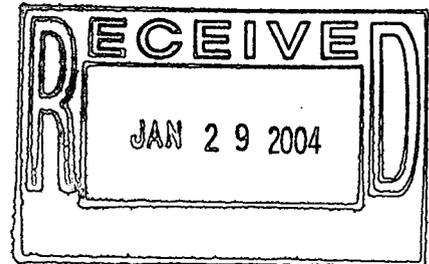


# Calendar Year 2002

## Well Abandonment and Replacement Program

### Work Plan Addendum for the Solar Evaporation Ponds

July 2002



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WATER PROGRAMS MANAGER NAME

/s/  
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22

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## **1.0 INTRODUCTION**

This Well Abandonment and Replacement Program Work Plan Addendum is an attachment to the Well Abandonment and Replacement Program Work Plan (WARP Work Plan). It describes specific WARP activities to be performed at and around the Solar Evaporation Ponds (SEPs) in calendar year 2002 (CY02). Other WARP activities will also be performed in 2002, as documented in a separate WARP Work Plan Addendum (document number WARP-02.1-WPA) addressing the western Buffer Zone/West Spray Field, 903 Pad, and other areas.

This Work Plan Addendum describes well abandonments, installations, and groundwater monitoring activities that shall be performed in CY02 in support of closure activities conducted at and around the SEPs. These closure activities include plans to remove the berms.

Numerous wells are present in the vicinity of the SEPs. Many will eventually be abandoned, but the abandonment schedule is only being accelerated for selected wells. Wells installed within and immediately adjacent to the berms are in the way of the proposed closure activities, and shall be abandoned in advance of closure work. To the extent that it is possible, well installations and sampling shall also be performed in advance of closure activities.

Coordination with SEP closure personnel may be necessary, especially if WARP activities and closure activities proceed concurrently. If activities do coincide, the WARP Field Supervisor shall establish and maintain contact with the ER Lead for SEP closure. WARP activities shall be scheduled so as to avoid areas in which closure activities are being conducted. Scheduling WARP activities to precede closure activities in an area will also be important so that wells that would be in the way of closure work can be abandoned in advance of that work.

Section 2 of this Work Plan Addendum identifies the wells to be abandoned. Section 3 defines pre-abandonment sampling to be performed prior to initiation of abandonment activities. Section 4 describes well installations and Section 5 outlines the groundwater monitoring network and sampling requirements.

Personnel engaging in WARP activities shall comply with the WARP Work Plan and the Health and Safety Plan for the Groundwater Monitoring Program (HASP), as well as other Site and task-specific procedures and requirements that apply. The appropriate notifications and authorizations shall be obtained prior to beginning fieldwork in an area, as discussed in the WARP Work Plan. If access restrictions (such as Radiological Work Permit requirements) apply to these activities, they shall be defined in the Soil Disturbance Permit for the well abandonments and installations. Wastes shall be handled according to the WARP Work Plan, applicable Soil Disturbance Permit, and other relevant waste control requirements.

While performing the activities described in this WARP Work Plan Addendum, worker safety and quality of work product shall be maintained. Safety is addressed in the HASP. Quality is addressed in the WARP Work Plan and supporting documents, including the Standard Operating Procedures (SOPs) referenced therein. Tools, materials, and supplies used for the project shall be new and/or freshly decontaminated, as appropriate, in accordance with the pertinent SOPs.

Project organization for CY02 WARP activities is defined in the WARP Work Plan. Work areas are shown in Figures contained within this WARP Addendum. Figure 1 presents the locations of the proposed SEP well abandonments and well installations.

## 2.0 SOLAR EVAPORATION POND WELL ABANDONMENTS

This WARP Addendum will identify wells in the immediate vicinity of the SEPs that need to be abandoned to make way for closure activities. Wells farther from the SEPs will not be abandoned as part of this WARP Addendum.

Three wells located between the various SEPs, seven wells in the area surrounding the SEPs, and two well points will be abandoned. Table 1 lists all the wells and well points in this area that are proposed for abandonment, and Figure 1 shows their location on a map of the SEP area. Selected wells will be sampled prior to abandonment, as discussed in Section 3.

**Table 1 Solar Evaporation Pond Well Abandonments**

Well	Casing TD	Casing ID/Material	Screened Interval	Location and Rationale for Abandonment
41693	18.0	1" PVC	6.0-16.0	Between ponds; in the way of closure
P209089	27.2	4" PVC	16.5-26.0	Between ponds; in the way of closure
43993	18.0	1" PVC	6.0-16.0	Between ponds; in the way of closure
43893	16.0	1" PVC	9.0-14.0	South of pond; in the way of closure
P209489	36.3	4" PVC	15.5-35.0	North of pond; in the way of closure
23795*	28.0	UNK	23.0-28.0	North of pond; unneeded temporary well point
05093	12.5	2" PVC	3.5-10.5	East of pond; in the way of closure
2786**	133.0	2" SS	128.5-133.0	East of pond; in the way of closure
05393	24.1	2" PVC	12.1-22.1	East of pond; in the way of closure
05193	13.4	2" PVC	4.4-11.4	East of pond; in the way of closure
26095*	8.0	UNK	3.0-8.0	South of pond; unneeded temporary well point
3887	9.5	2" SS	3.5-9.3	South of pond; in the way of closure

All depths are in feet below ground surface

TD = total depth

ID = inside diameter (inches)

UNK = unknown; expected to be quarter-inch to eighth-inch tubing

SS = stainless steel

\* = well point

\*\* = LHSU well; all other wells and well points in the above Table are screened in the UHSU

All Upper Hydrostratigraphic Unit (UHSU) and Lower Hydrostratigraphic Unit (LHSU) monitoring wells identified in Table 1, but not temporary well points, will be abandoned in place. This type of abandonment is acceptable and meets the well abandonment specifications of the Office of the State Engineer of the State of Colorado, because documentation on well construction is adequate and indicates the annular space was properly sealed when the wells were installed.

All well points (small-diameter tubing) identified in Table 1 will be completely removed. Because these well points were intended to be temporary, they are poorly marked and poorly protected. They will typically be protected and marked by a short length of 3/4-inch to 1-inch PVC casing that was inserted into the borehole a short distance (generally a couple of inches). As a result, locating these features may be difficult. The crew shall exert all reasonable efforts to locate each well point and remove it. If unable to locate a well point, the crew shall inform the Field Supervisor, who shall meet with the WARP Project Manager to discuss the missing well point(s). If a well point cannot be located, it will be necessary to forego formal abandonment of that feature as it may have been removed, destroyed, or buried in prior years by the various SEP cleanup activities.

### 3.0 SAMPLING OF WELLS TO BE ABANDONED

Attempts shall be made to collect selected samples from wells scheduled for abandonment. None of the temporary well points will be sampled. Table 2 identifies wells to be sampled and the analytical requirements for each. Sample priority is in the order listed (left to right). Sampling shall be performed in accordance with RMRS/OPS-PRO.113, Groundwater Sampling, or its successor.

**Table 2 Solar Evaporation Pond: Samples to be Collected from Wells to be Abandoned**

Well	VOCs	U*	Nitrate	Metals*	Tritium	Pu/Am/Np
41693	X	X	X	X	X	X
P209089		X				X
43993	X	X	X	X	X	X
43893	X	X	X	X	X	X
P209489						
23795						
05093					X	
2786						
05393		X	X	X	X	X
05193					X	
26095						
3887		X		X		X

\* Field filtered.

X Collect indicated sample.

Wells that have no sampling requirements indicated shall not be sampled.

4

#### 4.0 WELL INSTALLATIONS

Five wells, identified as 79102 through 79502, shall be installed to support groundwater monitoring of SEP closure as described in Section 5. These wells will be installed using hollow-stem auger drilling methods, and will be constructed of 2" diameter PVC well casing and screen, and annular materials as specified in PRO-1859-WELL-118. If the drill rig cannot safely access a selected location, that well may be installed using a Geoprobe® and the well components will be reduced accordingly (typically, 1" diameter PVC). Figure 1 shows the locations of the proposed well installations; these locations are subject to adjustment during the borehole clearing and well siting process. (The reason 79102 is being installed is because adjacent well 54494 is too shallow and is generally dry. The new well will be deeper.)

Water level data from the 2<sup>nd</sup> and 4<sup>th</sup> quarters of 2001 indicate saturated materials can be anticipated at depths of 10 to 15 feet below ground surface (bgs) on top of the terrace in the general area of the SEPs, and 10 to 25 feet bgs on the hillside north of the SEPs. Previous investigations have indicated most of the groundwater contamination from the SEPs is present within groundwater in the weathered bedrock portion of the UHSU. Wells will therefore be installed so as to screen the weathered bedrock and deeper alluvium. However, in some areas the bedrock contact is very shallow (e.g., 0.5 to 1 foot bgs); in such cases the screen will extend to no shallower than 5 feet bgs and the filter pack to no shallower than 4.5 feet bgs, with a bentonite seal extending from the top of filter pack to the base of the well protection assembly. Wells will be installed in accordance with PRO-1859-WELL-118, Monitoring Well Installation, and will include a 2 foot sediment sump. Depending on the actual well locations with respect to roadways, and SEP/Site Closure considerations, all wells may include aboveground or flush-mount surface protection.

Table 3 defines general well designs. The screen interval may be increased to include bedrock sandstone if it is intercepted, or decreased to exclude unweathered bedrock claystone if it is present at a depth shallower than the estimated total depth. If five feet of unweathered bedrock is recovered as a borehole is advanced, drilling at that location shall stop; the unweathered bedrock will be backfilled with bentonite chips or pellets (not of the "time release" variety) to leave only enough room in this interval for the well sump.

**Table 3 SEP Well Installations: Proposed Well Designs**

Design Element	Well 79102	Well 79202	Well 79302	Well 79402	79502
General location	North (downgradient) of Pond 207C, next to well 54494	North (downgradient) of Pond 207A	North (downgradient) of Pond 207B(N)	East (downgradient) of Pond 207B(N)	Southeast (downgradient) of Pond 207B(S)
Approx. bedrock contact	5'	5'	5'	10'	10'
Est. total depth	33' (may be deeper if sandstone is present)	33' (may be deeper if sandstone is present)	33' (may be deeper if sandstone is present)	22' (may be deeper if sandstone is present)	22' (may be deeper if sandstone is present)
Collect and log core	Over entire depth				
Top of screen	6'	6'	6'	10'	10'
Top of sand	5'	5'	5'	8.5'	8.5'
Seal	Bentonite pellets from top of filter pack to base of concrete well pad	Bentonite pellets from top of filter pack to base of concrete well pad	Bentonite pellets from top of filter pack to base of concrete well pad	Bentonite pellets from top of filter pack to base of concrete well pad	Bentonite pellets from top of filter pack to base of concrete well pad

Protective assemblies for the seven downgradient SEP groundwater monitoring wells shown in Figure 1 (those located north and east of the ponds), whether aboveground or flush-mount, should be painted a fluorescent color. This will enhance their identification and visibility, and thereby help to protect them from accidental damage (e.g., by contact with earth moving equipment). For new wells, this shall be performed in advance of installation. Performing this activity prior to installing the protective assemblies will prevent VOC contamination of the well via the paint. At the preexisting wells, extreme care shall be taken so as to minimize the risks of VOC contamination via the paint: paint shall only be applied when there is a breeze to drive off fumes, but no threat of rain that might transport paint and VOCs into the soil; all well openings (including weep holes) shall be sealed prior to applying paint; and components shall not be painted excessively such that the paint runs into the soil.

b

## 5.0 SOLAR EVAPORATION POND GROUNDWATER MONITORING

The SEPs were used from 1953 to 1986 to store and evaporate radioactive process wastes and neutralized acidic wastes containing high levels of nitrates and aluminum hydroxide. The earliest ponds were unlined and were located where the westernmost pond (Pond 207C) and part of the Building 779 foundation currently reside. Those ponds were later replaced with the current set of lined ponds. However, problems were repeatedly experienced with the SEPs, such as cracks in the liners, the need to reline ponds, etc. As a result of the historical purpose of and problems with the SEPs, a plume of contaminated groundwater exists in this area. The most obvious and typical contaminants are uranium and nitrates.

This Section defines the groundwater sampling that will constitute monitoring for closure activities conducted at the SEP area. Specific monitoring wells are identified, as are the analytes to be collected from these wells.

Nine wells will be used to monitor the groundwater around the SEPs. These wells will monitor the quality of the groundwater and track any impacts to groundwater that may result from the SEPs and associated closure activities. This groundwater monitoring network will include two upgradient wells and seven downgradient wells; four of the wells are existing and five will be installed as part of this Work Plan Addendum. The nine wells are identified below in Table 4 and shown on Figure 1.

**Table 4 Groundwater Monitoring of Solar Evaporation Pond Closure**

Well	Status	Location
79102	New downgradient	North of westernmost pond (Pond 207C)
79202	New downgradient	North of central pond (Pond 207A)
P208989	Existing downgradient	North of central pond (Pond 207A)
79302	New downgradient	North of northeastern pond (Pond 207B[N])
79402	New downgradient	East of northeastern pond (Pond 207B[N])
P207989	Existing downgradient	East of middle eastern pond (Pond 207B[M])
79502	New downgradient	Southeast of southeastern pond (Pond 207B[S])
02500	Existing upgradient	West of central pond (Pond 207A)
00500	Existing upgradient	Southwest of westernmost pond (Pond 207C)

Groundwater flow in the area of the SEPs is predominantly from the west and southwest towards the northeast. Water level data from monitoring wells in the vicinity of the SEPs show groundwater in the northern portion of the SEP area has a strong northward flow component, while groundwater in the southern portion of the area has a more easterly flow direction. These data also indicate groundwater in the extreme southern/southeastern portion of the SEP area flows to the east/southeast.

Four monitoring wells will be located on the north side of the SEPs to monitor flow in that direction, and three will be located on the east side (Figure 1). One of the wells on the eastern side is positioned to monitor southeasterly flow. Two wells currently used to monitor Building 779 and Building 776/777 D&D will also be used to monitor upgradient SEP groundwater.

After installation, each well shall be developed in accordance with RMRS/OPS-PRO.106, Well Development. Existing downgradient wells shall be redeveloped to the same standards. The upgradient wells need not be redeveloped. (The reason for redeveloping the preexisting downgradient wells but not the upgradient wells is that the former have not been in the routine groundwater program for many years, while the latter have been in the program since they were installed. The initial development and consistent sampling of the upgradient wells has acted to keep them relatively free of sediment, but that cannot be said for the preexisting downgradient wells.)

If possible, groundwater sampling of new monitoring wells shall be performed in advance of closure activities. If this cannot be done, sampling shall take place as soon as possible, and the timing of each well's sampling with respect to closure activities shall be documented on the appropriate forms from RMRS/OPS-PRO.113,

7

Groundwater Sampling (these forms include the Field Activity Daily Log and the appropriate Groundwater Sample Collection Log).

Analytical requirements for these wells are defined in Table 5; sampling priority is in the order listed. Sample collection, handling, preservation, shipping, and other requirements are as stated in the WARP Work Plan and referenced SOPs.

**Table 5 Analytical Suite for Solar Evaporation Pond Monitoring Wells**

Analyte	Method	Comments
Radiation Screen	Gross alpha/beta	Only collected and analyzed if Radiological Engineering requires this data
VOCs	SW-846 Method 8260	
Nitrate/nitrite as N	EPA 353.1 or 353.2	
U isotopes*	Alpha spectrometry	U-233/234, -235, -238
Pu/Am/Np**	Alpha spectrometry	Pu-239/240, Am-241, Np-237
Metals*	EPA 600	
Tritium	Liquid scintillation count	

\* Field filtered.

\*\* Neptunium may be eliminated from the analytical suite if the first two rounds of samples do not show elevated concentrations. This determination shall be made by the Water Programs Manager.

The nine monitoring wells supporting SEP closure shall be sampled on a semiannual basis (twice each year) and water levels shall be measured quarterly. Long-term groundwater monitoring requirements shall be defined in the Integrated Monitoring Plan (IMP). The wells will be assigned a well class through the IMP process. Coordination with SEP closure personnel may be required in order to access the wells in 2002 and possibly later, until those activities have concluded.

Sampling results shall be included and discussed in future Annual RFCA Groundwater Monitoring Reports.

8

