TABLES

SECTION 1.0

SECTION 3.0

SECTION 4.0

SECTION 5.0

SECTION 6.0

SECTION 7.0

SECTION 10.0

Table 1-1 Summary of SUA-1548 Amendments Since Last Renewal

Amendment No.	Date Issued	Topics Addressed
0	May 8, 2001	License renewed based on November 15, 1999 license renewal submittal and supplemental information provided by letter dated September 27, 2000.
1	September 27, 2001	Changed surety from $8.1M to $8.7M to reflect: (1) construction of new and expansion of existing buildings; (2) additional surface disturbance associated with wellfield construction; and (3) groundwater reclamation during an additional year of commercial mining operations. License Condition (LC) 9.5 was amended to reflect change. All other conditions remain the same.
2	March 5, 2002	This amendment revised Chapter 6 of the license renewal submittal to allow the use of the wellfield horizontal flair factors. Factors contained in Table 7.1 of the amended license renewal submittal are acceptable, unless additional information from the restoration of the first wellfield show RAMC analysis to be incorrect. This amendment accepted the wellfield #1 restoration plan and LC 10.8 was changed pursuant to the technical evaluation report to allow wellfield restoration. LC 12.3 was changed to allow the licensee to add wellfield restorations to Appendix L of the renewal submittal through the SERP, but will require submittal of wellfield completion reports of each wellfield for NRC review and approval. An administrative change to LC 9.4 to reflect the changes made to the new approved Change, Test, and Experiment LC.
3	July 11, 2002	This amendment addressed transfer of control of SR from RAMC to PRI. Administrative changes for LC 1, 2, 9.1, 9.5, 9.6 were made. An addition of LC 9.12 which requires that the closing and transfer of site records occur before Amendment 3 is effective was added. LC 9.5 was amended to reflect an upgrade in the 2002 surety amount from $8.7M to $12.2M pending approval from the state of Wyoming. Administrative changes were made to LC 9.4(b)(i), (ii), (iii) and (iv) indicating the addition of the word "appreciable" before the word "increase".
4	September 3, 2002	Administrative changes to correct errors in Amendment 3 were made. Specifically, in LC 9.1 and 9.6, RAMC was removed. In LC 9.5, RAMC was changed to PRI. An Irrevocable Letter of Credit from the BNY PARIBAS, New York Agency in the amount of $12.2M was added to LC 9.5.
5	August 18, 2003	Amendment 5 reflects the consolidation, establishing SR as the main uranium processing facility, with the HUP, RU and NB facilities to be operated as satellite facilities. LC 9.1 was modified to indicate that the SR-HUP will be the primary processing facility, while the HUP, RU and NB facilities will be operated as satellite facilities. LC 9.3 was modified to include the additions of the HUP, RU and NB Facilities on the SR license. LC 9.5 was modified to reflect that in addition to the currently approved surety instrument in the amount of $14.5M for SR, PRI added $21.3M for the HUP, $0.1M for RU, $0.06M for NB to the existing surety instrument, in favor of the State of Wyoming. Section 10 was modified to indicate that LC 10.1 applies to the SR-HUP; LC 10.2 applies to the RU and NB facilities. Additionally, LC 10.2 indicates that the RU and NB facilities cannot become operational until new operating plans are submitted and approved by the NRC. LC 10.1.2c was modified to require PRI to notify the NRC prior to restarting the Highland dryer. LC 10.1.3 was updated to incorporate the guidance in NUREG-1569 concerning well integrity testing. LC 10.1.6 was modified to include requirements for SR-HUP radium settling ponds and purge reservoirs. LC 10.1 was modified to include requirements for disposal of liquid effluents for SR-HUP. Renewal submittal, which allows PRI's SERP to add additional wellfields for restoration.
6	January 29,2004	LC 10.1.9 was modified to incorporate the license renewal submittal requirements from Chapters 5 and 6 of PRI's approved license This amendment incorporates the GH Satellite facility into SUA-1548. An EA and SER were produced by the NRC. SUA-1548 amendments include: LC 9.1: Revised, see SER LC 9.3: Revised, see SER LC 9.5: Revised, see SER LC 9.6: Revised, see SER LC 9.9: Revised, see SER Section 10.3 GH added LC 10.3.1: new condition, see SER LC 10.3.2: new condition, see SER LC 10.3.3: new condition, see SER

Table 1-1 Summary of SUA-1548 Amendments Since Last Renewal

Amendment No.	Date Issued	Topics Addressed
7	March 22, 2004	LC 9.5 was revised to indicate that PRI shall continuously maintain approved surety instruments in the amount of no less than $104,600 for RU and $78,800 for NB. All other LC conditions remain the same.
8	July 22, 2004	LC 9.5 was amended by revising LC 9.5 to indicate that PRI shall continuously maintain approved surety instruments in the amount of no less than $15,695,700 for the SR facility and $22,402,000 for the Highlands facility. All other conditions of the license shall remain the same.
9	December 3, 2004	LC 10.2.2 was revised to: (1) reduce inspection frequency at Ruth facility to quarterly; (2) eliminate inspection requirement for NB; and (3) indicate that the leak detection system check at the RU evaporation ponds consists of visual inspection of the pond liners, embankment, and fences.
10	August 10, 2005	LC 9.5 was revised to indicate that PRI shall continuously maintain approved surety instruments in the amount of no less than $16,629,800 for the SR facility and $21,786,700 for the HUP.
11	January 31, 2007	License was amended to allow operation of RR as a satellite facility. The NRC prepared an ER and SER for this amendment. LC 9.1, 9.3, 9.5, 9.6 and 9.9 were revised to reflect this change, refer to SER Section 8. New license conditions LC 9.13, 10.4 and 10.4.1 were added, as follows: LC 9.13: Before engaging in any uranium recovery operations in an undeveloped area, the licensee shall submit a complete evaluation of the area's baseline radiological characteristics for the NRC's review and approval. LC 10.4: RR added LC 10.4.1: Processing operations for the RR shall not exceed an average monthly flow rate of 4,500 gallons per minute, exclusive of restoration flow.
12	January 10,2008	License was amended to allow construction and operation of the in-situ leach satellite SR-2. The NRC prepared an ER and SER for this amendment. LC 9.3 and 9.3 were revised to reflect this change: LC 9.3 was revised to include PRI's SR-2 operational-related submittals of October 11, 2006 and December 29, 2006. LC 9.9 was revised by adding a condition related to Class III Cultural Resource inventoried sites located in the southwestern portion of the SR-HUP.
13	August 18, 2008	License was amended to reflect changes to Chapter 9, "Management Organization and Administrative Procedures" of the license renewal submittal submitted by PRI in response to a NRC issued NOV. A TER was prepared by the NRC. The following LCs were affected: LC 9.2 was revised to reflect the correct mailing address for submission of written notices and reports. LC 9.3 was revised to include PRI's submittal dated March 20, 2008.
14	March 12, 2009	License was amended to update surety for the GH Facility to include activities tentatively planned for 2009, including installation of the MU "1" monitoring well ring, installation of the interior monitoring wells within MU "1", upgrades to site infrastructure, and exploration drilling to further delineate the ore body. LC 9.5 was revised to increase the GH surety from $986,000 to $4,054,800.
15	September 15, 2009	License was amended to allow for processing of third party ion exchange resin from other NRC licensed facilities in Wyoming at SR-HUP. NRC prepared EA that documents NRC's environmental review of proposed action. LC 10.1.12 was added to allow SR-HUP to receive and process up to 365 toll shipments of loaded ion exchange resin at the SR CPP each calendar year.
16	March 11, 2010	Surety update for GH, RU and NB Satellite Facilities and the addition of Deep Disposal Well SR-HUP No.10.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
12-Jan-00	28	Test to Assess Effectiveness of Increased Airflow at the Packaging Enclosure Scrubber	Increasing airflow is expected to potentially remove more uranium dust from the area, and should reduce worker exposure. The test is to be conducted by fully opening the impinger on the scrubber as part of the semi-annual stack test, assessing emissions and scrubber performance under current conditions and then with the impinger fully opened.	The SERP concluded that the relatively minor and short duration of the test fit the intent of the license conditions, but a license condition that specifically prescribes the scrubber differential pressure will not be met. NRC guidance was sought. NRC indicated that the test was allowable by license condition intent for such tests of short duration. SERP approved the test. If the test shows that the airflow should be changed a license amendment will be prepared before permanent change will be instituted. The test was performed, but a decision was made not to implement this change.
24-Feb-00	29	Revision to Appendix A- "Respiratory Protection Program", of the Operations Plan	The Respiratory Protection Program for HUP was substantially revised in January 2000 in order that new NRC requirements (10 CFR 20, Subpart H) could be included. The program was revised in accordance with NRC Regulatory Guide 8.15 "Acceptable Programs for Respiratory Protection". Additional	The SERP concluded that the proposed changes, which were necessitated by amended NRC regulations, will not result in adverse safety of environmental impacts. The revised Respiratory Protection Program is attached to the SERP memo.
25-Sep-00	30	Installation of Reverse Osmosis (RO) Permeate De-Carbonator Tank at Satellite #1	In the process of ground water restoration in A and B-Wellfields, significant quantities of dissolved CO_2 have been detected in the production zone after leaching is complete. This keeps the pH of the ground water slightly acidic, which allows dissolution of calcite and corresponding increase of bicarbonate. Bicarbonate continues to complex with oxidized uranium. Decarbonation will increase ground water pH and will assist with lowering uranium concentrations. Previous test at Satellite #2 under SERP No. 24 showed 90 percent CO_2 removal, directly resulting in significant reduction of bicarbonate in ground water.	The SERP considered radon off-gassing with CO_2 as a radiation protection concern. The de-carbonator tank will be equipped with continuously operating forced air ventilation that exhausts to atmosphere. Radon monitoring will be conducted to ensure that no unanticipated conditions develop which could result in unacceptable occupational exposure. SOP for RO operation will be revised to include the de-carbonator tank. NRC was consulted and it was confirmed that the installation of a de-carbonator was in conformance with license conditions. The proposed change was approved.
16-Oct-00	31	Organizational Realignment	Uranium production from HUP will be reduced from the current (2000) level, Casper office will be closed, and several departments will be reorganized. Several positions including the Manager of Environmental and Regulatory Affairs/ Corporate Radiation Safety Officer (CRSO) were eliminated. A new position, titled Manager-Health, Safety and Environmental affairs was desired, replacing the existing Environmental Superintendent and including the responsibilities of the CRSO. The new position also retains the responsibilities of the Site RSO, and will directly supervise the Safety Superintendent.	The SERP concluded that the proposed organizational realignment is consistent with NRC License SUA-1511 and Regulatory Guide 8.31 and will not compromise the effectiveness of the ALARA and environmental compliance programs. Revised pages to reflect the organizational realignment changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2000.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
11-Jan-01	32	Organizational Realignment and Minor Change to Operating Procedures	The position of General Manager of Operations for HUP has been eliminated with the responsibilities being assumed by the Senior vice President of Operations. The position of General Manager, Wellfields has been reassigned to part-time status. The Wellfield Operations Superintendent will now report directly to the Senior Vice President of Operations. The Wellfield Operations Superintendent will assume the remaining responsibilities formally supervised by the General Manager, Wellfields.	The SERP concluded that the proposed organizational realignment is consistent with NRC License SUA-1511 and Regulatory Guide 8.31 and will not compromise the effectiveness of the ALARA and environmental compliance programs Revised pages to reflect the organizational realignment changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2001.
14-Feb-01	33	Change of Dosimetry Technology	Change to dosimetry technology at HUP is needed due to a merger of the current dosimetry vendor Eberline Dosimetry and Landauer Inc. New dosimeters based on thermoluminescence (TLD badge) for monitoring external exposure will be replaced by optically stimulated luminescence (OSL) technology. The license renewal submittal refers specifically to TLD technology, thus a change to the license renewal submittal is necessary.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. It was determined that the OSL dosimeters are more than adequate to monitor personnel gamma exposures and their use conforms with NRC requirements and ALARA principles. Revised pages to reflect the change in dosimetry are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2001.
28-Mar-01	34	Yellowcake Storage	Evaluate storage of drummed yellowcake at the South Warehouse portion of the HUP CPF in addition to the existing Yellowcake Warehouse. Due to market conditions additional storage for 1 to 1.5 million pounds is needed. The South Warehouse is approximately 250 feet from the Yellowcake Warehouse and is of similar construction. A new SOP is needed for transfer of yellowcake to the South Warehouse.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The SERP identified and addressed the following: safe transport of drummed yellowcake to the South Warehouse; proper posting of the building; and monitoring of radiation levels and conditions in the building. A new SOP was prepared. It was determined that this change does not conflict with NRC regulations, the license renewal submittal, EA or SER. The change was approved.
28-Mar-01	35	Organizational Realignment and Minor Change to Operating Procedures	Consolidation of the Environmental and Safety Department, eliminating the position of Safety Superintendent. The non-radiation related health and safety programs formerly administered in part by the Safety Superintendent will be administered by the personnel in the Safety and Environmental Department, including the Manager-Health, Safety and Environmental Affairs and the Radiation Safety Technician.	The proposed change was deemed necessary to meet the depressed uranium market conditions, planned future operations, and to permit more efficient utilization of staff responsible for environmental and safety programs at HUP. The planned reduction in future operations also reduces the number of contractors at the site, and contributes to the need to consolidate radiological and non-radiological components of the health and safety function. Revised pages to reflect the organizational realignment changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2001.
2-May-01	36	Commencement of Production Activities in the D-Extension Wellfield	Uranium will be recovered from the 40-Sand production zone, same as utilized by the D-Wellfield. The D-Extension will consist of 3 headerhouses. A hydrologic test report was submitted to WDEQ. WDEQ concerns were addressed through installation of a new well and a "mini" pump test to collect additional data.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The SERP determined that the D-Extension Wellfield hydrologic information conforms to the license renewal submittal, specifically Section 7 of the Operations Plan. WDEQ approved the hydrologic test results and UCL's. The SERP approves the change to allow commencement of production operations in the D-Extension Wellfield.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
20-Aug-01	37	Change to Operation Monitoring Plan Used During Ground Water Restoration	A, B, and C-Wellfields are in restoration. A change is proposed to the Monitoring Plan eliminating the monitoring of MP-Wells on an annual frequency. A baseline set would establish "end of mining" conditions and the MP wells would be monitored every 60 days for conductivity, chloride and uranium. The purposes for this change are to reduce the cost of monitoring which has limited usefulness in the ground water restoration program, and to allow limited manpower resources to be used for more significant activities needed for the ground water restoration program.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The SERP determined, based on 8-9 years of restoration monitoring that discontinuation of annual monitoring of the MP wells would not compromise PRI's ability to assess the progress of restoration activities or demonstrate that Best Practicable Technology has been utilized. WDEQ-LQD approved this change to WDEQ Permit No. 603. It was determined that the proposed change does not conflict with NRC regulations, License SUA-1511, the EA or the SER. The change was approved.
22-Aug-01	38	Test to Evaluate Bioremediation for Ground Water Restoration	A small-scale test of bioremediation for ground water restoration is proposed for the B-Wellfield, in the B-16 pattern area. Bench tests indicate that addition of nutrients will enhance the population and activity of naturally occurring bacteria. Bacterial activity could reduce dissolved metal compounds, principally uranium and selenium. The proposed test includes decarbonation and addition of alcohol and molasses. Production wells will be sampled every three days for uranium concentration. Flow rates and pressures at injection wells will also be monitored to indicate changes in formation permeability.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The proposed test will not result in conditions which significantly differ from the existing license basis because: NRC regulations do not preclude addition of non-toxic nutrients to the production zone; limited addition of non-toxic nutrients do not conflict with U.S. Environmental Protection Agency (EPA) Underground Injection Control (UIC) Program requirements associated with in situ leaching (ISL) mining; and the proposed test will enhance naturally occurring bacterial populations, very similar to conditions which currently occur, more slowly, in the production zone and have been previously evaluated as part of the existing license basis. The bioremediation test was approved by the SERP.
7-Nov-01	39	Organizational Realignment	Personnel changes and future operations at the highland Uranium Project result in elimination of the position of Manager, Plant and Restoration. The position of General Manager Operations has been reinstated. The General Manager Operations is responsible for managing the day-to-day operations of the project and reports to the Senior Vice President Operations.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 14, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The proposed change to reporting structure does not conflict with NRC requirements. Revised pages to reflect the organizational realignment are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2001.
3-Dec-01	40	Revised UCL's for Well DMU-6.	DMU-6 monitors the underlying zone at the D-extension Wellfield. Operational and monitoring data were inconsistent with baseline values and UCL's. Inconsistency is believed to result from poor well development prior to baseline sampling. Proposed UCL's were developed from 11 sampling results through September 2001. Proposed UCL's will ensure adequate detection in the event of an excursion.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 15, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. Minor change to UCL's for Well DMU-6 conforms to the requirements in the License Submittal and does not conflict with NRC regulations. WDEQ also approved the minor revision to UCL's. The change was approved.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
30-Aug-02	41	Administration and Operational; Changes Relative to the Acquisition of the SR	Acquisition of SR resulted in combining the work forces of both operations, moving all administrative and Main Office functions to SR and conduct all resin and yellowcake processing for both facilities at the SR Central Processing Plant. The CPP at HUP will be placed on "Stand-By", until market condition recover, allowing uranium production from other PRI properties. HUP CPF will also be maintained as a back-up to be used in case of an operational upset. A 3.5-mile gravel road will be constructed to facilitate operational changes.	In addition to administrative and operational changes, discussion with NRC will lead to the combination of licenses SUA-1511 (HUP and SUA-1548 (SR) as a single license, SUA-1548. This change is considered to be mutually beneficial to PRI and NRC. A 4 to 6-month transition period was proposed to: move administrative functions from HUP to SR Main Office; transport resin from HUP satellites to SR for processing; preparation of the HUP CPF for "Stand-by" status; and construction of the gravel road between SR and HUP Satellite Plant #. 3. Additional details for each phase of the changes were provided in the SERP memo. All administrative and operational changes were approved.
30-Sep-02	42	Discontinuation of Use of Satellite Plant #1 Radium Settling Basins	Radium Settling Basins were designed to settle out radium-barium-sulfate solids from the wellfield purge water treatment system at Satellite Plant #1. However, filter presses were installed to remove treatment solids at Satellite Plant #1. The basins were retained as secondary "polishing" treatment prior to discharge to the Purge Storage Reservoir or to the pivot irrigator. The treatment target is to treat the water to less than 30 picoCurries per liter (pCi/L) radium-226 to meet NRC's unrestricted release standard. Due to maintenance issues with pumps and piping at the Radium Settling Basins, the discontinuation of their use was evaluated.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 15, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. SERP evaluation determined the following: use of filter presses for removal of residual solids is sufficient to meet regulatory standards; revision to the License Submittal pages that cover the radium settling basins will be made; monitoring activities at the basins can cease when the ponds are drained; basins will be considered for decommissioning and reclamation in 2003; and the fence around the basins must be maintained. Revised pages to reflect the discontinuation of use of Sat. No. 1 Radium Settling Basins are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2002.
3-Oct-02	43	Discontinuation of Routine Monitoring Activities Associated with "Stand-By" Status of HUP Central Processing Facility	All uranium processing related activities at the HUP Central Processing Facility (CPF) were completed on September 20, 2002. Most cleanup and maintenance activities required for CPF "Stand-By" status were completed by September 30. Cleanup and winterizations should be complete by October 31. Routine monitoring associated with yellowcake processing will no longer be necessary. Specific items for discontinuation include: daily inspection of the CPF including alpha meter performance checks; weekly activities including clean area alpha survey, alpha meter reliability check, gamma meter performance check and respirator smear surveys; monthly and quarterly activities including process area alpha and gamma surveys and radon grab samples; continuous monitoring of particulate uranium at the Dryer and Packaging Rooms; and monitoring activities at eh "Overlook" environmental monitoring site, including air particulate, passive radon and gamma monitoring.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 15, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. The SERP concluded that none of the monitoring activities are necessary in "Stand-By" mode for the CPF because yellowcake processing activities will not occur, which in turn makes it unnecessary to assess radiological doses to workers, the public, or the environment. NRC concurrence was sought and confirmed. Monthly monitoring will begin, consistent with other PRI "Stand-By" facilities. If yellowcake processing is restarted at the CPF the Overlook monitoring station will be started 3 months prior. The alpha survey station will be maintained at the main entrance for use by anyone with reason to enter the Process Area. Continuous monitoring of the annulus pressure at the Waste Disposal Well will continue, regardless of whether the well is in use.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
16-Dec-02	44	Installation and Operation of a Pilot Selenium Removal Circuit at Satellite Plant #3	A pilot plant is proposed for Satellite Plant #3 for selenium removal from purge water. Treatment will consist of gravity flow through sand, gravel, and granular iron. Selenium is expected to precipitate and remain in the sand/gravel/iron bed. Treated water will be disposed with the normal treated purge water. Long-term benefit would be decreased concentration of selenium for land application disposal.	SERP evaluation considered CFR Title 10, License SUA-1511 amendment 15, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. Installation of a selenium removal pilot plant will not result in a condition that differs from the existing license requirements because neither WDEQ nor NRC regulations preclude the removal of selenium from water prior to irrigation; and if successful, the selenium concentration in land applied water could be reduced to 0.005 ppm, enhancing environmental protection. A decision was made not to implement this change.
30-Jan-03	45	Installation and Operation of a De-Carbonator Circuit at Satellite Plant #2	Wellfield-C restoration is being affected by dissolved CO_2 in the production zone. pH is slightly acidic which allows for continued dissolution of calcite, increasing the bicarbonate concentration. Elevated bicarbonate concentration causes continued complexation with trace quantity of uranium remaining in the production zone. The decarbonator will remove CO_2, increasing the pH of the restored ground water and lowering the uranium concentration.	The addition of a de-carbonator at Satellite #2 is consistent with a previous SERP (No. 30) for Satellite Plant #1, and is a minor change at Satellite Plant #2. SERP evaluation considered CFR Title 10, License SUA-1511 amendment 15, EA for renewal of SUA-1511, and the SER for renewal of SUA-1511. NRC Headquarters confirmation was obtained. The SERP concluded that a license amendment was not needed and the addition of the Satellite Plant #2 de-carbonator does not conflict with any regulatory requirement.
24-Mar-03	46	SUA-1511 (HUP) SUA-1548 (SR) Organizational Realignment	The Safety Supervisor/Radiation Safety Officer terminated employment. The EHS staff reporting structure requires revision such that the RST's report directly to the Manager-Health, Safety and Environmental Affairs/Corporate Radiation Safety Officer.	The organizational realignments were found to be consistent with NRC Licenses SUA-1511 and SUA-1548 and Regulatory Guide 8.31, and should not compromise the effectiveness of the ALARA and environmental compliance programs. Revised pages to reflect the organizational realignment are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2003.
8-May-03	47	SUA-1511 (HUP) SUA-1548 (SR) Organizational Realignment	Manager-Health, Safety and Environmental Affairs/Corporate Radiation Safety Officer was placed on temporary disability leave. The Environmental Scientist has assumed the role of Acting Manager-Health, Safety and Environmental Affairs. A new Radiation Safety Officer has been brought on site. Onsite reporting structure is revised such that the Acting Manager-Health, Safety and Environmental Affairs reports directly to the General Manager of Uranium Operations.	The organizational realignments were found to be consistent with NRC Licenses SUA-1511 and SUA-1548 and Regulatory Guide 8.31, and should not compromise the effectiveness of the ALARA and environmental compliance programs. Appropriate pages of the SR and HUP license submittals were revised and provided as an attachment to the SERP memorandum. Revised pages to reflect the organizational realignment are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2003.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
8-Sep-03	1	Decommissioning Satellite Plant No. 1 Radium Settling Ponds	Planned activities for the decommissioning of two Satellite Plant No. 1 Radium Settling Ponds were assessed from a health and safety standpoint. The ponds were used to retain treated purge and restoration fluids prior to pumping to Purge Storage Reservoir No. 1 and subsequent irrigation at the land application facility. The ponds' clay liners and residual solids will be removed and disposed as byproduct material. The ponds were never actually used for their intended purpose to settle out barium chloride radium precipitate - instead filter presses were used at the Satellite Plant. The ponds received treated water with only small residuals of uranium.	Concerns identified and mitigated included airborne hazards to workers, sampling of material to determine adequacy of removal, contractor training, personal contamination control of contractors, contamination control of contractor equipment, and documentation of the extent of cleanup of the ponds. The SERP determined that the planned activities do not conflict with License Condition 9.4 and do not compromise any evaluation contained in the SER, EA or Technical Evaluation Reports. The planned decommissioning activities constitute ALARA and are consistent with activities previously conducted and reviewed by NRC. Not all of the material has been removed from the ponds. More material will have to be removed before the ponds can be reclaimed. This should take place in late 2011 or 2012.
17-Oct-03	2	EHS Department Organizational Changes	Current Manager-Health, Safety and Environmental Affairs/Corporate Radiation Safety Officer, W.F. Kearney returned from temporary disability and re-assumed the responsibilities of Radiation Safety Officer. Mr. Kearney's return also results in the Environmental Scientist position returning to previous responsibilities, reclassified as "Senior Environmental Scientist". The organizational structure is also revised for a new position of "Safety Supervisor". The Senior Environmental Specialist has been revised in title to "Environmental Coordinator" and a new position of Environmental Specialist is added.	The proposed organizational changes were found to be consistent with NRC License SUA-1548 and Regulatory Guide 8.31, and should not compromise the effectiveness of the ALARA and environmental compliance programs. Revised pages to reflect the EHS Department organizational changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2003.
26-Nov-03	3	EHS Department Organizational Change, Radiation Safety Officer	Jake Hagar was promoted from Radiation Safety Technician to Radiation Safety Officer. SERP reviewed his qualifications	Mr. Hagar's education, training and work experience were reviewed and found to be in conformance to requirements for promotion to the position of Radiation Safety Officer, meeting the requirements of license SUA-1548 and NRC Regulatory Guide 8.31. Revised pages to reflect the EHS Department organizational changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2003.
10-Dec-03	4	Expansion of Bioremediation Testing of B-Wellfield	PRI has reviewed the use of methanol as a carbon source for enhanced bioremediation. Other reductants are sodium sulfide or hydrogen sulfide, which are marginally effective and present greater safety concerns. The SERP considered the hazards of methanol flammability and toxicity.	Additional training and emergency procedures were recommended. The expansion of the proposed bioremediation test was found to be consistent with section 6.1.3.3 (Ground Water Treatment) of the License Submittal. WDEQ-Land Quality Division (LQD) approved the proposed test as a revision to Permit No. 603. Bioremediation will not alter the conclusions determined by NRC in the Final SER or the EA. SERP approved the bioremediation test as meeting license requirements.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
23-Apr-04	2004-1	Start-up of I-Wellfield	Review of hydrologic test document, baseline water quality data and monitoring wells Upper Control Limits (UCLs) prior to wellfield startup. SERP also conducted an operations/technical review, environmental/safety review and a compliance review.	The test document was reviewed against NRC License SUA-1548. The Environmental/Safety Review showed no increased environmental or safety risk from start-up of I-Wellfield. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
22-Jul-04	2004-2	Changes to SR General Well Sampling Methods, Highland Reporting Parameters, and New Access Database Implementation	The change in well sampling methods at SR included taking water level measurements for a cluster of wells and sampling the cluster on the same day, rather than taking level measurements for the entire field which resulted in sample collection several days removed from level measurements. Highland will change from reporting bicarbonate to alkalinity as a UCL. A new combined database was implemented.	SERP concluded that the reviewed changes would not require a License Amendment and does not conflict with any other regulatory requirement. Also these changes will not result in the degradation of any essential safety or environmental commitments in the License Renewal Submittal, EAs or current operating procedures.
30-Jul-04	2004-3	Revised UCLs for Well M-212	Self identified violation for two slight exceedances of the Excursion criteria at perimeter monitor well M-212 resulting in change to the alkalinity UCL.	There was no occurrence of excursion of mining fluids. This well has anomalous water quality, thus it's UCLs for alkalinity and conductivity are considerably lower than those of other wells. Historical data shows that the water quality has gradually come in line with that of other wells. No uranium was detected, proving no excursion of mining fluid. The UCLs were increased, consistent with other wells.
12-Oct-04	2004-5	Changes to the Radiation Safety Program	Due to PRI's acquisition of the operation, proposed changes include reduced frequency of monitoring requirements.	Changes included: Discontinue Designating the Pilot Building as a "Restricted Area"; Change Frequency of Airborne Uranium Monitoring at CPP Dryer Room; Change Frequency of Breathing Zone Samples for Dryer Operator. It was decided that the proposed changes would not require a License Amendment and does not conflict with any other regulatory requirement. The changes will not result in degradation of any essential safety or environmental commitments in the License Renewal Submittal or EAs. Changes were approved.
21-Dec-04	2004-6	Temporary Management Replacement for General Manager of Operations	Ralph Knode is leaving SR-HUP for temporary assignment in Kazakhstan (2 years). Chuck Foldenauer has been named to fulfill the duties of General Manager.	The newly appointed General Manager's qualifications were reviewed and approved as consistent with the license, and should not result in the degradation of any essential safety or environmental commitments in the License Renewal Submittal EAs or current operating procedures.
10-Mar-05	2005-1	Start-up of Mine Unit-15	Review of hydrologic test document, baseline water quality data, and planned mining activities prior to wellfield startup. SERP also conducted an operations/technical review, environmental/radiation safety/industrial safety review and a compliance review.	Injection and production operations through Headerhouse 15-1 are nearly ready. Required submittals to WDEQ-LQD have been made. The hydrologic test objectives were met. No increased environmental or safety risk result from start-up of Mine Unit-15. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary. Also commencement of production at MU-15 will not result in degradation of any essential safety or environmental commitments in the License Renewal Submittal, EA or current operating procedures.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
15-Jun-05	2005-2	EHS Department Staff Changes to the Manager - Health, Safety, and Environmental affairs, and appointment of Radiation Safety Officer	Precedent Manager of Health, Safety, and Environmental Affairs/Corporate Radiation Safety Officer terminated employment. Ken Milmine was appointed as Manager of Health, Safety and Environmental Affairs, and Tim McCullough was appointed as acting Radiation Safety Officer.	Candidates' qualifications were reviewed and approved as consistent with the license and Regulatory Guide 8.31, and should not compromise the effectiveness of ALARA or environmental compliance programs.
16-Jun-05	2005-3	Evaporation Pond Sludge Removal and Liner Replacement	Discuss changes to the evaporation ponds at the SR CPP area, including removal of sludge and relining with a new synthetic liner over the old synthetic liner.	Operations/Technical Review was conducted along with a Safety and Environmental Review. Reviewed against conditions in License Condition 9.4 as summarized in the License Requirements checklist. License amendment was not required.
28-Jul-05	2005-4	Reduction of Inspection Frequency at Satellite Plant No. 1	Facility inspection at Satellite Plant No.1 area are conducted daily. Satellite Plant No.1 and other associated facilities are not in operation. Activities will be very limited since mining and restoration activities are complete in this area. PRI is proposing to change to weekly inspections.	SERP concluded that reducing the inspection frequency at Satellite Plant No. 1 from daily to weekly is consistent with License and should not compromise the effectiveness of the ALARA and environmental compliance programs. Daily inspections will be required if Satellite No. 1 is in use.
1-Feb-06	2005-3A	Amendment - Evaporation Pond Sludge Removal	Discuss amendment of SERP 2005-3 to include use of a track hoe.	Operations/Technical Review was conducted along with a Safety and Environmental Review and Compliance Review. Use of track hoe was approved. License amendment was not required. Use of track hoe will not result in degradation of any essential safety or environmental commitments in the License Renewal Submittal, EAs or current operating procedures.
1-Feb-06	2005-5	Adding Mine Unit E, D and 1 to Restoration Plan	Review and approval of adding Mine Unit D, E, and 1 to the Restoration Plan when Operations is prepared to begin restoration activities.	Operations/Technical Review was conducted along with a Safety and Environmental Review. Addition of Mine Units to the Restoration Plan was approved. License amendment was not required. Changes to the Restoration Plan will not result in degradation of any essential safety or environmental commitments in the License Renewal Submittal, EAs or current operating procedures.
16-May-06	2006-3	EHS Department Staff changes of the Radiation Safety Officer	Arlene Crook was appointed Radiation Safety Officer, replacing Tim McCullough	Ms. Crook's qualifications were review and deemed to satisfy Regulatory Guide 8.31. A subsequent NRC Site Inspection resulted in a determination that this individual didn't meet License Condition 9.7 Requirements (refer to Attacment A-3 Table A-3-1 for NOV and NOV closure details).
16-May-06	2006-2	Start-up of J-Wellfield	Review of hydrologic test document, baseline water quality data and monitoring wells UCLs prior to wellfield startup. SERP also conducted an operations/technical review, environmental/radiation safety/industrial safety review and a compliance review.	Injection and production operations through Headerhouse J-3 are nearly ready. Required submittals to WDEQ-LQD have been made. The hydrologic test (pump test in June-July 2005) objectives were met. Data loggers were installed to monitor water levels in the overlying aquifer. No increased environmental or safety risk result from start-up of J-Wellfield. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
7-Jul-06	2006-1	Operation of a shredder to shred wellfield 11(e)2 byproduct waste prior to final off-site disposal	11(e)2 byproduct waste (mostly pipe) has been stored onsite. Offsite disposal facilities do not want waste forms with large void space. A shredder would be used onsite to reduce the disposal volume of 11(e)2 waste pipe.	Use of a shredder to reduce the volume of 11(e)2 waste prior to off-site disposal is consistent with the license and Regulatory Guide 8.31. Shredder operation will not compromise the effectiveness of ALARA and environmental compliance programs. SERP conclusions include shredder operations guidance (personnel protective equipment (PPE), Radiation Work Permit (RWP), SOP). SOPs prepared in September 2006 are attached to this SERP.
17-Jul-06	2006-4	Elevated Radon in the Central Processing Plant	Review of information presented on occurrence of elevated radon inside the CPP associated with tank cleaning and in the RO area.	SERP recommendations include: providing negative pressure vent fans on tanks T-20 and T-21 in the existing overhead vent line; ensure that vent hose used to ventilate open tanks is long enough to reach outside the building; review SOPs to ensure proper ventilation and worker protection; repositioning of ceiling mounted fans to louvered window close to the tanks; equivalent tanks will also be checked for ventilation and fans will be installed if necessary; and UW Engineering Dept will perform an energy audit to minimize heat loss while maintaining adequate ventilation.
12-Mar-07	2007-1	Self Identified Violation	Environmental Dosimeter supplier/product requirements in EHS Volume VI and as described in license renewal submittal.	License Renewal Submittal states that Spherical thermoluminescent dosimetry (TLD's) will be used. EHS Volume VI describes use of Landauer X9 Environmental TLD dosimeter. Cameco switched to a comparable National Voluntary Laboratory Accreditation Program (NVLAP) certified supplier. The EHS Volume will be updated to allow changes in suppliers and to account for technology improvements. The License Renewal Submittal needs to be revised to allow any product or vendor that meets NRC qualifications. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
17-Apr-07	2007-2	Lab testing for decontamination of shredded material for potential release	Assess results of decontamination efforts regarding shredded poly pipe. Onsite lab work will be conducted by trained personnel, utilizing all appropriate protective equipment. The effects of decon solution concentration, time and agitation will be evaluated for maximum decontamination result. All SOPS will be read and signed by individuals associated with testing.	Oxalic acid is to be tested and has not been previously assessed. A Material Safety Data Sheet for oxalic acid was provided along with reference to appropriate new and existing SOPs. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
13-Jul-07	2007-4	South West Bicarbonate Additions	Testing of cores indicated increased uranium recovery could be achieved with increased bicarbonate concentration for the South West Mine Unit	A bicarbonate addition system for the South West area is consistent with license conditions and should not compromise the effectiveness of the "As Low As Reasonably Achievable" (ALARA) and environmental compliance programs. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
23-Oct-08		EHS Management Replacement and the addition of Assistant Environmental Health and Safety (EHS) Manager/RSO	The position of Environmental Health and Safety Assistant Manager and RSO is added to the Organizational Reporting Structure	The addition of Environmental Health and Safety Assistant does not require a license amendment and does not conflict with any other regulatory requirement. This change will not result in degradation of any essential safety or environmental commitments in the License Renewal Submittal, EA or current operating procedures.
23-Oct-08		Mine Unit 9 Hydrologic Test Report	Review of hydrologic test document, baseline water quality data and monitoring wells UCLs prior to wellfield startup. SERP also conducted an operations/technical review, environmental/safety review and a compliance review.	The test document was reviewed against NRC License SUA-1548, Chapter 5, 5.13 "Mine Unit Hydrological Test Document. The Environmental/Safety Review showed no increased environmental or safety risk from start-up of the 9-Wellfield. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
7-Jan-09		Mine Unit C Biological Treatment - Restoration	Use of methanol as a carbon source for bioremediation	Methanol storage tank is within a bermed area. There will be no chemical differences than in past practices. The need for additional sampling during treatment may be evaluated during the treatment period. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
3-Mar-09		Mine Unit K Hydrologic Test Report Extension HH 8 & 9	Review of hydrologic test document, baseline water quality data and monitoring wells UCLs prior to wellfield startup. SERP also conducted an operations/technical review, environmental/radiation safety/industrial safety review and a compliance review.	The test document was reviewed against NRC License SUA-1548, Chapter 5, 5.13 "Mine Unit Hydrological Test Document. The Environmental/Safety Review showed no increased environmental or safety risk from start-up of K wellfield. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
8-Mar-09	O-71609-1	Resin (Scale) Traps	Install resin traps to capture carbonate scale in the IC trunkline, preventing the repeated fouling of turbine meters on the IC headers.	A SOP will need to be written and approved prior to operating /maintaining this equipment. A JHA will need to be performed prior to the commencement of work. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
16-Apr-09		RSO Refresher Re-training	Applicable alternate classes for substitution in place of normal RSO refresher training	NRC suggested that alternate pertinent classes would be beneficial. A list of classes was provided for review. Alternate classes were deemed acceptable by the SERP. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.
4-Sept-09		Gas/Liquid Ratio Meter	Cameco constructed an apparatus for measuring Gas/Liquid Ratio (GLR) in each leg of an IC distribution Header. This will assist in well field balancing and determine the proper ratio of O_2 in the injection stream. This system is portable and will test each IC line at the header independently.	Pre-operational SOPs were written prior to the using the new GLR meter. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
4-Aug-10	07/10-3	DDW Infrastructure, SR-1 RO Installation, Degasser Experiment, Mine Unit 4 Restoration	Rehabilitate Morton 1-20 and Vollman 33-27 in 2010. Develop SRHUP 6, 9, and 10 in 2010. Develop SRHUP 7 and 8 in 2011. Add HCL where possible to all disposal fluid transfer lines, at the origin, to prevent scaling and improve DDW performance. Install distribution infrastructure to allow the transfer of disposal fluid from the CPP, or any Satellite, to any DDW. Proposed an alternate process for using RO in restoration, and the use of a vacuum degasser to remove oxygen and carbon dioxide from the IC flow prior to injection in to the well field. Mine Unit 4 was added to the wellfield Restoration Plan.	The WDEQ/EPA has been reviewed for completeness and approved the construction and operation for the wells listed in Permit09-054. The SERP committee reviewed the Permit and additional documentation and determined that the infrastructure for deep injection wells, installation and operation of RO unit at SR-1, and adding MU 4 to the restoration plan were not contrary to the license or reviews conducted by the NRC during previous approvals. Revised pages to reflect the DDW infrastructure changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2010.
9-Aug-10	8/10-1	Mine Unit D-Extension to the Restoration Plan	Add Mine Unit D-Extension to the Wellfield Restoration Plan. Mine Unit D restoration SERP was performed in 2006; however, this did not include the Mine Unit D-Extension.	The SERP concluded that the proposed addition of Mine Unit D-Extension to the restoration plan would not require a License Amendment and does not conflict with any other regulatory requirements. The SERP has been completed in alignment with the SERP completed for the addition of Mine Unit D, Header Houses D1-D5 and as a result the SERP approved the addition of the this extension to the Restoration Plan.
27-Oct-10	10/10-2	Organizational Restructure	The responsibility of the SHEQ group to be split into two groups at the division level. One group to be accountable for implementing the Safety, Health, Environmental and Quality Program. The other group to be accountable for radiation safety programs and regulatory affairs, including licensing/permitting. Both position to report directly to the President.	The SERP concluded that the proposed organizational realignment should be beneficial to the operation of the environmental, health and safety programs and is consistent with NRC license SUA-1548 and Regulatory Guide 8.31 and should not compromise the effectiveness of the ALARA and environmental compliance programs. Revised pages to reflect the organizational restructure changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2010.
5-May-11	03/11-1	Minor Revision to NRC Application Chapter 9	Proposed a revision to the NRC License Application, Chapter 9 Section 9.6 to allow more flexibility in the scheduling of annual training provided to employees. The proposed change would remove the word "quarterly" from the application and replace it with "at most four times per year" or "once a year."	The SERP reviewed the page changes and potential impacts to the site training program and application. The panel considered the change to be of administrative nature and did not impact the license, application, or the regulations. A copy of the page changes to the application will need to be prepared for submittal with semi-annual report.
5-May-11	03/11-2	Approval of RSO	Approval of Arlene Faunce as Radiation Safety Officer.	The SERP reviewed all supplied documents and determined that Ms. Faunce met the requirements of Regulatory Guide 8.31 concerning the qualifications of a Radiation Safety Officer. As such, the panel recommended that Ms. Faunce be approved as the Radiation Safety Officer for Smith Ranch-Highland.

Table 1-2 Summary of SERPS

Date	SERP No.	Subject	Synopsis	Results
10-Sept-09	O-301009-1	Selenium Treatment Facility	Construct a Selenium Removal Plant which will contain the Selenium removal process, plus provide Radium removal for water from Sat 2 and Sat 3.	A SERP completed the SERP review and approved the operation of the Selenium Circuit portion of the new Selenium Treatment facility only. The checklist of NRC requirements was reviewed and it was concluded that a license amendment was not necessary. The committee will reconvene at a later date to perform an ORC/SERP for the operation of the Barium Chloride Treatment Circuit.
10-Feb-10	02/10-1	Installation of New DDWs No. 6, 9, and 10	Install new DDWs to be used for the disposal of wastes including, the production bleed stream, wash down water, and ground water sweep.	The deep injection wells described in Permit 09-054 will inject into the same receiving formations as the existing permitted well. The well construction, monitoring and operation are analogous to the approved permitted wells. The only difference will be in the sampling parameters and this will be addressed in the SOPs. The WDEQ/EPA has reviewed for completeness and approved the construction and operation for the wells listed in Permit 09-054. The SERP has reviewed the Permit and additional documentation and determined that a license amendment was not necessary.
10-Feb-10	02/10-2	Organizational Restructure	Revised reporting structure to include North Butte and SRH. Positions of both Director and Manager will be modified to reflect this new structure which indicates the Manager, SHEQ now reports to directly to Director, SHEQ, who now reports the VP of Operations.	The SERP concluded that the proposed organizational realignment should be beneficial to the operation of the environmental, health, and safety programs and is consistent with NRC License SUA-1548 and Regulatory Guide 8.31 and should not compromise the effectiveness of the ALARA and environmental compliance programs. Revised pages to reflect the organizational restructure changes are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 1st half 2010.
27-Jul-10	05/10-1	Alternate RSO	Designating an alternate radiation safety person and/or a lead position to be considered as available personnel resources to assist in performing the weekly required and facility foreman inspections.	The SERP reviewed the Permit and additional documentation and determined that the utilization of alternate HP designees to perform weekly RSO and facility foreman inspections would be acceptable. Revised pages to reflect the assignment of alternate personnel to perform RSO inspections are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2010.
19-Jul-10	07/10-1	F200/F300 Sampling Change	A single sample be collected downstream of the Selenium Plant containing a barium chloride radium removal system to demonstrate compliance.	The SERP concluded that the proposed change was consistent with the reviewed documents and meets the requirements of the sampling procedure as described in the original amendment application, June 10, 1994. The Selenium Plant will become the single point of radium removal in the wastewater circuit and as such, only one point for compliance sampling will be available. Revised pages to reflect the F200/F300 sampling change are included in Attachment B of the Semi-Annual Effluent Monitoring Report submitted for the 2nd half 2010.

Table 1-3 Summary of NRC Inspection Topics and Findings for Smith Ranch (SUA-1548)

Inspection Scope items								
Report Date	**Management Organization and Controls**	**Site Operations**	**Radiation Protection**	**Environmental Protection and Radioactive Waste Management**	**Process Safety Information**	**Transportation Activities**	**Emergency Preparedness**	**Findings (IFI, URI, NCV, VIO)**
February 11, 2000	x	x	x					VIO failure to use SOPs and RWPs during remedial activities
August 11, 2000	x	x	x	x				VIO failure to use SOPs for calibrating instruments
March 9, 2001	x	x	x	x				
July 26, 2001	x	x	x	x				
May 17, 2002	x	x	x	x				
October 3, 2002	x	x	x	x				
September 8, 2003	x	x	x	x	x			
September 24, 2004	x	x	x	x				IFI to review instrument calibration tracking system
September 16, 2005								IFI to review groundwater sampling procedures
August 11, 2006	x	x	x	x		x	x	VIO conducting non-routine work without an RWP; VIO shipment of resin trailer with external contamination above DOT limits
April 24, 2007	x	x	x	x		x	x	VIO failure to post a radiation area
October 15, 2007	x	x	x	x				
May 16, 2008	x	x	x	x		x	x	URI related origin of a conversion factor used to calculate weekly soluble uranium from total DAC-hrs; response adequately addressed concern and URI closed in inspection report
November 25, 2008	x	x	x	x		x		VIO exceeding the dose limit for members of the public near the byproduct storage bins; VIO failure to store byproduct storage bins in a restrictive area; VIO failure to control a restricted area
April 17, 2009	x	x	x	x		x	x	

Table 1-3 Summary of NRC Inspection Topics and Findings for Smith Ranch (SUA-1548)

Inspection Scope items								
Report Date	**Management Organization and Controls**	**Site Operations**	**Radiation Protection**	**Environmental Protection and Radioactive Waste Management**	**Process Safety Information**	**Transportation Activities**	**Emergency Preparedness**	**Findings (IFI, URI, NCV, VIO)**
November 16, 2009	x	x	x	x		x	x	VIO failure to decommission well field within 24 months and failure to request an alternate decommissioning schedule; NCV failure of a worker to provide a monthly bioassay sample; Revised procedure deemed adequate by NRC and NCV closed in inspection report NCV failure to take a confirmatory sample within 24 hours when a monitoring well exceeded upper control limits
April 29, 2010	X	X	X		X			VIO failure to post a radiation area
December 17, 2010	x	x	x	x	x	x	x	VIO failure to demonstrate that packages used for shipment of radioactive material met applicable regulatory requirements
October 25, 2011	x	x	x	x	x	x	x	URI failure to store contaminated materials in a restricted area boundary; VIO failure to provide a 30 day follow-up report and copies of WDEQ correspondence regarding a spill; VIO failure to have an alarm to notify wellfield operators about exceedence

Table 1-4 Summary of NRC Inspection Topics and Findings for Highland Uranium Property (SUA-1511)

Inspection Scope Items								
Report Date	**Management Organization and Controls**	**Site Operations**	**Radiation Protection**	**Environmental Protection and Radioactive Waste Management**	**Process Safety Information**	**Transportation Activities**	**Emergency Preparedness**	**Findings (IFI, URI, NCV, VIO)**
January 26, 2000	x	x	X	x				
August 11, 2000	x	x	X	x				
March 8, 2001	x	x	X					VIO failure to survey equipment for removable contamination; violation withdrawn by NRC in letter dated May 21, 2001
August 30, 2001	x	x	X	x				
May 17, 2002	x	x	X	X				
October 4, 2002	x	x	X	x				
Acronyms: **IFI** Inspector Follow-up Item **NCV** Non-Cited Violation **URI** Unresolved Item **VIO** Violation								
The violation found in the March 8, 2001 Inspection Report was documented as closed in the August 30, 2001 Inspection Report.								

Table 1-5 Notices of Violation and Non-Cited Violations for Smith Ranch During the Period of 2000 Through 2010

Report Date	Description of NOV/NCV	Licensee Response	Closure
Feb 11, 2000	NOV- Severity Level IV "From July through December 1999, eight spill events occurred onsite involving 98,330 gallons of production or injection liquids containing low-levels of radioactive material. Without an SOP or RWP, workers repaired equipment; processed, stored, and transported radioactive material; and conducted environmental monitoring associated with all eight spill recovery operations". (NRC, 2000b)	Line supervisors were directed "to initiate RWPs for all corrective actions related to future spills…and to assess any potential radiological hazards prior to implementation of corrective action to restore operations after the spill". Use of RWPs will continue "where an SOP has not been developed for use in order to assess the potential hazards inherent in the work areas related to radioactive material." Response also notes that "personnel exposure histories…showed no adverse or increased exposure resulting from the execution of the work"; and "neither human health nor the environment were adversely affected by the lack of a written SOP or RWP". Full compliance was achieved on January 13, 2000, through corrective steps taken (RAMC, 2000a).	NRC documented the NOV as closed by verifying that corrective actions were completed and particularly noted improvements to licensee's SOP No. 1110 "Work Order/RWP". (NRC, 2000d)
Aug 11, 2000	NOV- Severity Level IV "The radiation safety technician calibrated the alpha radiation counter without following the established written procedure 'Calibration of the Scintillation Counter'. Consequently, the technician did not conduct the counter efficiency calibration or establish the instrument operating voltage as stated in the written procedure." (NRC, 2000d)	The calibration in question occurred on June 7, 2000. The RSO conducted a verification calibration on July 14, 2000 (immediately after the NRC Inspection) and "concluded and verified that employee safety was not compromised as a result of the June 7th calibration" (RAMC, 2000d). Corrective actions included: 1. Periodic Planned Task Observations to ensure that there are no deviations from written procedures. 2. A formalized task training program was designed and implemented for all environmental and health physics procedures. 3. RSO conducted additional calibrations by the correct procedure and by the incorrect procedure (used by the RST on June 7) to re-verify the scintillation counter efficiencies. The additional calibrations verified "no significant difference between the results". (RAMC, 2000d). 4. Systematic review of the Health Physics Manual during the regular Annual Review.	NRC documented the NOV as closed by verifying that corrective actions were completed. (NRC, 2001b)
Aug 11, 2006	NOV- Severity Level IV "On or about February 15, 2006, workers commenced with non-routine work on a yellowcake dryer without a radiation work permit. As a result, one worker experienced an intake of radioactive material." (NRC, 2006a)	Licensee (PRI) responded on September 20, 2006 by letter to NRC describing corrective actions including a procedure for assessing internal doses from uranium uptakes. NRC documented review of PRI's response stating "We have reviewed your reply and find it responsive to the concerns raised in our Notice of Violation." (NRC, 2006b)	NRC documented the NOV as closed by verifying that corrective actions to prevent recurrence were completed. NRC noted that the protocol to assess internal doses from uranium intakes "was in agreement with NRC guidance documents". (NRC, 2007d)
	NCV "Shipment of resin tanker with external removable contamination in excess of the U.S. Department of Transportation limit." (NRC, 2006a)	Swipe sampling of the tanker prior to shipment was conducted in four discrete areas, which were not contaminated. The resin tanker never left SR property, moving only from Satellite SR1 to the Central Processing Plant. "Corrective actions taken by licensee included staff meetings, retraining, and updating of the applicable survey procedure." (NRC, 2006a)	NRC documented the NCV as both opened and satisfactorily closed in the same inspection report. (NRC, 2006a)
April 24, 2007	NOV- Severity Level IV "On April 3, 2007 the Satellite SR-1 resin transfer water tank area, an accessible area in which an individual could receive a dose equivalent in excess of 0.005 rems (0.05 mSv) in one hour at 30 centimeters from the tank surface that the radiation penetrated, was not posted with a sign bearing the radiation symbol and the words "Caution, Radiation Area." (NRC, 2007d)	Licensee immediately posted the tank as a radiation area and responded on May 18, 2007 by letter to NRC. NRC documented review of PRI's response stating "We have reviewed your reply and find it responsive to the concerns raised in our Notice of Violation." (NRC, 2007e) "The licensee subsequently elected to implement area postings versus equipment postings. This programmatic change was necessary because radiological conditions routinely vary as a result of operational evolutions. The licensee also updated site procedures to specify when tank cleanouts were necessary. Additionally, the licensee began conducting area gamma radiation surveys more frequently than required by the license." (NRC, 2008c)	NRC documented the NOV as "discussed" in the subsequent inspection report (NRC, 2007f) and ultimately "closed" during the next inspection stating that "the inspectors reviewed the licensee's corrective actions and determined that these actions were effective." (NRC, 2008c)

Table 1-5 Notices of Violation and Non-Cited Violations for Smith Ranch During the Period of 2000 Through 2010

Report Date	Description of NOV/NCV	Licensee Response	Closure
Dec 11, 2007	NOV Severity Level IV "NRC conducted a review of past SERP determinations which involved changes in site staffing. The violation involved the SERP's approval of an individual as radiation safety officer, although this individual did not meet the requirements specified in License Condition 9.7." (NRC, 2007g) This NOV resulted from an "in-office" review of past SERP determinations, conducted after an on-site inspection September 20-21, 2007.	In a letter reply to NRC, PRI described the following corrective actions: 1. Documentation will be provided to Operation Review Committee (ORC)/SERP participants prior to group review of the proposed activity. 2. Work requests entered in to the automated preventive maintenance system were modified to include consideration of ORC/SERP review requirements before the "work request" could become a "work order". 3. Safety, Health and Environment (SHE) review of ORC/SERPs decisions for consistency with license conditions. 4. ORC/SERP attendees will include Management, SHE, RSO or designee, and Manager/Supervisor of the department involved in the change. 5. Review of ORC/SERP procedures by Managers and Supervisors on an annual basis. 6. Documentation demonstrating aspects of the change, test or experiment reviewed will be attached to records of ORC/SERP meetings. 7. A new training position was proposed with responsibility for overseeing and maintaining documentation of all training activities. 8. A revised organizational chart and description of responsibilities was submitted as an amendment to Chapter 9 of the existing license renewal submittal. 9. All positions described in the license renewal submittal that require meeting specific qualifications will undergo the ORC/SERP process prior to approval of an individual to fill such a position. (PRI, 2007h)	NRC documented the NOV as closed. "The inspectors reviewed the corrective actions from the December 28, 2007 letter and identified that the licensee had adequately addressed and implemented the nine corrective actions." (NRC, 2008c)
Nov 25, 2008	NOV Severity Level IV "Byproduct storage bins at satellite Sat-3 and satellite Sat-2 were found to have exposure rates of 3.5 millirems in any one hour at one foot from the surfaces of the bins. Both bins were located in unrestricted areas." (NRC, 2008d) The regulatory standard for exposure rate is less than 2 millirems (mrems) in any one hour. NOV Severity Level IV "The byproduct storage bins at satellite Sat-3 and satellite Sat-2 contained items contaminated with licensed radioactive material, in storage pending disposal, and were in unrestricted areas." (NRC, 2008d) Bins with byproduct material should have been maintained within the restricted area. NOV Severity Level IV "The licensee did not control and/or maintain constant surveillance of uranium contained in the T-207 transfer storage tank in the satellite SR-1 building, which is a controlled area...The satellite SR-1 building and the immediate area around the T-207 transfer storage tank were unoccupied by employees, the doors to the SR-1 building were unlocked, and the overhead bay doors were open allowing uncontrolled access to licensed source materials." (NRC, 2008d)	Licensee (PRI) responded on December 22, 2008 by letter to NRC describing corrective actions. Corrective actions included: 1. Surrounding byproduct bins with chain-link fence and restricting access to the public by using chain locks. 2. Installing security gates and padlocks affixed at the bottom of the overhead doors in all satellites. 3. Installing coded security locks on all exterior doors in each satellite building. NRC documented review of PRI's response stating "We have reviewed your reply and find it responsive to the concerns raised in our Notice of Violation. We will review the implementation of your corrective actions during a future inspection to determine that full compliance has been achieved and will be maintained." (NRC, 2009b).	NRC documented the NOVs as closed. "The NRC inspectors viewed the new fences and verified that the areas were locked. Confirmatory exposure rates taken by the NRC inspectors were found to be 1000 μR/hr (1 millirem/hr) at the fence line." "The NRC inspectors verified that the security gates at the satellites were locked when the overhead doors were open and the exterior doors were locked." (NRC, 2009d)

Table 1-5 Notices of Violation and Non-Cited Violations for Smith Ranch During the Period of 2000 Through 2010

Report Date	Description of NOV/NCV	Licensee Response	Closure
Nov 16, 2009	NOV Severity Level IV "The licensee failed to complete decommissioning of Mine Units 1 and C within 24 months and failed to request an alternate decommissioning schedule. Specifically, the licensee began decommissioning of Mine Unit 1 during July 2006 and Mine Unit C during May 1999, both of which continue to be decommissioned, and the licensee had not requested an alternate decommissioning schedule until August 13, 2009." (NRC, 2009g)	Licensee (Cameco) responded on December 16, 2009 by letter to NRC describing corrective actions. Corrective actions included: "On July 31, 2009. Cameco submitted a license amendment request to revise portions of its current license related to ground water restoration at its Smith Ranch – Highland Uranium Project. On August 13, 2009, Cameco submitted to Mr. Doug Mandeville of the NRC a Request for Alternate Schedule for Completion of Decommissioning (Ground water Restoration) for Mine Units C, D, D-extension, E, F, 1 and 4/4A/4-extension. The NRC staff accepted those requests for full review on September 2 and September 11, 2009, respectively. Ground water restoration is currently taking place in mine units C and 1, with unit D scheduled to begin in January 2010". (Cameco Resources, 2009h) "Cameco is working closely with the Wyoming Department of Environmental Quality and the NRC to meet our commitments for ground water restoration in our mine units. Work currently in progress includes: Increasing wastewater disposal capacity by installing new deep disposal wells, ongoing restoration in two mine units and preparations to begin restoration in three additional units in 2010, purchase of an additional 500 gallon/minute reverse osmosis unit for restoration support, continuing to refine our restoration process through pilot and small scale testing, and providing updates to our restoration schedule in the NRC semi-annual report. A formal request for restoration schedule changes will be sent to NRC as needed." (Cameco Resources, 2009) "CR submitted to NRC an alternate schedule on August 13, 2009 explaining when reclamation efforts in each wellfield will take place. CR will be in full compliance upon NRC's approval of CR's alternative schedule." (Cameco Resources, 2009h)	NRC has responded by letter to Cameco Resources stating "We have reviewed your reply and find it responsive to the concerns raised in our Notice of Violation. We will review the implementation of your corrective actions during a future inspection to determine that full compliance has been achieved and will be maintained." (NRC, 2009h)
Nov 16, 2009	NCV "The licensee collected bioassay samples to assess the potential for intakes of uranium. During the inspection, the licensee discussed with the inspectors a self—identified violation. In July 2009, a new CPP operator failed to provide a routine monthly bioassay sample." (NRC, 2009g)	"Corrective actions included changing their procedure to require workers to submit routine bioassays within the first two weeks of every month. If a worker does not submit a bioassay within the first two weeks of a month, an e-mail notice from the radiation safety staff is sent to the employee's supervisor as a reminder. This procedure ensures that the employee, the employee's supervisor, and the radiation safety staff are aware if an individual had not provided a bioassay sample within the month." (NRC, 2009g)	"The inspectors concluded that the revised procedure was adequate." (NRC, 2009g) NRC documented the NCV as both opened and satisfactorily closed in the same inspection report.
	NCV "During the inspection, the licensee discussed with the inspectors a self-identified violation. On July 7, 2009, two constituents at monitoring well FM-8 exceeded the upper control limits (UCLs) for alkalinity and conductivity. The licensee did not resample monitoring well FM-8 until July 20, 2009. This is a violation ...of LC 11.5, which states, in part, that if two UCLs are exceeded in a well, the licensee shall take a confirmation sample within 24 hours and analyze it for the excursion indicators." (NRC, 2009g)	"Corrective actions include updating their monitoring well sampling procedure to have two separate individuals review the sampling results for any exceedances of parameters." (NRC, 2009g)	"The inspectors found the corrective action to be adequate." (NRC, 2009g) NRC documented the NCV as both opened and satisfactorily closed in the same inspection report.

Table 3-1 Mine Unit Development Schedule

Mine Unit	Drilling/Development Time Frame - Comments
MU A	WDEQ approved restoration
MU B	WDEQ approved restoration
MU C	Off – not producing
MU D	Off – not producing
MU E	Off – not producing
MU F	1 pattern operating in HH F-23. Approx. 5 new HHs on the mine unit fringe are being planned with delin. Drilling in 2012 and MWs and production drilling in 2013-2014
MU H	11 HHs actively producing
MU I	6 HHs are active, 2 new HHs are being planned for production drilling in 2011
MU J	6 HHs are active
MU K/K North	9 HHs are operating. 5 HHs are scheduled for startup in 2011, and two additional HHs are scheduled in 2012.
MU 1	Off – not producing
MU 2	4 HHs are active. Redrills in HH 2-5 are scheduled for 2011
MU 3	2 HHs are active. Redrills in several HHs are scheduled for 2011. One new HH is scheduled for 2011.
MU 4/4A	Off – not producing
MU 9	12 HHs are active
MU 15/15A	22 HHs are active. Two additional HHs are scheduled to be turned on in 2011
MU 10	Actively installing monitoring wells. Monitoring and production wells are planned to be initiated in 2011
MU 7	Monitoring well installation planned in 2011; production drilling 2012-2013.
MU 11	Delineation 2011-2012; monitoring and production wells in 2013-2014
MU 27	Production wells installed in 2012 and 2013.
MU 21	Delineation drilling in 2012-2014. Monitor and production wells in 2015-2016
MU 28	Delineation Drilling 2013; monitoring and production well drilling 2014-2016
MU 23	Delineation drilling 2014-2015; monitoring well and production well drilling 2016-2017
MU 22	Delineation drilling 2015-2016; Monitoring well and production well drilling 2017-2018
MU 24	Delineation drilling 2015-2016; Monitoring well and production well drilling 2017-2018
MU 25	Delineation drilling 2016-2017; Monitoring well and production ell drilling 2018-2019
MU 26	Delineation drilling 2016-2017; Monitoring well and production well drilling 2018-2019

Table 3-2 Gas Hills Flow Rate Estimates

	Mine Unit #1	Mine Unit #2	Mine Unit #3 North	Mine Unit #3 South	Mine Unit
Depth to SWL (ft)	265	230	250	415	150
SWL to Ore (ft)	180	120	60	187	100
Surface Injection Pressure (psia)	74	58	52	101	42
Delta P – Injection (ft)	436	365	370	647	246
Delta P – Production (ft)	180	120	60	187	100
Permeability (md)	1000	400	600	600	300
Single Row 5-Spot Rate (gpm)	41.0	13.0	10.0	28.0	7.5
Double Row 5-Spot Rate (gpm)[1]	20.0	7.0	10.0	19.0	4.0
Double Row 5-Spot Max Rate (gpm)[2]	20.0 Ei=20% Ep=45%	13.0 Ei=32% Ep=90%	11.0 Ei=20% Ep=100%	19.0 Ei=20% Ep=70%	9.0 Ei=40% Ep=100%
Groundwater Sweep Max Rate at one month (gpm)	12.0	3.5	3.0	8.0	2.0
Groundwater Sweep Max Rate at one year (gpm)	10.0	2.5	2.0	6.0	1.8
RO Max Rate at one year (gpm)[3]	20.0	6.0	4.5	13.0	4.0
Ei = Injection Efficiency Ep = Production Efficiency 1 – Ei=20%, Ep=85%, Bleed=1% 2 – Bleed = 1% 3 – Bleed=10%					

Table 3-3 Summary of Groundwater Flow Path Simulation for Gas Hills Remote Satellite

Simulation Area	Mine Unit #1	Mine Unit #2	Mine Unit #3 South	Mine Unit #3 North	Mine Unit #4
Permeability (md)	1000	400	600	600	300
Hydraulic Gradient (ft/ft)	0.017	0.042	0.0013	0.029	0.054
Groundwater Velocity (ft/yr)	62	62	3	62	62
Direction of Groundwater Flow	Northwest	Northwest	North	Northeast	North to Northwest
Well Pattern and Orientation	Double Row 5-Spot at 90E	Block 5-Spot at 90E	Block 5-Spot at 45E	Block 5-Spot at 90E	Block 5-Spot at 30E
Maximum Design Rate (gpm)	20	13	19	11	9
Contacted Volume using Adjusted Rates (Mgal)	12.032	9.419	11.001	9.166	8.606
Maximum Groundwater Sweep Rate (gpm)	10	3	7	3	2
Groundwater Sweep Volume (Mgal)	12.960	9.435	11.794	9.435	11.531
Mgal = million gallons					

Table 3-4 Baseline Water Quality Parameters

Parameter	Minimum Reporting * **
Ammonia as N	0.05
Nitrate + Nitrite as N	0.05
Bicarbonate as Alkalinity	1.0
Boron	0.1
Carbonate as Alkalinity	1.0
Fluoride	0.1
Sulfate	1.0
Total Dissolved Solids	10
Arsenic (Dissolved)	0.001 (Low Level)
Cadmium (Dissolved)	0.0001 (Low Level)
Calcium (Dissolved)	1.0
Chloride (Dissolved)	1.0
Chromium (Dissolved)	0.001 (Low Level)
Iron (Total and Dissolved)	0.005 (Low Level)
Magnesium (Dissolved)	1.0
Manganese (Total)	0.005 (Low Level)
Molybdenum (Dissolved)	0.00005
Potassium (Dissolved)	1.0
Selenium (Dissolved)	0.001 (Low Level)
Sodium (Dissolved)	1.0
Zinc (Dissolved)	0.001 (Low Level)
Radium-226	0.2 pCi/L
Radium-228	1.0 pCi/L
Gross Alpha	1.0 pCi/L
Gross Beta	2.0 pCi/L
Uranium	0.0003
Vanadium	0.1
* From Energy Laboratories, 2008 ** mg/L unless otherwise specified	

Table 3-5 Baseline Parameter Short List

Alkalinity	pH
Chloride	Selenium
Conductivity	Uranium
Sulfate	Radium-226
TDS	Arsenic*
Iron	Fluoride*
* Arsenic and fluoride will be deleted from the above list of parameters if the previous two analyses (conducted for the list of parameters included in **Table 3-4** show that arsenic and fluoride are less than their respective monitoring reporting limit.	

Table 3-6 Topsoil/Subsoil Management

Nature of Disturbance	Management
Main Facilities Area, Building, Storage Areas, Surge Ponds/Evaporation Ponds	Salvage and stockpile all recommended suitable topsoil and subsoil. Replace and seed upon decommissioning.
Primary Access Road	Existing CBM roads and new roads. To the extent new disturbance takes place, CR will windrow (salvage) 3 to 6 inches of suitable topsoil within area of disturbance in accordance with landowners' instructions. At the end of mining, landowner (private or public) will specify reclamation of roads.
Culvert, Erosion Protection, Road Crossings	Salvage 6 to 24 inches of recommended suitable topsoil and subsoil. Replace and seed upon decommissioning.
Secondary Access Roads (to header houses within mine units)	Windrow (salvage) 3 to 6 inches of suitable topsoil. Replace and seed upon decommissioning.
Non-constructed Roads (from header houses to individual wells and access to monitor well rings)	Topsoil will not be removed. Traffic will be minimized and restricted to defined corridors. **
Pipeline and Utility Corridors and Installation of Drill Holes and Wells	Segregate suitable topsoil and subsoil during backhoe trench construction. Replace topsoil and subsoil in sequence and regrade contemporaneously. Seed at first available seeding window.
** During operations, mine unit activity includes routine maintenance and monitoring of wells and header houses within a wellfield or mine unit. This requires daily, light vehicle access to the wellfield areas.	

Table 3-7 Deep Disposal Well Information

Well ID	Status	UIC Permit	Authorized Injection Rate (gpm)	Quarterly Analysis
Morton 1-20	Existing	09-054	105 gpm/well	Carbonate, Bicarbonate, Ammonia, Uranium, TDS, Radium 226, Hydrogen Sulfide, pH, Chloride, Sulfate, Conductivity, Uranium, Trioxide, Uranium Dioxide, Arsenic, Lead, Mercury, Total Phenolic Hydrocarbons, VOCs (624 Long List)
Vollman 33-27	Existing			
SRHUP#6, 9 & 10	Existing			
SRHUP#7 & 8	Permitted			
Reynolds DW#1	Existing	04-611	105 gpm	TDS, Total Alk., Nat Uranium as U, Radium 226, and pH
SR DW#1	Existing	99-347*	300 gpm/well	TDS, Total Alk., NH_3 as N, Nat Uranium as U, Radium 226, and pH
SR DW#2	Existing			
* 99-347 is under WDEQ renewal review under a new application.				

Table 3-8 Purge Storage Reservoir No. 1 Land Application Monitoring Program (when operational)

Sample Type	Location	Frequency	Analyses
Treated Excess Water	At radium settling ponds or discharge from Satellite No. 1 radium treatment system	Monthly; grab	Ra226
Irrigation Fluid	At irrigation pivot during irrigation	Grab sample during each calendar month of operation	Na, Ca, Mg, Cl, SO_4, As, Se, U, Ra226, HCO_3, TDS, K, Ba, B, SAR, pH
Soil Water	24, 48, 72 inch depth	August	pH, Electrical Cond., Cl, SO_4, HCO_3, B, U, Ra226
Irrigated soil thoroughly blended composite 6-12 inch depth	One sample per four irrigated acres	August	Na, Ca, Mg, K, As, Se, B, Ba, Ra226, U, Electrical Cond., SAR, pH
Irrigated Vegetation	One sample at each soil sample location, composited	August; if harvested as hay, one sample per cutting	As, Se, B, Ra226, U, Ba
Visual Inspection	Irrigation perimeter	Daily during irrigation	Check for runoff
Note: Heavy metal analyses in soils will be performed on plant available or ADPTA extractable fraction.			

Table 3-9 Purge Storage Reservoir No. 2 Land Application Monitoring Program

Sample Type	Location	Frequency	Analyses
Treated Excess Water	At discharge from radium treatment system at Satellite Nos. 2 and 3	Monthly; grab	Ra226
Irrigation Fluid	At irrigation pivot during irrigation	Grab sample each calendar month of operation	Na, Ca, Mg, Cl, SO_4, As, Se, U, Ra226, HCO_3, TDS, K, Ba, B, SAR, pH
Soil Water	At two 4 ft lysimeters	June	pH, Electrical Cond., Cl, SO_4, HCO_3, Se, B, U, Ra226
Water	At shallow wells 1 and 2 adjacent to reservoir	Water level quarterly, semi-annual grab water quality	pH, Electrical Cond., Cl, SO_4, HCO_3, Se, B, U, Ra226
Irrigated Soil	Four sample sites per quarter of irrigated area, obtained at depths of 0-6 inches, 6-12 inches	August	Na, Ca, Mg, K, As, Se, B, Ba, Ra226, U, Electrical Cond., SAR, pH
Irrigated Vegetation	One sample at each soil sample location, composited by quarter	August	As, Se, B, Ra226, U, Ba
Visual Inspection	Irrigation perimeter	Daily during irrigation	Check for runoff
Note: Heavy metal analyses in soils will be performed on plant available or ADPTA extractable fraction.			

Table 10 PMP Hydrologic Analysis

Drainage	Contributing Area (ac)	PMP (in)	PMF (cfs)	Flood Stage (ft)	Relief (ft)
West	38.9	19	500	2.7	9
East	277.9	19	3501	6.7	50

Table 3-11 Gas Hills Production Water Balance

	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Production																						
Mine Unit Flow (gpm)		2800	5600	7100	8500	9500	9900	11500	11900	11400	10800	10300	10000	9700	7760	6208	4346	3042	2129	1491	1043	
Operation Timeframe																						
Mine Unit One																						
Mine Unit Two																						
Mine Unit Three																						
Mine Unit Four																						
Mine Unit Five																						
Production Bleed (gpm)		28	56	71	85	95	99	115	119	114	108	103	100	97	78	62	43	30	21	15		
(Assume 1% bleed)																						
Restoration																						
(Assume nine CPV of treatment)																						
Mine Unit 1 (gpm)	1CPV=	180	Mgal.			550	1000	1000	750													
Total (Mgal.) (Annually)						285	518	518	389													
Total Cumulative Treated (Mgal.)						285	804	1322	1711													
Mine Unit 2 (gpm)	1CPV=	293	Mgal.					200	450	1200	1200	1200	1000									
Total (Mgal.) (Annually)								104	233	622	622	622	518									
Total Cumulative Treated (Mgal.)								104	337	959	1581	2203	2722									
Mine Unit 3 (gpm)	1CPV=	148.5	Mgal.										200	1200	1000	200						
Total (Mgal.) (Annually)													104	622	518	104						
Total Cumulative Treated (Mgal.)													104	726	1244	1348						
Mine Unit 4 (gpm)	1CPV=	160	Mgal.												200	1000	1200	500				
Total (Mgal.) (Annually)															104	518	622	259				
Total Cumulative Treated (Mgal.)															104	622	1244	1503				
Mine Unit 5 (gpm)	1CPV=	180	Mgal. (est.)															700	1200	1200	200	
Total (Mgal.) (Annually)																		363	622	622	104	
Total Cumulative Treated (Mgal.)																		363	985	1607	1711	
Water Disposal Capacity Required																						
RO Concentrate to Disposal (gpm)		5	11	14	17	128	219	262	263	262	261	260	259	259	255	252	248	246	244	243	40	0
Total Slurry Processing Water to Disposal (gpm)		11	15	15	16	16	19	20	22	18	16	13	11	10	9	8	7	6	6	5	5	0
Total Water Disposal Required (gpm)		16	25	28	33	145	239	283	285	281	277	273	270	269	264	260	255	252	250	248	45	0
Water Disposal Capacity Available																						
Disposal Capacity Evaporation (gpm)		21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	0
Forced Evaporation (gpm.)		0	0	0	0	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	0
Forced Evaporation (gpm)		0	0	0	0	0	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	0
Total Disposal Capacity Available (gpm)		21	21	21	21	147	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	0
Water Balance																						
																						0
Total Disposal Capacity (gpm)		21	21	21	21	147	272	272	272	272	272	272	272	272	272	272	272	272	272	272	272	0
Total Disposal Capacity Required (gpm)		16	25	28	33	145	239	283	285	281	277	273	270	269	264	260	255	252	250	248	45	0
Net Disposal Balance (gpm)		5	-4	-7	-12	2	34	-10	-13	-8	-5	0	2	4	8	12	17	20	22	24	227	0
Annual Pond Water Accumulation (Acre/ft.)		0	6	11	18	0	0	18	22	14	10	2	0	0	0	0	0	0	0	0	0	0
Cumulative Pond Storage Liquid (Acre/ft.)		0	6	17	36	34	0	18	40	54	64	66	64	60	48	29	4	0	0	0	0	0
Pond Volume Available (Acre/ft.)		145	139	128	109	111	145	127	105	91	81	79	81	85	97	116	141	145	145	145	145	145
TDS Balance																						
Sludge Disposal Ongoing (Tons)						2569	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	5138	0
Sludge Disposal (Yards.)						1359	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	2718	0
Number of Truckloads per Year (est.)						128	257	257	257	257	257	257	257	257	257	257	257	257	257	257	257	459
Cumulative Sludge in pond (tons)		332	854	1436	2114	2522	4855	5525	6249	6876	7439	7904	8317	8700	8985	9188	9188	9188	9188	9188	9188	9188
Cumulative Sludge in pond (yards)		176	452	760	1118	1335	2569	2923	3307	3638	3936	4182	4401	4603	4754	4862	4862	4862	4862	4862	4862	4862

Total Sludge Hauled from GH (tons) **79638**
Life of Project

Total Sludge Hauled from GH (yards) **42136**
Life of Project

Definitions

Mine Unit 1
Mine Unit 2
Mine Unit 3
Mine Unit 4
Mine Unit 5*

CPV = Contacted Pore Volume
Mgal= Million Gallons

Table 3-12 Smith Ranch Water Balance

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Sattellite CPP \ SR1 Water Balance																															
Total CPP /SR 1 Production Flow (gpm)				6800	7070	8500	6720	5820	6720	7280	7130	6510	3080	1600	2025	2350	2075	1160	0	0	0	0	0	0	0	0	0	0	0	0	0
Total CPP /SR 1 Production Bleed (gpm)				68	70.7	85	67.2	58.2	67.2	72.8	71.3	65.1	30.8	16	20.3	23.5	20.8	11.6	0	0	0	0	0	0	0	0	0	0	0	0	0
Total CPP/SR 1 Production RO Con. (gpm)				13.6	14.14	17	13.44	11.64	13.44	14.56	14.26	13.02	6.16	3.2	4.06	4.7	4.16	2.32	0	0	0	0	0	0	0	0	0	0	0	0	0
Sattellite SR2 Water Balance																															
Total SR 2 Production Flow (gpm)				4500	4500	4500	4500	4480	4500	4500	4500	3200	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Production Bleed (gpm)				45	45	45	45	44.8	45	45	45	32	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total SR 2 Production RO Con. (gpm)				9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	6.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Smith Ranch Production Flow				11300.0	11570.0	13000.0	11220.0	10300.0	11220.0	11780.0	11630.0	9710.0	4080.0	1600.0	2025.0	2350.0	2075.0	1160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Production Bleed (gpm)				22.6	23.1	26.0	22.4	20.6	22.4	23.6	23.3	19.4	8.2	3.2	4.1	4.7	4.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Bleed (gpm)				20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0	0	0	0
Restoration Flows																															
	PV With Flair (Kgal)	GWS PV to Finish	RO PV to Finish																												
MU 1 (gal) (RO)	62837	0	5	320	320																										
GWS (gal)																															
Total Disposal (gal)				80	80																										
MU 2 (gal)(RO)	125235	1	8	0	0	0	0	0	150	150	160	160	160	160	160	160	150	160	160	160	160	160	160	160							
GWS (gal)				30	38	45	80	60																							
Total Disposal (gal)				30	38	45	0	10	36	36	40	40	40	40	40	40	36	40	40	40	40	40	40	40							
MU 3 (gal)(RO)	151878	1	8														150	150	150	560	560	560	560	560	720	560					
GWS (gal)										40	60	40	50	50	40	40															
Total Disposal (gal)										0	0	0	10	0	0	0	36	36	36	140	140	140	140	140	180	140					
MU 4/4A (gal)(RO)	119216	1	8				400	400	400	400	400																				
GWS (gal)				80	80	80																									
Total Disposal (gal)				15	15	80	100	100	100	100	100																				
MU 15(gal) (RO)	137426	1	8									400	400	400	400	400	400														
GWS (gal)							35	55	100	60	40																				
Total Disposal (gal)							35	25	0	0	0	100	100	100	100	100	100														
MU15A (gal)(RO)	52669	1	8															400	400	400											
GWS (gal)															20	30	70														
Total Disposal (gal)															0	0	0	100	100	100											
MU 7 (gal)(RO)	53608	1	8															40	40	40	400	400	400								
GWS (gal)																															
Total Disposal (gal)																		0	0	0	100	100	100								
MU 9(gal)(RO)	136376	1	8														20	100	100	80	280	280	280	680	680						
GWS (gal)																	0	0	0	0	70	70	70	170	170						
Total Disposal (gal)																															
MU 10 (gal)(RO)	43282	1	8																			40	40	40	40	680	200				
GWS (gal)																						0	0	0	0	170	50				
Total Disposal (gal)																															
Total Restoration Disposal (gpm)				125	133	125	135	135	136	136	140	140	150	140	140	140	172	176	176	140	170	170	170	170	170	170	50	0	0	0	0
Installed RO Capacity (gpm) (feed)																															
	Feed (gpm)																														
	200																														
	200																														
	250																														
	250																														
	250																														
	250																														
	250																														
	250																														
	250																														
Total Capacity	2400																														
Deep Disposal Well Capacity (gpm)	**Permitted**	**Current**																													
DDW #1	**150**	**50**		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
DDW #2	**158**	**80**		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
DDW #10	**126**	**20**		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
DDW #6	**105**	**60**		60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Total Available		**210**		210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Smith Ranch CPP Elutions				32.6	32.6	36.4	31.7	30.7	27.9	30.7	26.9	20.2	24.0	17.4	16.4	15.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	9.8	8.8	6.9	6.0	5.0	5.0	5.0	5.0
Total Production Bleed (gpm)				22.6	23.1	26.0	22.4	20.6	22.4	23.6	23.3	19.4	8.2	3.2	4.1	4.7	4.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Bleed				30.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0
Total Restoration Disposal (gpm)				125.0	133.0	125.0	135.0	135.0	136.0	136.0	140.0	140.0	150.0	140.0	140.0	140.0	172.0	176.0	176.0	140.0	170.0	170.0	170.0	170.0	170.0	170.0	50.0	0.0	0.0	0.0	0.0
Total Disposal Required (gpm)				210.2	208.7	207.4	209.1	206.3	206.3	210.3	210.2	199.6	202.2	180.6	180.5	180.2	207.9	210.0	207.7	171.7	201.7	201.7	201.7	199.8	198.8	196.9	56.0	5.0	5.0	5.0	5.0
Total Disposal Balance				**0.0**	**1.0**	**3.0**	**1.0**	**4.0**	**4.0**	**0.0**	**0.0**	**10.0**	**8.0**	**29.0**	**30.0**	**30.0**	**2.0**	**0.0**	**2.0**	**38.0**	**8.0**	**8.0**	**8.0**	**10.0**	**11.0**	**13.0**	**154.0**	**205.0**	**205.0**	**205.0**	**205.0**

Table 3-13 Reynolds Ranch Water Balance

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Total Production Flow (gpm)				0	2400	4740	5700	5360	5630	5840	5850	5310	5180	4700	4735	4725	4510	4450	5300	3420	1900	25	0	0	0	0	0	0	0	0	0
Total Production Bleed (gpm)				0	24	47.4	57	53.6	56.3	58.4	58.5	53.1	51.8	47	47.4	47.3	45.1	44.5	53	34.2	19	0.3	0	0	0	0	0	0	0	0	0
Restoration Flows																															
	PV With Flair (Kgal)	GWS PV to Finish	RO PV to Finish																												
MU 27(gal) (RO)	147510	1	8							75	75	50	50	50	400	400	200	200	200	200	200	200	200								
GWS (gal)																															
Total Disposal (gal)										75	75	50	50	50	100	100	50	50	50	50	50	50	50								
MU 21 (gal)(RO)	77530	1	8									45	25	25	40	25	200	200	200	200	200	200	200								
GWS (gal)																															
Total Disposal (gal)												45	25	25	0	0	50	50	50	50	50	50	50								
MU 22 Ext.(gal)(RO)	79690	1	8															60	60	60	50	50	50	200	200	200	200	200	200	600	400
GWS (gal)																															
Total Disposal (gal)																		0	0	0	0	0	0	50	50	50	50	50	50	150	100
MU 23 (gal)(RO)	51440	1	8										20	20	40	25	200	200	200	200	200										
GWS (gal)																															
Total Disposal (gal)													20	20	0	0	50	50	50	50	50										
MU 24 (gal) (RO)	71610	1	8													25	25	25	25	25	25	200	200	200	200	200	200				
GWS (gal)																															
Total Disposal (gal)																0	0	0	0	0	0	50	50	50	50	50	50				
MU 25 (gal)(RO)	98060	1	8														40	40	40	40	40	200	200	200	200	200	200	200	200		
GWS (gal)																															
Total Disposal (gal)																	0	0	0	0	0	50	50	50	50	50	50	50	50		
MU 26 (gal)(RO)	50610	1	8																		30	30	30	30	200	200	200	200	200		
GWS (gal)																															
Total Disposal (gal)																					30	0	0	0	50	50	50	50	50		
MU 28 (gal)(RO)	17480	1	8																				10	10	10	10	10	200	200		
GWS (gal)																															
Total Disposal (gal)																							0	0	0	0	0	50	50		
Total Restoration Disposal (gpm)				0	0	0	0	0	0	75	75	95	95	95	100	100	150	150	150	150	180	200	200	200	200	200	200	200	200	150	100
Installed RO Capacity (gpm) (feed)																															
	Feed (gpm)																														
	250																														
	250																														
	250																														
Total Capacity	**250**																														
Deep Disposal Well Capacity (gpm)	**Assumed**																														
Reynolds Ranch 1 (gpm)	**50**			50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Reynolds Ranch 2 (gpm)	**50**			0	0	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Reynolds Ranch 3 (gpm)	**50**								50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Reynolds Ranch 4 (gpm)	**50**																50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Total Available	**200**			50	50	100	100	100	150	150	150	150	150	150	150	150	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Control Bleed Capacity Available (gpm)				50	26	52.6	43	46.4	93.7	16.6	16.5	1.9	3.2	8	20	25	85	25	25	25	35	120	110	160	190	190	190	200	200	150	100
Total Production Bleed (gpm)				0	24	47.4	57	53.6	56.3	58.4	58.5	53.1	51.8	47	47.4	47.3	45.1	44.5	53	34.2	19	0.3	0	0	0	0	0	0	0	0	0
Total Restoration Disposal (gpm)				0	0	0	0	0	0	75	75	95	95	95	100	100	150	150	150	150	180	200	200	200	200	200	200	200	200	150	100
Total Disposal Required (gpm)				0	24	47.4	57	53.6	56.3	133.4	133.5	148.1	146.8	142	147.4	147.3	195.1	194.5	203	184.2	199	200.3	200	200	200	200	200	200	200	150	100
Total Disposal Balance				**50**	**26**	**52.6**	**43**	**46.4**	**93.7**	**16.6**	**16.5**	**1.9**	**3.2**	**8**	**2.6**	**2.7**	**4.9**	**5.5**	**-3**	**15.8**	**1**	**-0.3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50**	**100**

Table 3-14 Highland Water Balance

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
				2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2035
Production Flows																												
Total Production Flow (gpm)				4810	4360	5070	3946	2800	1110	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Production Bleed (gpm)				48.1	43.6	50.7	39.5	28	11.1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Control Bleed (gpm)				40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	0							
Restoration Flows																												
	PV With Flair (Kgal)	**GWS PV to Finish**	**RO PV to Finish**																									
MU C (gal) (RO)	88652	0	5	200	400	400																						
GWS (gal)																												
Total Disposal (gal)				50	100	100																						
MU D (gal) (RO)	28046	0	5	200	200																							
GWS (gal)																												
Total Disposal (gal)				50	50																							
MU D Ext. (gal) (RO)	17296	0	5		200	200																						
GWS (gal)																												
Total Disposal (gal)					50	50																						
MU E (gal) (RO)	81658	1	8			152	760	400																				
GWS (gal)				150	140																							
Total Disposal (gal)				70	20	38	190	100																				
MU F (gal) (RO)	221800	1	8					100	100	100	160	320	320	720	720	720	520	320										
GWS (gal)								0	0	0	10	80	80	180	180	180	130	80										
Total Disposal (gal)																												
MU H (gal)(RO)	94815	1	8			100	100	360	840	600																		
GWS (gal)						0	0	90	210	150																		
Total Disposal (gal)																												
MU I (gal)(RO)	115820	1	8					80	80	80	760	600	600															
GWS (gal)								10	10	60	190	150	150															
Total Disposal (gal)																												
MU J (gal)(RO)	86995	1	8							20	30	100	50	200	200	200	200	400	200									
GWS (gal)										20	30	0	0	50	50	50	50	100	50									
Total Disposal (gal)																												
MU K (gal)(RO)	84209	1	8									40	40	40	40	40	200	200	720	320								
GWS (gal)												0	0	0	0	0	50	50	180	80								
Total Disposal (gal)																												
Total Restoration Disposal (gpm)				170	170	188	190	200	220	230	230	230	230	230	230	230	230	230	230	80	0	0	0	0	0	0	0	0
Restoratio Water From Smith Ranch (gpm)																				140	180	180	140	140	180	140	0	0
																				220	180	180	140	140	180	140	0	0

Installed RO Capacity (gpm) (feed)	**Feed (gpm)**
	200
	200
	100
	250
	250
	250
Total RO Capacity (gpm)	1250

Deep Disposal Well Capacity (gpm)	**Permitted**	**Current**																										
Morton 1-20 (gpm)	**147**	**28**		28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
DDW 9 (gpm)	**158**	**28**		28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Volman 33-27 (gpm)	**105**	**50**		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
PSR2 Evaporation (gpm)		**20**		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Irrigator Circle 2 (gpm)		**180**		180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
Total Available		**306**		306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306
HUP Resin Transfer				0	17.4	26	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	26	26	26	26	26	26	26	26	26	26	26	0
Total Production Bleed (gpm)				48.1	43.6	50.7	39.5	28	11.1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Control Bleed (gpm)				40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0	0	0	0
Total Restoration Disposal (gpm)				170	170	188	190	200	220	230	230	230	230	230	230	230	230	230	230	220	180	180	140	140	180	140	0	0
Total Disposal Required (gpm)				258.1	271	304.7	298.3	296.8	299.9	303.8	298.8	298.8	298.8	298.8	298.8	298.8	296	296	296	286	206	206	166	166	206	166	26	0
Total Disposal Balance				**48**	**35**	**1**	**8**	**9**	**6**	**2**	**7**	**7**	**7**	**7**	**7**	**7**	**10**	**10**	**10**	**20**	**100**	**100**	**140**	**140**	**100**	**140**	**280**	**306**

Table 3-15 North Butte Production Water Balance

Date	Year	1 2013	2 2014	3 2015	4 2016	5 2017	6 2018	7 2019	8 2020	9 2021	10 2022	11 2023	12 2024	13 2025	14 2026	15 2027	16 2028
Reserves	6000	5566	4777	4027	3277	2665	2054	1454	904	504	254	154	94	49	19	-1	-6
Flow /Pattern		16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Head Grade		62	54	37	29	24	24	24	22	19	17	11	7	7	5	5	4
Production (Thousand lbs.)		434	789	750	750	612	612	600	550	400	250	100	60	45	30	20	5
Production																	
Flow (gpm)		2200	3500	4800	6100	6000	6000	6000	6000	5000	3500	2200	2000	1500	1500	1000	300
Operation Timeframe																	
Mine Unit One																	
Mine Unit Two																	
Mine Unit Three																	
Mine Unit Four																	
Mine Unit Five																	
Annual Bleed Total (Mgal) **(Assume 1% bleed)**		11	18	25	32	31	31	31	31	26	18	11	10	8	8	5	2
Restoration **(Assume nine CPV of treatment)**																	
Mine Unit 1 (gpm)	1CPV=	66	Mgal.			600	550										
Total (Mgal.) (Annually)						311	285										
Total Cumulative Treated (Mgal.)						311	596										
Mine Unit 2 (gpm)	1CPV=	124	Mgal.				50	600	600	300	600						
Total (Mgal.) (Annually)							26	311	311	156	311						
Total Cumulative Treated (Mgal.)							26	337	648	804	1115						
Mine Unit 3 (gpm)	1CPV=	87	Mgal.							300	300	600	300				
Total (Mgal.) (Annually)										156	156	311	156				
Total Cumulative Treated (Mgal.)										156	311	622	778				
Mine Unit 4 (gpm)	1CPV=	98	Mgal.									300	300	600	600		
Total (Mgal.) (Annually)												156	156	311	311		
Total Cumulative Treated (Mgal.)												156	311	622	933		
Mine Unit 5 (gpm)	1CPV=	113	Mgal. (est.)										300	300	300	900	300
Total (Mgal.) (Annually)													156	156	156	467	156
Total Cumulative Treated (Mgal.)													156	311	467	933	1089
Water Treatment Capacity																	
Total Water Treatment (Annual Mgal.)		11	18	25	32	342	342	342	342	337	485	478	477	474	474	472	157
Average treatment volume (gpm)		22	35	48	61	660	660	660	660	650	935	922	920	915	915	910	303
RO Concentrate to Disposal (gpm)		3	5	7	9	99	99	99	99	98	140	138	138	137	137	137	45
RO Concentrate to Disposal (Annual) (Mgal)		2	3	4	5	51	51	51	51	51	73	72	72	71	71	71	24
Water Disposal Capacity																	
Annual Disposal Needed (Mgal)		2	3	4	5	51	51	51	51	51	73	72	72	71	71	71	24
Water Balance																	
Total Disposal Capacity (Mgal.)		52	52	52	52	78	78	78	78	78	104	104	104	104	104	104	104

Definitions

Mine Unit 1
Mine Unit 2
Mine Unit 3
Mine Unit 4
Mine Unit 5*

CPV = Contacted Pore Volume
Mgal= Million Gallons

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
11/23/99	HH-F-15	Approximately 900 gallons were released.	Fitting on bottom of tank broke.	Replaced fitting.
11/28/99 1:30am	Wellfield 3, Production well 3-P-133	Approximately 1,500 gallons of production fluid were released with a natural uranium content of approx. 149.7 mg/l. The spill was contained in the wellfield and did not threaten any waters of the state.	Mechanical failure of a flexible rubber hose fitting joining the wellfield to the poly piping to the header house caused the leak.	The hose was replaced and approx. 100 gallons of the spill were recovered with a vacuum truck and disposed of.
12/4/99	Wellfield 1, Header House 2	Approximately 50,000 gallons were released.	Failure of an aluminum cam- lock fitting.	Replaced fitting and inspected all like fittings in wellfield.
12/9/99	CMP-5	Approximately 900 gallons were released.	Well not shut off after pumping.	Incident discussed with operator
12/11/99 3:00am	Wellfield 1, Header House 2	Approximately 25,000 gallons of injection fluid were released with a natural uranium content of approx. 5.6 mg/l. The spill left the fenced wellfield area, but did not leave the permit area and did not threaten any waters of the state.	Failure of an aluminum camlock fitting that was connected to the header house filtration system used to remove suspended particulates within the injection solutions.	Wellfield 1 production was shut-in to visually inspect and rectify the construction issue. Bleed solutions were continued in the wellfield to maintain hydrologic control of the wellfield mining solutions. The inspection indicated that no other operating wellfield utilized aluminum camlock fittings. Areas adversely affect by the spill will be reseeded as the seasons permit. Additional erosion control structures will be constructed and the affect soil graded.
12/31/99 4:30pm	Wellfield 1, Header House 5	Approximately 3,000 gallons of injection were released, with a natural uranium content of 4.5 mg/l. The spill did not leave the permit area, but did enter an ephemeral drainage adjacent to the header house.	Equipment Failure: Failed joint holding PVC pipe together.	Production was halted from Header Houses 4 and 5 until similar glue joints were visually inspected. Bleed solutions were continued in the wellfield to maintain hydrologic control of the wellfield mining solutions. The minor rills were graded and reseeded as the seasons allowed.
1/17/00 2:30pm	Wellfield 4, well 4-P-2	Approximately 6,300 gallons of production fluid were released, with a natural uranium content of approx. 26 mg/L. The spill stayed within the fenced wellfield and did not leave the permit area or threaten any waters of the state.	Equipment Failure: failed manufacturer's crimp fitting connecting a flexible hose coming out of the wellhead to poly pipe which runs to the header house.	Similar crimp fittings were inspected and any that appear to have poor placement were replaced. Areas adversely affected by the spill will be reseeded as the seasons permit.
2/3/00	C-17	Approximately 1,800 gallons were released.	Clean-out line froze and broke, power down in wellfield.	Insured clean-out line was below ground to prevent freezing.
2/3/00	FP-156	Approximately 300 gallons were released.	Wellhead hose failed at well head.	Hose replaced and placed back into service.
2/15/00	FI-1128	Approximately 300 gallons were released.	Well head flange failed.	Replaced flange.
2/26/00 4:30am	Wellfield 4, well 4-P-13	Approximately 3,780 gallons of production fluid were released, with a natural uranium content of approx. 36 ppm.	Equipment failure: Failed manufacturer's crimp fitting connecting a flexible "red" hose coming out of the wellhead to poly pipe which runs to the header house.	All hoses of the type that failed were replaced with a higher-quality product. Areas adversely affected by the spill were reseeded as the seasons permit.
4/3/00	FI-1209	Approximately 1,000 gallons were released.	Well head flange failed.	Replaced flange.
8/7/00 8:00pm	Wellfield 4, well 4-P-30	Approximately 780 gallons of production fluid were released, with a U_3O_8 concentration of 24 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	Equipment Failure: Failed manufacturer's crimp fitting connecting a flexible "red" hose coming out of the wellhead to poly pipe which runs to the header house.	All hoses of the type that failed were replaced with a higher-quality product.
10/22/00 6:00pm	Wellfield 4, well 4-I-39	Approximately 1,100 gallons of injection fluid were released. The spill stayed within the permit area and did not threaten any waters of the state.	Human Error: Spill resulted from the failure of an employee to re-insert a plug in the gas trap after routine servicing.	Training program and protocols were reviewed to see if improvements can be made to prevent similar occurrences in the future. The minor surface erosion resulting from the spill were smoothed and seeded in the spring.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
11/22/00 12:00 noon	Wellfield 4, well 4-I-140	Approximately 1,870 gallons of injection fluid were released, with a U_3O_8 concentration of 2.3 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	Human Error: Spill resulted from the failure of an employee to re-insert a plug in the gas trap after routine servicing.	Training program and protocols were reviewed to see if improvements could be made to prevent similar occurrences in the future. All wells swabbed since September 1, 2000 were inspected to confirm the plugs were replaced. Minor surface erosion resulting from the spill were smoothed and seeded in the spring.
4/13/01	H-I-2	Approximately 1,500 gallons were released.	Glue joint on well head flange failed.	Repairs completed.
4/19/01	CI-186	Approximately 600 gallons were released.	Split 1.25-inch union to transition at well head.	Uncertain if fitting was faulty or over tightened. Repairs completed.
6/18/01 10:15pm	Deep Disposal Well #1	Approximately 1,100 gallons of water were released with a U_3O_8 concentration of 3 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	Equipment Failure: Failure of 3/8-inch diameter stainless steel tubing leading to the flow meter at the deep disposal well pump. The tubing sheared due to excessive vibration caused by failed bearings in the pump.	Upon discovering the leak, the well was immediately shut off. To prevent similar occurrences in the future, the pump was fitted with a device capable of shutting down the pump if excessive vibration is detected.
10/10/01	EPI-110	Approximately 100,800 gallons were released.	Meter run piped to wrong well.	Corrected and returned to service.
10/14/01 8:30am	Injection pipeline (SW¼, SE¼, Sec.26, T36N, R74W)	Approximately 3,600 gallons of water were released, with a U_3O_8 concentration of 0.9 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	Failure of an injection fluid pipeline connecting Wellfield 3 and the central processing plant; Water passed between a valve disc and the valve seat which were seated, but were not leak tight.	The valve was immediately tightened upon discovery of the leak. The minor erosion resulting from the spill was repaired.
10/22/01 10:30pm	Wellfield 3, Header house 3-2	Approximately 62,400 gallons of injection fluid were released with a U_3O_8 concentration of 2.7 ppm. The spill stayed within the permit area and did not threaten any waters of the state	Equipment Failure: Failed flange in the main PVC injection line feeding the header house.	The minor erosion resulting from the spill was repaired and the area was reseeded in the spring.
12/5/01 3:30am	Wellfield 3, wells 3-I-44 and 3-I-53	Approximately 3,600 gallons of injection fluid were released, with a natural uranium concentration of approx. 0.8 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	Human Error: The spill resulted when an operator turned on two wells without realizing surface piping had been disconnected to carry out maintenance. The piping had been taped shut, but the tape was insufficient to prevent flow.	The minor erosion resulting from the spill was repaired and the area was reseeded in the spring.
1/4/02 7am	3-P-163	Approximately 1,800 gallons of production fluid were released containing 18 ppm U_3O_8. The spill stayed within the permit area and did not threaten any waters of the state.	Galvanized nipple at wellhead corroded through and allowed water to escape.	The corroded nipple was removed and replaced with a stainless steel nipple, which is resistant to corrosion. Galvanized nipples are no longer used for this license renewal submittal and previously used galvanized nipples are being replaced. The minor erosion resulting from the spill was repaired and the area was reseeded in the spring.
4/11/02	C-24	Approximately 1,000 gallons were released.	0.5-inch metal fitting corroded and failed.	Repaired and returned to service.
4/24/02 12:10pm	Header house 4-7 in the (NW ¼ , SW ¼, Sec.35, T36N, R74W)	Approximately 18,000 gallons of water were released, with a natural uranium concentration of approximately 1.2 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	A glue joint connecting a 6-inch PVC Schedule 40 pipe on the injection circuit to a 6-inch PVC Schedule 80 fitting failed. The cause of the spill is thought to be due to the use of bad glue or the license renewal submittal of glue to the joint after the primer had dried.	Failed line was replaced with new parts. The next day the same line failed at a different fitting. See description of spill below.
4/25/02 12:10pm	Header house 4-7 (NW ¼, SW¼, Sec.35, T36N, R74W)	Approximately 3,500 gallons of water were released, with a natural uranium concentration of approximately 1.2 ppm. The spill stayed within the permit area and did not threaten any waters of the state.	PVC piping might have been damaged by UV radiation or from improper gluing techniques.	Additional destructive testing was conducted to assist in determining the possible cause of the failures. Employees will be retrained on the proper techniques of PVC gluing. The minor erosion resulting from the spills was repaired.
7/30/02	HH-4-8	Approximately 1,480 gallons were released.	Broken flange on main IC header.	Investigation was completed. The failure was caused by lack of support on the trunk line feeding the header. All header houses were inspected and similar issues corrected.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
10/10/02		Approximately 750 gallons were released.	Threads bad on hose, resulting in failure.	Repaired and returned to service.
1/11/03 7:00am	Wellfield No. 3, Well 3P-97 (NE¼, SW¼, Sec.26, T36N, R74W)	Approximately 1,380 gallons of production fluid were released with a natural uranium concentration of approximately 20 mg/l, and affected approximately 0.1 acres. The released fluid flowed into a draw, but did not exit the fenced wellfield area.	A crimp ring on the end of a pre-manufactured hose at a production wellhead caused the spill.	The well was immediately shut-in and the well was repaired using a new hose and put back into service. All hoses with similar style crimp rings that are still in service will be replaced by hoses that have banded end connections.
2/9/03 6:00pm	Wellfield No. 3, Well 3P-113 (NE¼, SW¼, Sec.26, T36N, R74W)	Approximately 500 gallons of production fluid were released, with a natural uranium concentration of approximately 2 mg/l, and affected approximately 0.01 acres. The released fluid flowed into a dry draw, where it ponded and soaked into the ground. The fluid did not exit the fenced wellfield area.	The crimp ring on a pre-manufactured hose failed and allowed the release of production fluid.	The well was immediately shut-in. The well was repaired using a new hose with a different type of hose connection. All hoses in the area with similar style crimp rings were replaced on Feb. 10, 2003 with hoses that have banded end connections.
5/21/03	Trunk line station	Approximately 1,400 gallons were released.	Pinhole in steel tee inside the culvert (trunk line station).	Repairs completed and returned to service.
8/4/03	FI-106	Approximately 28,000 gallons were released.	Wrong well turned on by operator.	Review of procedures and revisions, as necessary.
9/6/03 7:40am	Headerhouse 4-7 in Wellfield 4 (NW¼, Sec.35, T36N, R74W)	Approximately 20,800 gallons of injection fluid were released, with an approximate natural uranium concentration of 1.1 mg/l and affected approximately 0.25 acres. The entire affected area is contained within the fenced wellfield area.	The release was caused by the separation of a Schedule 80 PVC elbow along the injection pipeline due to apparent inferior glue joint. In addition, the low pressure and sump water detection devices used on this pipeline did not shut down the header house and activate the alarm, allowing the release to go undetected until the Operator discovered it.	The header house was immediately shut down. The safety circuit shunt trip and alarm system were redesigned to ensure that any future spill occurrences are detected in a timely manner. The area will be reevaluated during decommissioning of the wellfield to ensure that applicable decommissioning standards for soil are not exceeded.
9/29/03	CMP-13	Approximately 5,000 gallons of water with a U_3O_8 concentration of approximately 2 mg/l were released from CMP-13. Fluid did not enter waters of the state.	The fluid was released from a cracked pipe at the wellhead of CMP-13. During monitoring events the purge water is piped to the C-14 Headerhouse.	The situation was corrected and the well placed back into service.
10/15/03	2P-182	Approximately 5,000 gallons of production fluid with a U_3O_8 concentration of approximately 47 mg/l were released from well 2P-182. All the released fluid was retained in the fenced wellfield area.	The release resulted from the failure of a pressure relief valve on the wellhead.	The well was immediately shut off. A vacuum truck was used to recover approximately 4,000 gallons. All relief valves are being replaced.
10/20/03 2:30pm	C-Wellfield, Well CI-28 (SW¼, NE¼, Sec.14, T36N, R72W)	Approximately 2,800 gallons of injection fluid were released, with an approximate uranium concentration of 1.5mg/l, which affected approximately 0.5 acres. All released fluid remained within the fenced wellfield area and did not entire into any waters of the state.	The release was likely due to a break in the well casing just below the surface of injection well CI-28.	The well was immediately shut off and repaired. Mechanical Integrity tests continue to be conducted on a regular schedule to prevent this type of release. It was not possible to retrieve any of the released fluid, as the fluid immediately absorbed into the ground. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
12/20/03 10:30am	Headerhouse F-44 in the F-Wellfield; fluid leaking from Well FI-1286 meter run. (NW¼, SE¼, Sec.21, T36N, R73W)	Approximately 600 gallons of injection fluid were released, with an approximate uranium concentration of 1.5 mg/l. The released fluid remained within the fenced wellfield area and did not enter into any waters of the state.	A crack in a PVC end cap allowed the release of injection fluids.	Well FI-1286 was immediately shut off, the end cap was replaced, and fittings were repaired. It was not possible to retrieve any of the released fluid. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for the soils are met.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
2/8/04 9:30pm	D Extension Wellfield, Well DI-204 (NE¼, SW¼, Sec.22, T36N, R73W)	Approximately 500 to 1000 gallons of injection fluid were released, with an approximate uranium concentration of 1.1 mg/l. The released fluid flowed into two small ponds of water in an ephemeral draw, contained within the fenced area of the wellfield.	The well was investigated with a downhole camera and was found that the well had leaked at the first casing joint, approximately 20 feet below the surface. A separation in the splined groove casing was observed at this joint. The last mechanical integrity test was conducted on June 28, 2001 and no problems were noted.	The well was immediately shut down and tagged out. The top joint of the well casing was repaired and the well was brought back into service. Approximately 1500 gallons of combined injection fluid, snowmelt, and purged monitor well water were recovered from the two small pools. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
2/11/04 3:15pm	Mine Unit 4, Well 4I-307 (NW¼, NE¼, Sec.22, T35N, R74W)	Approximately 400 to 600 gallons of injection fluid were released, with an approximate uranium concentration of 1.3 mg/l, and affected 0.01 acres.	The PVC flange assembly separated from the well casing at the top of well 4I-307. The separation appears to be due to improper application of the glue at the joint.	The well was tagged out of operation until the PVC flange assembly is installed back on the well casing. Proper glue application to the joint will be practiced to prevent future separation of the PVC flange assembly to this well. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
5/3/04 2:20pm	Mine Unit 4, near Headerhouse 4-9 (SE¼, SW¼, Sec.35, T36N, R74W)	Approximately 800 to 1000 gallons of production fluid overflowed onto the ground, with an approximate uranium concentration of 11.1 mg/l. The released fluid flowed approximately 200 feet where it then soaked into the ground. Approximately 0.01 acres were affected.	The release occurred when a steel fitting on the production line inside the valve station failed. Investigation showed that the cause of the failure was rusting of the fitting.	The main line was immediately shut down and repairs were completed. It was not possible to recover any of the fluid released to the ground; however, the fluid that remained in the culvert was recovered. Repairs were also made to other areas where this type of fitting was in place. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
7/22/04 10:00am	Mine Unit 4, near Headerhouse 4-9 (NW¼, SW¼, Sec.35, T36N, R74W)	Approximately 2700 to 5000 gallons of production fluid overflowed onto the ground, with an approximate uranium concentration of 11 mg/l. The release flowed approximately 500 feet where it soaked into the ground. Approximately 0.6 acres were affected.	The release occurred when a carbon steel fitting on the production pipeline located inside the valve station failed. Investigation showed that the cause of the failure was due to corrosion of the fitting.	Approximately 200 gallons were recovered from the small depression, and fluid from the culvert was also recovered. The fitting was replaced with stainless steel. All valve stations at Smith Ranch were inspected to assess if any similar equipment existed, and if found, were replaced. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
9/6/04	Mine Unit 2, Injection well 2I-122	Approximately 1,600 gallons of injection fluid were released. No fluid reached any waters of the state. All fluid soaked into the ground.	Investigation with a downhole camera showed the leak occurred at the first casing joint located about 15 feet below ground.	The well was turned off.
9/12/04 1:30pm	F-Wellfield, near Headerhouse F-42 (NE¼, SE¼, Sec.21, T36N, R73W)	Approximately 1000 gallons of production fluid overflowed onto the ground, with an approximate uranium concentration of 10.5 mg/l. The released fluid flowed approximately 600 feet where it then soaked into the ground. Approximately 0.03 acres were affected.	The release occurred when a steel reducer connecting the production line inside the valve station failed. Investigation showed that a hole had developed in the reducer as a result of rusting.	The main line was immediately shut down. The fluid that remained in the culvert was recovered. The reducer was replaced and the pipeline placed back into service.
9/29/04 1:20pm	Near Mine Unit I, along the 14-inch injection trunk line that runs from Mine Unit I to Satellite No. 2 (SW¼, NW¼, Sec.24, T36N, R73W)	Approximately 2,000 gallons of injection fluid emerged from the point of failure and covered approximately 0.23 acres. The approximate uranium concentration of the injection fluid was 1.6 mg/l. None of the released fluid entered waters of the state.	The cause of the release was determined to be failure of a fusion joint.	The Injection Trunk Line was immediately shut down and repaired that evening. Approximately 1,200 gallons of the released fluid was recovered before it was absorbed. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for the soils are met.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
6/19/07 12:30pm	Wellfield K, Injection well KI-156	Approximately 900 gallons of production fluid were released, with a uranium concentration of approximately 41.2 mg/l. The release affected approximately 0.03 acres.	An employee had finished swabbing well KI-156 and was backing the truck to attach the water trailer. The trailer was bumped when attempting to hook-up and the plastic water tank was breached, releasing the fluid.	The trailer was taken out of service. Approximately 60 gallons were recovered with a vacuum truck. The affected soils were removed from the spill area and disposed of at a licensed By-Product Facility.
6/22/07	Wellfield H, injection well HI-744	Approximately 198,500 gallons were released from the injection well, with a uranium concentration of 3.3 mg/l.	HI-744 was not adequately isolated. A tee and valve were left in place on the meter run to HI-744 after HI-744 was removed from service. The valve isolating HI-744 was mistakenly opened and the valve to well HP-3911 was closed.	An extensive environmental investigation was completed to determine the impacts of the release. Cameco removed and disposed the affected soil, reseeded and stabilized the area. The release was limited to a total area of less than two acres, completely on Cameco's property and within the permitted area.
6/25/07	Wellfield H, production well HP-397	Approximately 3,747 gallons of production fluid were released with a uranium concentration of 21.0 mg/l, affecting 0.28 acres.	Corroded brass nipple at the wellhead.	This release was detected while determining the extent of the affected area from the injection fluid release on 6/22/07. The release was mitigated in conjunction with the larger release noted above.
6/27/07	Wellfield 2, injection well 2-I-166	Approximately 900 gallons of injection fluid was released, with a uranium concentration of 1.1 mg/l. The release affected approximately 0.07 acres.	The release was caused by a broken flange.	Mine Units 2 and 3 were shut off until all wells could be inspected. The wells were inspected for potential problems as they were brought back on line.
8/23/07 10:55am	Deep disposal pipeline adjacent to Wellfield 2	Approximately 11,600 gallons of deep disposal fluid were released from the buried pipeline with approximately 7,500 gallons surfacing. The release affected approximately 0.34 acres.	The cause of the release was a failure of a cold fusion joint in the buried Deep Disposal polyline.	The line was shut off and repaired.
7/18/08 12:00pm	Booster station #5, located northeast of Wellfield 4	Approximately 2,887 gallons of production fluid were released from the booster pump station. The release affected approximately 0.18 acres.	Failure of a poly-can that encases a booster pump as a result of heat/pressure in the pump, and consequent melting of the polyethylene material of the can.	Upon discovery of the leak, the wellfield was immediately shut down. Corrective actions included setting booster pump drives to operate above a specific frequency, and an alarm if it falls below the frequency.
8/17/08 1:00am	Mine Unit K injection trunk line to Headerhouse K-6	Approximately 7,965 gallons of injection fluid were released, with a uranium concentration of 1.4 ppm. The release affected approximately 1.55 acres.	The cause of the leak was a fuse joint failure on the trunk line.	Upon discovery, the pipeline was immediately isolated by shutting down the trunk line. A vacuum truck recovered 450 gallons of the spilled solution.
9/17/08 1:30am	Booster House #3, located northeast of Wellfield K	Approximately 3,932 gallons of production fluid were released from the booster station.	The cause of the release was a failure of a polyethylene can that encases a booster pump as a result of heat/pressure in the pump, and consequent melting of the polyethylene material of the can.	The wellfield was immediately shut down. Corrective actions include setting booster pump drives to operate above a specific frequency and to alarm if it falls below the frequency.
10/30/08 12:23am	Mine Unit K injection 8-inch trunk line to Headerhouse K-7	Approximately 5,500 gallons were released from the trunk line, with an approximate uranium concentration of 2.0 ppm. The release affected approximately 1 acre.	The cause of the leak was a failed electrically fused collar.	The pipeline was immediately isolated upon discovery of the leak by shutting down the trunk line. The use of the electric fusion below ground was discontinued in August 2008.
12/29/08 10:30am	Mine Unit 9, well 9I-44	Approximately 1,144 gallons of injection fluid were released, with an approximate uranium concentration of 0.2 ppm. The released fluid went beyond the fenced area and terminated approximately at the monitor well ring.	A 1-inch polyline from the well was punctured while attempting the removal of ice at the wellhead. The well was not operating at the time and the operator did not realize the puncture had occurred. The well was turned back on at the header house and the release occurred.	The well was immediately shut down until repairs could take place. The polyline was repaired.
1/9/09 3:00pm	Mine Unit 15, well 15P-122	Approximately 2,169 gallons of production solutions were released, with an estimated U_3O_8 concentration of 11 ppm.	A 1½-inch transition at well 15P-122 was leaking due to rusted threads.	Approximately 2,000 gallons were recovered and disposed of via deep disposal well. Transitions of this type were inspected visually and replaced as needed.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
1/10/09 10:30pm	Satellite No. 2	Injection and production fluid leaked onto the floor of Satellite No. 2. The sump activated and transferred solutions to a storage tank within the satellite. Approximately 1,820 gallons exited the building.	An 8-inch Schedule 80 dump valve and associated piping broke free of IX-21 in Satellite No. 2, releasing fluid to the process area of the satellite.	The leak was isolated, clean up was completed, and radiation surveys confirmed the clean-up was successful. The satellite and affected area was cordoned off to reduce access until radiological surveys were completed. The dump valve and piping were repaired and the satellite placed back into service.
2/9/09 8:30am	Valve station in Wellfield 2 (SE¼, SE¼, Sec. 26, T36N, R74W)	Approximately 14,600 gallons of production solution were released with a U_3O_8 concentration of approximately 7 ppm.	A 16-inch steel tee on the main pipeline between Satellite SR-1 and the Central Processing Plant was leaking due to corrosion.	The valve station was repaired. Approximately 3,800 gallons were recovered and disposed of via deep disposal well. At the time of the leak, Cameco Resources already had a list of this type of valve station prioritized based on risk of a leak. The details from this spill were used to refine that list and implement repairs as necessary.
4/2/09 7:50pm	Mine Unit K, Well no. KI-218	Approximately 1,474 gallons of injection solution were released from the well, with a U_3O_8 concentration of approximately 2.0 ppm.	The release was caused by operator error.	Mine manager met with all wellfield operators to discuss incident.
5/11/09 11:45pm	Mine Unit J, Headerhouse J-3	Approximately 6,500 gallons of production solution were released, with a U_3O_8 concentration of approximately 19.8 ppm. Most of the released fluid was contained within the header house.	The release resulted from a failed gasket.	Approximately 5,600 gallons of the released fluid were recovered from the headerhouse.
5/26/09 1:00pm	Mine Unit H, well HI-43	Approximately 5,050 gallons of injection fluid were released from the well, with an approximate U_3O_8 concentration of 3.0 ppm.	The release was the result of the flange separating from the wellhead casing.	The H wellfield was turned off, awaiting replacement fittings for several wellheads in the H wellfield. Approximately 7,350 gallons were recovered, which included rainwater that had pooled in the area and co-mingled with the injection fluid.
6/10/09 12:30pm	Mine Unit 9, Well no. 9I-142	Approximately 190 gallons of injection solutions were released from the well, with an approximate U_3O_8 concentration of 0.7 ppm.	A 1-inch diameter line was accidently damaged, causing the leak. The damage may have been from digging that occurred in a nearby drill pit.	The line was repaired.
8/26/09 4:30am	Mine Unit K, Well no. KI-10	Approximately 1,500 gallons of injection fluids were released from the well, with an estimated U_3O_8 concentration of 1.1 ppm.	The release was caused by the failure of a brass pipe nipple at the wellhead which had corroded from the inside.	During well repairs prior to the release, the decision was made to replace these brass nipple fittings with stainless steel fittings. As a result of the spill, a wellfield operator was been assigned to inspect all the wellheads in the wellfield to expedite and prioritize replacement of the fittings.
9/23/09 2:30pm	Bellhole No. 21E, near Headerhouse 1 in Mine Unit E	Approximately 90,600 gallons of treated process water were released from Bellhole No. 21E, with an approximate uranium concentration of 0.01 mg/l.	The release resulted from an open, unused 3-inch clean-out line connected to the Selenium Treatment Plant.	The source of the release was immediately turned off and two vacuum trucks were mobilized to the scene, recovering approximately 22,000 gallons of the released water.
11/19/09	Mine Unit 9, Well 9I-127A,(SE¼, SE¼, Sec.8, T35N, R74W)	Approximately 560 gallons of injection solution was released with a U_3O_8 concentration of 1.4 ppm.	Operator swabbed well onto ground rather than the water trailer.	Apparent cause investigation resulted in a revision to the SOP, and the changes were reviewed with all swabbing operators.
1/28/10	MU-J, JI-184, in HH-J-5	Approximately 224 gallons of injection solution was released with a U_3O_8 concentration of 1.3 ppm.	Pop off valve had PVC shavings back flushed into the valve seat, causing failure.	The well was shut off and the valve replaced.
2/11/10	MU 9 HH 9-9, Well No. 9I-239	Approximately 94 gallons of injection solution was released with a U_3O_8 concentration of 1.1 ppm.	Because of a missing spline, the well head came off when the well was pressurized.	The spline in the well head was installed.
2/11/10	MU D	Approximately 100 gallons of injection solution was released with a U_3O_8 concentration of 0.5 ppm.	A contract backhoe was excavating a mud pit and encountered a poly trunk line.	The poly line was repaired.
2/11/10	MU 15 HH 15-8 Well No. 15-296	Approximately 112 gallons on injection solution was released with a U_3O_8 concentration of 0.5 ppm.	The well was turned on but was not connected to the piping.	The well was connected to the piping.
3/1/10	MU 15 HH 15-16 Well No. 15I-575	Approximately 236 gallons of injection solution was released with a U_3O_8 concentration of 1.1 ppm.	The well was hit by a vehicle and the impact broke the casing,	The casing was repaired.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
3/9/11	MU 15 HH 15-18 Well 15P-361	Approximately 323 gallons of injection solution was release with a U_3O_8 concentration of 14.2 ppm.	1 ½ inch polyline failed.	The polyline was replaced.
3/17/10	MU 1 HH 1-5 Well No. 1I-201	Approximately 318 gallons of injection solution was released with a U_3O_8 concentration of 0.5 ppm.	A 1-inch Schedule 80 Union failed and allowed fluid to spray inside of the well head.	The union was replaced.
7/8/2010	MU K, KI-006	Approximately 1,440 gallons of injection solution was released with a U_3O_8 concentration of 1.0 ppm.	O-ring seal 5' below surface failed and let the well leak to surface	This appeared to be a non-generic failure, probably due to an unreported vehicle contact with the exposed casing prior to start-up. The leak did not occur until the well pressured up. No action is warranted.
7/8/2010	MU-1 Main Pipeline	Approximately 1,190 gallons of production fluid was release with a U_3O_8 concentration of 2.4 ppm.	16" poly fusion joint separated	The cause of this leak was never identified. It was probably a failed fusion. The line has been isolated. It will be blinded and abandoned in-place. (Complete by 9/30/2010)
9/10/10	MU 15 HH 15-12	Approximately 350 gallons of injection solution was released with a U_3O_8 concentration of 1.3 ppm.	O-ring seal in completion cap split.	The O-ring was replaced,
9/22/10	MU 2 HH 2-1	Approximately 244 gallons of injection solution was released with a U_3O_8 concentration of 0.8 ppm.	6-inch gasket failed in the main IC header inside the headerhouse.	The gasket was replaced.
9/22/10	MU-15, HH 15-12	Approximately 960 gallons of injection solution was released with a U_3O_8 concentration of 1.5 ppm.	Main pipeline appeared to be leaking	This line was installed during a time when compressed air was used for leak testing. Our current use of hydrostatic testing should eliminate this type of failure. No action is warranted.
10/7/10	MU I HH I-1, Well No. II-0071P	Approximately 252 gallons of injection solution was released with a U_3O_8 concentration of 3.0 ppm.	A hose fitting failed due to corrosion.	The hose fitting was replaced.
12/22/10	MU H HH 15-22 Well No. 15I-796	Approximately 137 gallons of injection solution was released with a U_3O_8 concentration of 1.2 ppm.	Pop off valve failed.	The pop off valve was replaced.
3/10/11	MU K	Approximately 35,000 gallons of pump test water was released.	Modular tank failure during pump test.	
5/3/11	MU-15, HH 15-20	Approximately 1,500 gallons of production fluid was released with a U_3O_8 concentration of 99 ppm.	Power line fuse at headerhouse 15-20 blew down and all power to the headerhouse was off. Clay valve failed to close causing injection fluid to continue to be fed into the formation, pushing water up to overflow from the production (8) wells.	Header house 15-20 was isolated manually to stop the overflow which was done immediately upon discovery on May 3, 2011.
5/19/11	SR-2 Bellhole #1	Approximately 790 gallons of production fluid was released with a U_3O_8 concentration of 20.3 ppm.	Restart of wellfield and booster pumps after power outage at SR2 and discovered an 18" gasket on a blind flange failed.	The gasket was replaced and the power was restored.
7/22/11	MU-1, 1I-179	Approximately 53 gallons of injection fluid was released with a U_3O_8 concentration of 0.8 ppm.	Well was shut off for P-well being down. In the time it was off, the flange was cut off to be fitted with a splined wellhead, but job was not finished. Well was turned back on by an operator and not checked.	Well was immediately shut off. Action was taken to finish repair to the wellhead and the well was returned to service.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
10/9/04 4:00pm	Mine Unit C, at 6-inch pipeline in the C-19 Valve Station	Approximately 5,000 gallons of fluid with a uranium concentration of 7 mg/l were released. No fluid reached waters of the state.	Excavation of the valve station showed that the release was caused by a hole rusted in the steel tee.	Approximately 2,400 gallons were recovered with the vacuum truck.
1/10/05 10:00pm	Well FPI-45, located in the F-3 area of Mine Unit-F (SE¼, NE¼, Sec.21, T36N, R73W)	Approximately 300 gallons of injection fluid were released into a small, dry, ephemeral channel. All fluid soaked into the ground. The fluid had an approximate uranium concentration of 1 mg/l. The affected area was less than 0.01 acres.	The cause of the release was a pop-off valve that was stuck in a partially open position.	The well was shut off and the valve was serviced before the well was restarted. Before restarting, the valve was isolated and it was verified that the well was operating properly. All similar installations are being inspected to ensure the pop-off valves and all related equipment are functioning as intended.
2/26/05 10:30am	Wellfield F, Headerhouse F-5	Approximately 3,000 gallons of production fluid were released and flowed down an ephemeral draw for approximately 475 feet. The approximate uranium concentration of the production fluid was 11.5 mg/l, and the release affected approximately 0.1 acres.	Operator failed to open the production bypass valve at Satellite No. 3 prior to starting the wellfield after an unscheduled shutdown and opened another valve by mistake.	The header house was immediately shut down and repairs to the main PC header were completed on Feb. 27, 2005. The production bypass valve at Satellite No. 3 has been marked to distinguish it from the adjacent valve to avoid similar occurrences. Approximately 4,500 gallons of production fluid combined with runoff water was recovered.
5/16/05 9:30am	H-Wellfield, Injection well HI-35 (SW¼, SE¼, Sec.12, T36N, R72W)	Approximately 20,700 gallons of injection fluid flowed from the hose onto the ground and into a small playa. The uranium concentration of the production fluid was approximately 1.1 mg/l and the release affected approximately 1.5 acres.	The release occurred when a brass nipple on the hose connection at the wellhead failed as a result of corrosion.	The well was immediately shut down and repairs were completed. A retaining trench was dug upstream of the playa to catch any remaining production fluid flowing toward the playa.
5/31/05 4:45am	Mine Unit I at a valve station manhole near Headerhouse I-3 (SE¼, SW¼, Sec.24, T35N, R73W)	Approximately 4,700 gallons of injection fluid flowed from the manhole onto the ground. The fluid flowed approximately 3,300 feet down an ephemeral draw where it then entered a small stockpond. The approximate uranium concentration of the released fluid was 1.1 mg/l. The release affected 0.22 acres.	The release occurred when a fused joint on a 6-inch poly feeder line failed. It is believed this failure was the result of settling of the 6-inch line and a weak fusion at the joint.	The joint was repaired and the line was placed back into service.
8/16/05 12:30pm	Mine Unit 15, a manhole near the staging area (SW¼, SE¼, Sec.10, T35N, R74W)	Approximately 1,050 gallons of production fluid flowed from the manhole onto the ground, with an approximate uranium concentration of 2.9 mg/l. The release affected 0.1 acres.	The release occurred when the flange between the 18-inch steel tee and the 18-inch poly trunk line began leaking.	The line was immediately shut down and repairs were completed. A small earthen dam was placed to prevent further migration of the released fluids. As a result, the spill did not enter any ephemeral drainage. Approximately 200 gallons of released fluid was recovered from ponded areas.
8/30/05 5:15am	Mine Unit F, Production well FP-435	Approximately 1,000 gallons of production fluid flowed from the well onto the ground. The approximate uranium concentration of the production fluid was 15.4 mg/l and the release affected approximately 0.04 acres.	The release occurred when a 1.5-inch Schedule 80 union on the wellhead failed.	The well was immediately shut down and repairs were completed. The union was replaced with a brass union instead of PVC. The entire area will be re-evaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
9/2/05 8:30pm	Mine Unit 2, Well 2P-182 (SW¼, SW¼, Sec.25, T36N, R74W)	Approximately 4,500 gallons of production fluid flowed from the wellhead onto the ground. The approximate uranium concentration of the production fluid was 8.6 mg/l and the release affected approximately 0.2 acres.	The release occurred when a 1.5-inch Schedule 80 union on the wellhead failed.	The well was immediately shut down and repairs were completed. The union was replaced with a brass union instead of PVC.
12/30/05 11:45am	Mine Unit C, Injection Well CI-140 (SW¼, NE¼, Sec.14, T36N, R73W)	Approximately 1,000 gallons of restoration injection fluid flowed from the wellhead and absorbed into the ground. The approximate uranium concentration of the restoration injection fluid was 0.7 mg/l and the release affected 0.15 acres.	The release occurred when the PVC wellhead casing failed at ground level due to degradation of the casing. The well was operating under normal operating pressures. The well passed the previous MIT in January 2005.	The well was immediately placed out of service until repairs could be made. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.

Table 3-16 Summary of Spills and Releases

Date of Detection	Location	Description	Cause	Resolution
1/9/06 12:30am	Mine Unit 3, Headerhouse 3-3 (SW¼, Sec.26, T36N, R74W)	Approximately 6,240 gallons of injection fluid flowed from the headerhouse. The approximate uranium concentration of the injection fluid was 1.7 mg/l and the release affected approximately 0.75 acres.	The release occurred when a full-faced rubber gasket failed at the tee for the main 6-inch IC line. The failure was caused from high pressure in the IC line and failure of the high/low pressure automatic shutdown device to function.	Upon discovery, the well was immediately placed out of service until repairs could be made. Flow from Mine Unit 3 was sent to the central processing plant instead of Satellite SR-1 until the corrective actions could be completed. A variety of corrective actions were conducted, including installing pressure reducing valves, wet alarms, and alarm lights.
2/10/06 9:30am	Mine Unit 2, Well 2P-182 (NE¼, SW¼, Sec.26, T36N, R74W)	Approximately 1,000 gallons of production fluid flowed from the wellhead onto the ground. The release had an approximate uranium concentration of 21.0 mg/l and affected approximately 2,000 square feet.	The release occurred when a 1.5-inch Schedule 80 union on the wellhead failed.	The well was immediately shut down and repairs were completed. The union was replaced with a brass union instead of PVC. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
10/21/06 6:00am	Deep Disposal Line from Bellhole 3-6-7 in Wellfield 3 (SE¼, SW¼, Sec.26, T36N, R74W)	Approximately 7,041 gallons of deep disposal well fluid filled the bellhole to the plant supply line level. The fluids then followed the supply line for 50 feet and surface to be absorbed into the ground. The uranium concentration of the released fluid was 1.8 mg/l and the release affected approximately 0.11 acres.	The release occurred when a welded joint in a carbon steel tee failed.	The plant was immediately shut down upon discovery of the release and until repairs could be completed. Approximately 3,100 gallons were recovered from two ponded areas.
11/22/06 9:30am	Wellfield 3 (SE¼, SW¼, Sec.26, T36N, R74W)	Approximately 2,100 gallons of mine waste fluid were released and absorbed into the ground. The uranium concentration of the mine waste fluid was 7.1 mg/l and the release affected approximately 0.15 acres.	The release occurred when a fused joint of a 6-inch buried polyline failed.	The line was immediately shut down until repairs could be completed. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.
12/5/06 11:00am	Wellfield C, Headerhouse C-22	Approximately 10,000 gallons of mixed monitor well and restoration and mine waste fluid were absorbed into the ground. The released fluid had an approximate uranium concentration of 1.0 mg/l and affected approximately 0.26 acres.	The release occurred when a PVC line tied to the cleanout line failed as a result of freezing and subsequent breakage.	Upon discovery, the line was immediately shut down until repairs were completed. Approximately 9,000 gallons were recovered.
12/13/06 11:30am	Wellfield I, Well I-1-14	Approximately 560 gallons of injection fluid were absorbed into the ground. The released fluid had an approximate uranium concentration of 2.0 mg/l and affected approximately 0.04 acres.	The release occurred when a water trap failed as a result of corrosion preventing proper seating.	Upon discovery, the line was immediately shut down until repairs could be completed.
1/13/07	Wellfield F, bellhole F-47	Approximately 5,000 gallons of injection fluid were released. The uranium concentration of the fluid was 2.0 mg/l and the release affected 0.03 acres.	The release occurred with the failure of a metal fitting.	Upon discovery, the line was immediately shut down until repairs could be completed. A total of 3,500 gallons were recovered with a vacuum truck. Mine Unit F and parts of Mine Unit D were taken out of service while an investigation was conducted to assess the cause.
2/19/07 8:15am	Wellfield 15, production well P-76	Approximately 6,000 gallons of production fluid were released. The uranium concentration of the fluid was 32.5 mg/l and the release affected approximately 0.09 acres.	The outer casing was checked and found to be good, the inter tubing had a hole and was replaced.	Upon discovery, the line was immediately shut down until repairs could be completed. A total of 5,500 gallons were recovered.
5/21/07	Wellfield I, Injection well I-19	Approximately 700 gallons of injection fluid were released and absorbed. The uranium concentration of the fluid was approximately 1.2 mg/l and the release affected 0.03 acres.	The cause was a petcock valve left in the open position.	Upon discovery, the valve was closed by the operator. The entire area will be reevaluated during the decommissioning of the wellfield to ensure that applicable decommissioning standards for soils are met.

Table 3-17 Summary of East and West Storage Pond Leak Events – November 15, 1999 through September 30, 2011

Leak Event #	Pond	Leak Identification Date	Cause of Breach to Primary Liner	Liner Repair Date	Corrective Actions, Design and/or Operational changes
1	West	Oct-99	Camlock end on transfer hose	Nov-99	Holes repaired; Pump installation in pond(s) to supplement need for transfer hoses
2	West	Mar-00	Old liner patches	Jun-00	Holes repaired: Higher grade patch kits: HH-66 vinyl cement and vinyl laminated fabric
3	West	Sep-00	Small hole(s) – cause unknown	Jun-01	Holes repaired
4	East	Nov-00	Ice expansion	Dec-00	Holes repaired
5	East	Aug-01	Small Hole(s) – cause unknown	Oct-01	Holes repaired
6	West	Aug-01	Small Hole(s) – cause unknown	Oct-01	Holes repaired
7	West	Jan-02	Small Hole(s) – cause unknown	2004	Holes repaired and new liner
8	East	Jan-02	Small Hole(s) – cause unknown	Mar-02	Holes repaired
9	East	Oct-05	Maintenance – use of track hoe to clean out sludge	Oct-08	New liner
10	East	Dec-08	Holes (deer access to pond)	Dec-08	Holes repaired; Fencing upgrades
11	East	Apr-09	Maintenance – repair of dock with pre-fabricated floating platform	Apr-09	Holes repaired
12	East	Jul-10	Small hole(s) – cause unknown	Sep-10	Holes repaired
13	East	Jun-11	Small hole(s) – cause unknown	Jul-11	Holes repaired
14	East	Aug-11	Small hole(s) – cause unknown	Aug-11	Holes repaired

Table 3-18 Groundwater Sampling Results for Monitor Wells Near PSR-2

Parameter	East Well								
	3/5/2009	6/26/2009	9/3/2009	11/12/2009	3/23/2010	6/25/2010	9/22/2010	11/18/2010	3/17/2011
General Chemistry									
Bicarboante as HCO_3 (mg/L)	293	339	366	282	321	427	401	331	294
Chloride (mg/L)	401	480	414	368	376	502	442	409	409
Sulfate (mg/L)	2490	2390	2310	2440	2320	2340	2420	2390	2430
Specific Conductivity (µmhos/cm)	5120	5310	5240	5070	5050	5280	5210	5090	5090
pH	7.52	7.51	7.51	7.9	7.29	7.36	7.47	7.5	7.3
Dissolved Metals									
Barium (mg/L)	>0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium (mg/L)	0.046	0.096	0.045	<0.0025	0.038	0.065	0.039	0.036	0.029
Uranium (µCi/mL)	3.78E-08	4.50E-08	5.99E-02	<6.77E-10	3.47E-08	5.57E-08	5.36E-08	4.43E-08	3.69E-08
Radium-226 (µCi/mL)	9.00E-10	9.60E-10	8.98E-10	8.1E-10	1.6E-09	7.70E-10	7.80E-10	8.40E-10	1.10E-09
Parameter	**South Well**								
	3/5/2009	**6/26/2009**	**9/3/2009**	**11/12/2009**	**3/23/2010**	**6/25/2010**	**9/22/2010**	**11/18/2010**	**3/17/2011**
General Chemistry									
Bicarboante as HCO_3 (mg/L)	352	385	384	Dry well	343	310	Dry well	Dry well	Dry well
Chloride (mg/L)	278	327	329	Dry well	254	321	Dry well	Dry well	Dry well
Sulfate (mg/L)	2370	2390	2270	Dry well	2050	2190	Dry well	Dry well	Dry well
Specific Conductivity (µmhos/cm)	4740	4790	4890	Dry well	4280	4400	Dry well	Dry well	Dry well
pH	7.8	7.8	7.68	Dry well	7.74	7.59	Dry well	Dry well	Dry well
Dissolved Metals									
Barium (mg/L)	<0.001	<0.001	<0.001	Dry well	<0.1	<0.001	Dry well	Dry well	Dry well
Selenium (mg/L)	1.78	1.63	1.46	Dry well	2.21	2.02	Dry well	Dry well	Dry well
Uranium (µCi/mL)	5.50E-07	5.37E-07	3.87E-07	Dry well	2.48E-07	5.57E-08	Dry well	Dry well	Dry well
Radium-226 (µCi/mL)	1.10E-09	7.70E-10	1.00E-09	Dry well	2.40E-10	1.40E-09	Dry well	Dry well	Dry well

Table 3-18 Groundwater Sampling Results for Monitor Wells Near PSR-2

Parameter	MW-1S						MW-2S					
	9/11/2009[1]	3/23/2010	6/30/2010	9/28/2010	11/18/2010	3/16/2010	9/11/2009[1]	3/23/2010	6/30/2010	9/28/2010	11/18/2010	3/16/2010
General Chemistry												
Bicarboante as HCO_3 (mg/L)	376	456	Dry well	428	368	366	371	393	Dry well	381	368	363
Chloride (mg/L)	298	269	Dry well	279	307	317	64	70	Dry well	69	72	73
Sulfate (mg/L)	1860	1870	Dry well	1920	1930	1920	248	238	Dry well	231	240	248
Specific Conductivity (µmhos/cm)	NDP	4400	Dry well	4340	4390	4430	NDP	1170	Dry well	1160	1180	1170
pH	NDP	7.07	Dry well	7.76	7.48	7.23	NDP	7.31	Dry well	7.87	7.61	7.52
Dissolved Metals												
Barium (mg/L)	<0.1	<0.1	Dry well	ND	ND	ND	<0.1	<0.1	Dry well	ND	ND	ND
Selenium (mg/L)	1.91 / 2.16	1.76	Dry well	2.00	2.08	2.30	0.006 / 0.036	0.004	Dry well	0.003	0.005	0.003
Uranium (µCi/mL)	3.22E-08	3.91E-08	Dry well	4.40E-08	3.80E-08	3.40E-08	1.49E-09	8.124E-10	Dry well	8.10E-10	1.20E-09	1.00E-09
Radium-226 (µCi/mL)	1.20E-09	8.1E-10	Dry well	1.50E-09	2.90E-10	5.20E-10	7.80E-10	1.4E-10	Dry well	7.00E-10	3.10E-10	2.00E-10
Parameter	**MW-3S**						**MW-4S**					
	9/11/2009[1]	**3/23/2010**	**6/30/2010**	**9/28/2010**	**11/18/2010**	**3/16/2010**	**9/11/2009[1]**	**3/23/2010**	**6/30/2010**	**9/28/2010**	**11/18/2010**	**3/16/2010**
General Chemistry												
Bicarboante as HCO_3 (mg/L)	382	404	Dry well	408	396	402	532	590	548	553	504	497
Chloride (mg/L)	504	516	Dry well	521	497	473	104	112	126	115	126	138
Sulfate (mg/L)	1080	952	Dry well	972	1020	1040	1550	1790	1750	1680	1620	1730
Specific Conductivity (µmhos/cm)	NDP	3490	Dry well	3410	3410	3370	NDP	3840	NDP	3610	3410	3660
pH	NDP	7.4	Dry well	7.85	7.6	7.51	NDP	7.03	NDP	7.8	7.59	7.24
Dissolved Metals												
Barium (mg/L)	<0.1	<0.1	Dry well	ND	ND	ND	<0.1	<0.1	<0.1	ND	ND	ND
Selenium (mg/L)	0.44 / 0.437	0.254	Dry well	0.226	0.198	0.178	0.377 / 0.554	0.895	0.498	0.900	0.681	0.840
Uranium (µCi/mL)	4.70E-07	5.29E-07	Dry well	5.70E-07	5.80E-07	5.60E-07	1.25E-07	1.2931E-07	8.87E-08	1.50E-07	1.90E-07	1.60E-07
Radium-226 (µCi/mL)	7.20E-10	1.2E-10	Dry well	7.60E-10	2.70E-10	3.90E-10	3.50E-09	2.5E-10	2E-09	3.50E-09	2.10E-09	2.10E-09

ND = non-detect, detection limit not provided
NDP – no data provided
Mg/L = milligrams per liter
µmhos/cm = micromhos per centimeter
µCi/mL = microcuries per milliliter
1 Second value given for Se on 9/11/09 sampling date represents data from Cameco Resource Laboratory

Table 4-1 Trend Analyses of Concentrations of Radon-222 Progeny in Air

Location	Radionuclides	Data Trend Direction
Central Processing Plant	Rn^{222} Progeny – Average	Stable
Pilot Plant	Rn^{222} Progeny – Average	Stable
Satellite Plant SR-1	Rn^{222} Progeny – Average	Negative
Satellite Plant No. 1	Rn^{222} Progeny – Average	Negative
Satellite Plant No. 2	Rn^{222} Progeny – Average	Stable
Satellite Plant No. 3	Rn^{222} Progeny – Average	Stable
Satellite Plant SR-2	Rn222 Progeny – Average	Negative*
Selenium Plant	Rn222 Progeny – Average	Negative*
Header Houses	Rn^{222} Progeny – Average	Stable

Rn^{222} progeny monitoring is reported in units of a working level (WL), which is any combination of Rn^{222} progeny in one liter of air that would result in emission of 1.3 x 105 mega electron volts of potential alpha energy. The DAC for Rn^{222} progeny is 0.33 WL. **Table 5-4** presents the Rn^{222} progeny concentrations in air as a percent of the DAC for each monitored building. The average concentrations in all cases are well below, and do not exceed, 10 percent of the DAC. The maximum concentrations occasionally are above the Rn^{222} progeny DAC for SR-1 in 2000 and 2001 and the CPP in 2001, but otherwise have been less than the DAC.

Note: The trend analysis provided within this section covers the period from 2000 to 2010. Rn^{222} progeny monitoring has only been conducted at the SR-2 and the Selenium Plant since 2009.

Location	New or Existing	Instrumentation (as spececified or equivallent)	LLD's
ENVIRONMENTAL SAMPLING			
AS-1 Background Station (Daves water well	existing	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	existing	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
AS-2 Fence Line	existing	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	existing	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
AS-3 Volmans	existing	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	existing	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
AS-4 HUP Overlook	reinstated	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	reinstated	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	reinstated	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
AS-5 Fowlers	reinstated	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	reinstated	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	reinstated	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
AS-6 Reynolds	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	existing	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
RG-1 West end of wellfield 4	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	New	Modified Kusnetz Method	0.033 WL
RG-2 Cattle guard into MU K	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
RG-3 Near PSR-2	existing	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NP-1 Smith Ranch Warehouse	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NP-2 Smith Ranch Central Processing Plant North end	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NP-3 Smith Ranch Central Processing Plant south end	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL

Table 5-1 Smith Ranch Radiological Sampline Plan

Location	New or Existing	Instrumentation (as spececified or equivallent)	LLD's
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NP-4 Smith Ranch Central Processing Plant east end	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NP-5 Smith Ranch Central Processing Plant west end	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NS-2 Satelltie SR-2 north end	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NS-3 Satelltie SR-2 south end	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NS-4 Satelltie SR-2 east end	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
NS-5 Satelltie SR-2 west end	new	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Global Environmental TLD	10 mrem
	new	Modified Kusnetz Method	0.033 WL
Header House 15-20	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Modified Kusnetz Method	0.033 WL
Header House 9-9	new	Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
	new	Modified Kusnetz Method	0.033 WL
ISOTOPIC ANALYSIS (Mixed DAC)			
Central Processing Plant	New	RADECO Model HD-29A	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
Satellitte Facilitiys	New	RADECO Model HD-29A	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
BETA CAMPAIGN			
α/β/γ Campaign for Personal Contamination	New	To be determined	To be determined
α/β/γ Campaign for Contamination Control	New	To be determined	To be determined
α/β/γ Campaign for Offsite releases	New	To be determined	To be determined
DOSE TO PUBLIC			
Dose to public (on site vendors) At locations NP-1, NS-2 and NS-4	New	Regulated air pump 50 LPM	$^{Nat}U - 1x10^{-16}$, $^{226}Ra - 1x10^{-16}$, $^{230}Th - 1x10^{-16}$, $^{210}Pb - 1x10^{-15}$ uCi/mL
		Radtrak© Type DRNF	$2x10^{-10}$ uCi/mL
		Global Environmental TLD	10 mrem
		Modified Kusnetz Method	0.033 WL
OCCUPATIONAL DOSE			
Evaluate dose for Office and Wellfield workers	New	Global TLD	10 mrem

Table 5-2 Average Annual Radiation Dosimeter Reading (mrem)

Workers	2002	2003	2004	2005	2006	2007	2008	2009	2010
CPP	363	250	286	305	249	498	336	389	417
Lab	110	96	65	98	103	112	104	53	131
Satellite SR-1	204	130	87	111	179	124	56	65	77
Satellite-2	132	138	145	188	108	169	125	86	67
Satellite-3	102	145	140	146	165	232	147	208	177
Maintenance	26	90	98	150	82	76	35	34	54
SR-2								138	103
Note: The Annual Dose Limit for a radiation worker, 5,000 mrem/year – 10 CFS 20.1201.									

Table 5-3 Natural Uranium Concentrations in Air as a Percent Derived Air Concentration

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Average	5.89	4.55	1.26	1.48	1.00	1.00	1.00	1.00	1.00	1.00	1.0	1.0
Maximum	93.98	21.31	16.66	17.65	24.00	22.00	14.60	15.00	9.40	5.40	10.5	5.4

Table 5-4 Radon-222 Progeny Concentrations in Air for Smith Ranch Facility Structures as a Percent of Derived Air Concentration

Location	Statistic	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Pilot Plant	Average	3.0	6.1	3.0	3.0	3.1	2.0	-	-	-	-	-	-
	Maximum	9.1	18.2	12.1	15.2	24.2	24.2	-	-	-	-	-	-
CPP	Average	6.1	3.0	6.1	3.0	3.1	4.0	4.0	5.0	2.0	2.7	1.8	1.8
	Maximum	57.6	30.3	175.8	36.4	24.2	24.2	24.2	51.5	24.2	24.2	20.3	21.5
SR-1	Average	6.1	6.1	3.0	6.1	6.1	5.0	2.0	1.0	1.5	1.5	1.2	1.5
	Maximum	81.8	172.7	175.8	78.8	24.2	24.2	24.2	24.2	24.2	24.2	14.5	12.4
*Satellite No 1	Average	-	3.1	3.1	3.0	3.1	3.0	2.0	2.0	-	-	-	-
	Maximum	-	-	-	-	24.2	24.2	24.2	24.2	-	-	-	-
*Satellite No 2	Average	-	4.0	2.8	2.7	6.1	5.0	3.0	3.0	5.0	3.0	3.0	1.8
	Maximum	-	-	-	-	63.6	24.2	24.2	24.2	27.6	24.2	42	12.1
*Satellite No 3	Average	-	3.9	3.3	3.6	9.1	7.0	4.0	3.0	2.0	2.0	1.5	1.5
	Maximum	-	-	-	-	24.2	24.2	24.2	24.2	24.2	24.2	13.3	9.7
*Header Houses	Average	-	1.8	2.3	2.3	3.1	6.00	4	3	2.7	2.4	2.7	3.0
	Maximum	-	-	-	-	24.2	24.2	24.2	24.2	24.2	27.3	26.7	27.9
*Selenium Plant	Average	-	-	-	-	-	-	-	-	-	-	3.0	1.8
	Maximum	-	-	-	-	-	-	-	-	-	-	14.5	21.5
*Satellite No. SR-2	Average	-	-	-	-	-	-	-	-	-	-	2.7	1.5
	Maximum	-	-	-	-	-	-	-	-	-	-	138	15.5
*Data prior to 2003 are associated with Highlands Uranium Project prior to incorporation into the Smith Ranch license.													

Table 5-5 Annual Total Effective Dose Equivalent for CPP Workers (mrem)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Average	-	-	-	492	433	498	478	419	619	475	482	515
Minimum	-	-	-	396	378	416	433	88	239	274	247	248
Maximum	301	583	1080	714	495	537	546	779	902	583	625	707

Table 5-6 Actions Taken for Individual Urinalysis Results

Uranium Content of Specimen		Required Action(s)	
a	Less than 15 pg/L.		None.
b	15 to 35 pg/L or 9 to 16 nCi in vivo.	1	Confirm results (repeat analysis).
		2	Attempt to identify cause of elevated result.
		3	Take corrective measures and/or limit employee's exposure.
		4	Document corrective actions.
		5	Submit documentation to NRC, as part of 10 CFR 40.65 report.
c	Greater than 35 pg/L.	1	Take actions specified for **b** above
		2	Restrict employee from yellowcake area work until results of subsequent specimens are less than 15 pg/L.
d	Greater than 35 pg/L for two consecutive specimens, or greater than 130 pg/L for any single specimen.	1	Take actions specified for **c** above.

Table 5-7 Bioassay Results for Smith Ranch from 1999 Through 2010

Year	Total Number Of Bioassays	Number <LLD	Number LLD to 15 µg/L	Number 15 to 35 µg/L	Number >35 µg/L
1999	408	390	0	18[a]	0
2000	388	381	0	6[b]	1 (364 µg/L)[b]
2001	304	302	0	1	1 (59 µg/L)[c]
2002	303	193	10	0	0
2003	241	236	5	0	0
2004	173	167	4	1[d]	1(61 µg/L)[d]
2005	184	183	1	0	0
2006	446	444	1	0	1 (39 µg/L)[e]
2007	509	508	0	1[f]	0
2008	529	526	2	0	1 (44 µg/L)[g]
2009	485	485	0	0	0
2010	834	832	2	0	0

Notes:

1. LLD = 5 µg/L;
2. Inferred causes for elevated bioassay results:
   a. Causes attributed to improper use of respirators, poor personal hygiene, and/or poor housekeeping.
   b. Personnel sneezing, water infiltration of respirator, improper use of respirator, or entering area without respirator.
   c. Believed to be from employee bringing contaminated gloves to nose or mouth.
   d. Probable improper bioassay sample handling.
   e. Maintenance worker worked without respiratory protection.
   f. Driller pulled wet piping material from well. Two elevated results were from baseline samples and are not reported here.
   g. Contract employee likely inadvertently contaminated sample.

Table 5-8 Allowable Limits for Removal to Uncontrolled Areas

These values are taken from: Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source or Special Nuclear Material."			
Surface Contamination levels for uranium, radium and their associated decay products on equipment to be released for unrestricted use, clothing, and non-operating areas of mills are as follows:			
a	b	c	
Nuclide	Average	Maximum	Removable
Natural Uranium	5,000 dpm/100 cm^2	15,000 dpm/100 cm^2	1,000 dpm/100 cm^2
Radium-226	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
a. Averaged over no more than 1 cm^2.			
b. Applies to an area of not more than 100 cm^2.			
c. Determined by smearing with dry filter or soft absorbent paper, applying moderate pressure and assessing the amount of radioactive material on the smear.			
Beta-Gamma Radiation	Average: 0.2 mR/hr above background		
	Highest: 1.0 mR/hr above background		

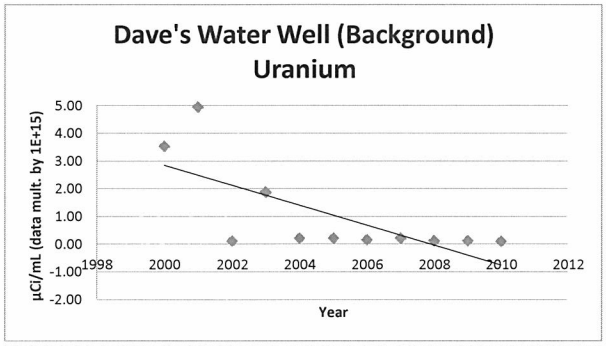
Table 5-9 Radiation Survey and Monitoring Equipment

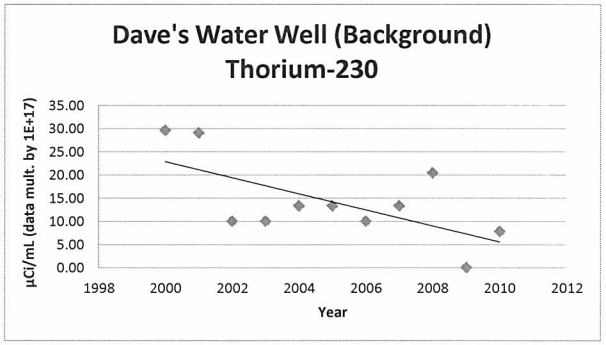
Manufacturer	Model #	Range (face scale)	X Factor (multiplier)	Probe/Drawer	Calibration Frequency	Planned Use
Ludlum	3	0-2 mR/hr	0.1-100	44-6	Annual[1]	Truck surveys
Ludlum	19	0-50 µR/hr	25-5000	NA	Annual[1]	Low level gamma surveys
Ludlum	2221 ratemeter/scaler	cps	Various	44-10	Annual[1]	Gamma surveys
Ludlum	3	0-500 cpm	0.1-100	43-5	Annual[1]	Personal alpha surveys and truck surveys
Ludlum	2000	Digital		43-9 drawer	Annual[1]	Analysis for modified Kusnetz Method
Ludlum	2000	Digital		43-78 drawer	Annual[1]	Large sample alpha survey
Ludlum	3	0-5 K cpm	0.1-100	44-9 pancake	Annual[1]	Alpha, beta and gamma surveys
Ludlum	12	0-500 cpm	0.1-100	43.5	Annual[1]	Alpha surveys
Giliam	GilAir 3	5-500 cc/min		NA	Bios DH_HC 1 Dry Cell Calibrator	Monthly radon testing
1. Calibration by EPA approved laboratory of instrument manufacturer.						

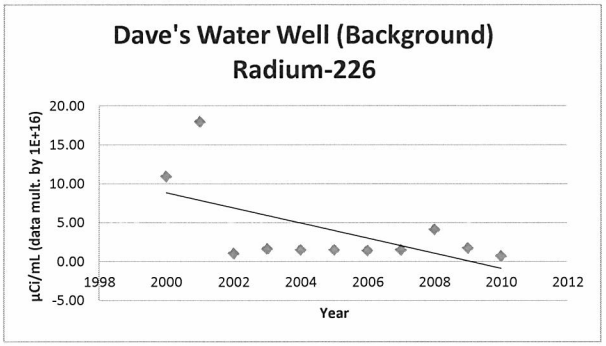
Table 5-10 Radionuclides Air Monitoring Data 2000-2010 Dave Water Well (AS-1)

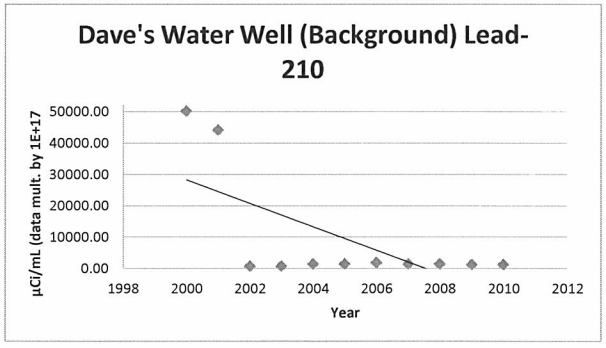
Dave's Water Well (Background)	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Uranium (µCi/ml)	9.13E-17	1.13E-16	1.08E-16	2.03E-16	1.48E-16	2.03E-16	2.03E-16	1.86E-15	1.00E-16	4.93E-15	3.51E-15
Thorium-230 (µCi/ml	< 7.82E-17	0.00E+00	2.04E-16	1.33E-16	1.00E-16	1.33E-16	1.33E-16	1.00E-16	1.00E-16	2.90E-16	2.96E-16
Radium-226 (µCi/ml	< 6.65E-17	1.71E-16	4.08E-16	1.46E-16	1.40E-16	1.46E-16	1.46E-16	1.60E-16	1.00E-16	1.79E-15	1.09E-15
Lead-210 (µCi/ml)	1.10E-14	1.11E-14	1.29E-14	1.32E-14	1.74E-14	1.32E-14	1.32E-14	5.75E-15	5.82E-15	4.41E-13	5.01E-13
Radon-222 (µCi/ml)	7.5E-10	1.4E-09	1.1E-09	3.0E-09	6.67E-10	3.0E-09	3.0E-09	9.8E-10	8.50E-10	9.75E-10	8.50E-10
Gamma (mrem/yr)	151	152	159	134	153	134	134	128	131	130	98

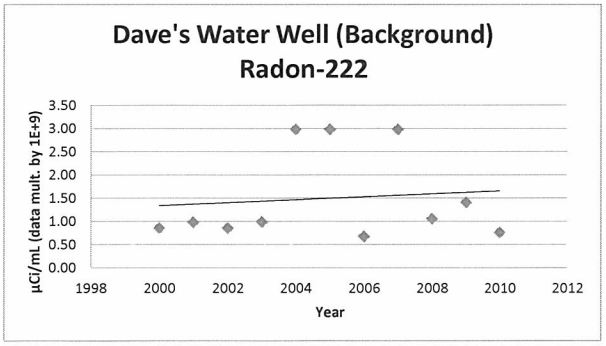
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Normalizat	Uranium (µCi/ml)	0.09	0.11	0.11	0.20	0.15	0.20	0.20	1.86	0.10	4.93	3.51
1.00E+15	Thorium-230 (µCi/ml)	7.82	0.00	20.40	13.33	10.00	13.33	13.33	10.00	10.00	29.00	29.60
1.00E+17	Radium-226 (µCi/ml)	0.66	1.71	4.08	1.46	1.40	1.46	1.46	1.60	1.00	17.90	10.90
1.00E+16	Lead-210 (µCi/ml)	1104.75	1107.50	1290.00	1322.75	1743.00	1322.75	1322.75	575.00	582.00	44100.00	50100.00
1.00E+17	Radon-222 (µCi/ml)	0.75	1.40	1.05	2.98	0.67	2.98	2.98	0.98	0.85	0.98	0.85
1.00E+09	Gamma (mrem/yr)	151.00	152.00	159.00	134.00	153.00	134.00	134.00	128.00	131.00	130.00	98.00











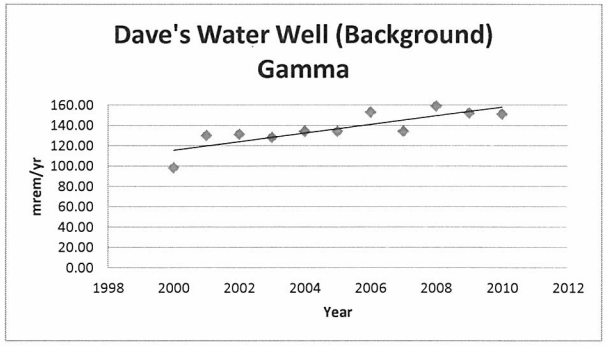
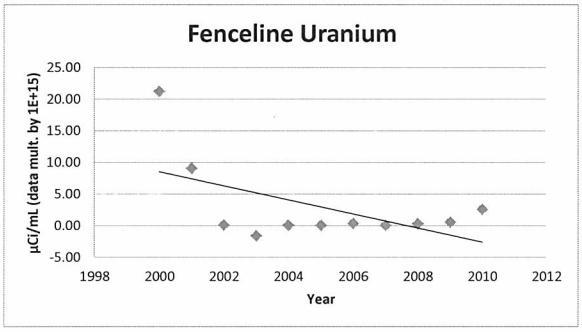


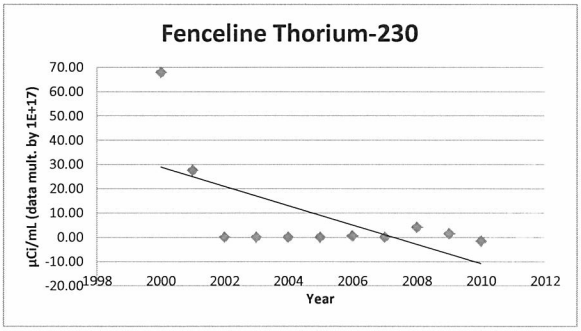
Table 5-11 Radionuclides Air Monitoring Data 2000-2010 Smith Ranch Controlled Area-Fence Line (AS-2)

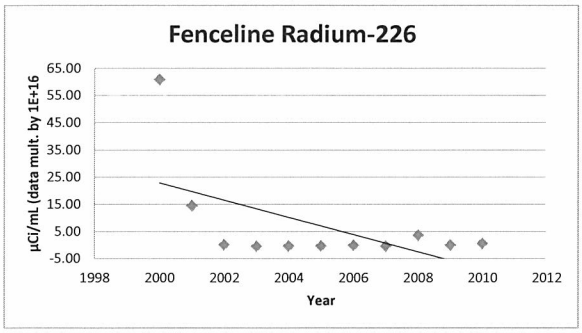
Fenceline (Controlled Area Boundary)

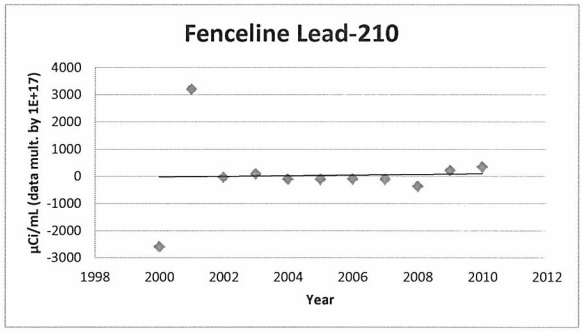
	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Uranium (µCi/ml)	2.59E-15	5.37E-16	2.86E-16	5.13E-17	3.47E-16	5.13E-17	5.13E-17	-1.6E-15	8.2E-17	9.07E-15	2.12E-14
Thorium-230 (µCi/ml) <	-1.5E-17	1.48E-17	4.1E-17	0	5E-18	0	0	0	0	2.75E-16	6.79E-16
Radium-226 (µCi/ml) <	5.02E-17	-6.6E-18	3.54E-16	-4.6E-17	-2.1E-17	-4.6E-17	-4.6E-17	-6E-17	0	1.45E-15	6.08E-15
Lead-210 (µCi/ml)	3.34E-15	2.07E-15	-3.7E-15	-1.1E-15	-1E-15	-1.1E-15	-1.1E-15	8.5E-16	-4.3E-16	3.2E-14	-2.6E-14
Radon-222 (µCi/ml)	5E-10	1.2E-09	6E-10	-1.5E-09	3E-10	-1.5E-09	-1.5E-09	2.2E-10	4E-10	1.05E-10	4E-10
Gamma (mrem/yr)	31	34	-10	23	27	23	23	20	18	28	-3

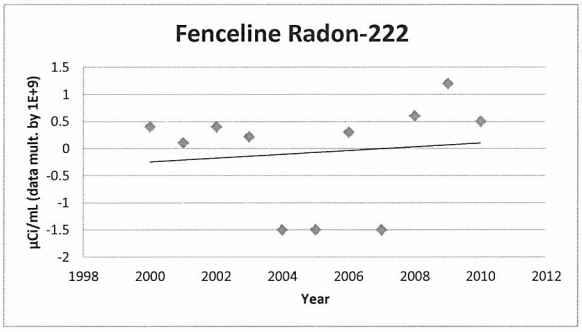
Normalization		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
1.00E+15	Uranium (µCi/ml)	2.59	0.54	0.29	0.05	0.35	0.05	0.05	-1.63	0.08	9.07	21.19
1.00E+17	Thorium-230 (µCi/ml)	-1.55	1.48	4.1	0	0.5	0	0	0	0	27.5	67.9
1.00E+16	Radium-226 (µCi/ml)	0.50	-0.07	3.54	-0.46	-0.21	-0.46	-0.46	-0.60	0.00	14.50	60.80
1.00E+17	Lead-210 (µCi/ml)	334.25	206.75	-374	-112.5	-100.5	-112.5	-112.5	85	-43	3200	-2600
1.00E+09	Radon-222 (µCi/ml)	0.5	1.2	0.6	-1.5	0.3	-1.5	-1.5	0.22	0.4	0.105	0.4
none	Gamma (mrem/yr)	31	34	-10	23	27	23	23	20	18	28	-3











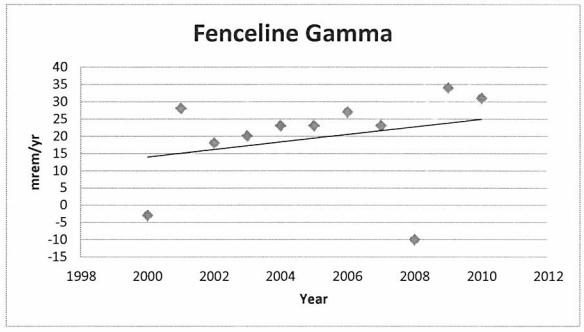
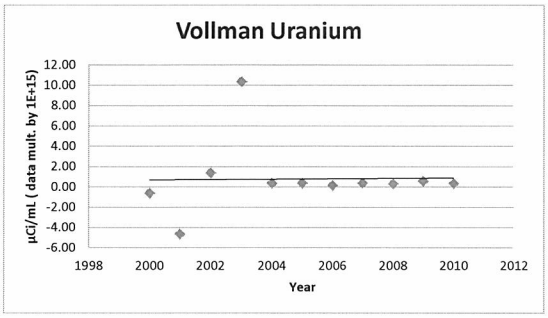


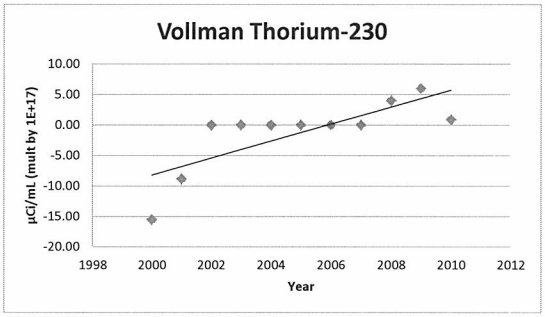
Table 5-12 Radionuclides Air Monitoring Data 2000-2010 Vollman Ranch (AS-3)

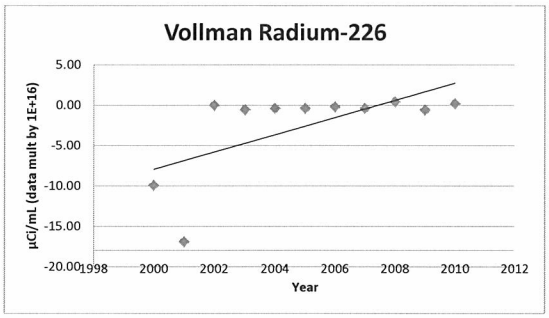
Vollman (Nearest Downwind Residence)

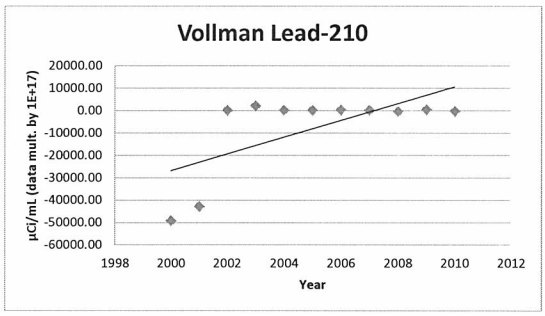
		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Uranium (µCi/ml)		3.38E-16	5.4E-16	2.81E-16	3.57E-16	1.38E-16	3.57E-16	3.57E-16	1.034E-14	1.38E-15	-4.656E-15	-6.2E-16
Thorium-230 (µCi/ml)	<	9.1E-18	6.05E-17	4E-17	0	0	0	0	0	0	-8.8E-17	-1.55E-16
Radium-226 (µCi/ml)	<	2.1E-17	-5.75E-17	4.5E-17	-3.83E-17	-1.65E-17	-3.83E-17	-3.83E-17	-5.6E-17	1E-18	-1.69E-15	-9.9E-16
Lead-210 (µCi/ml)		-3.43E-15	3.22E-15	-5.86E-15	4.18E-16	1.92E-15	4.18E-16	4.18E-16	2.045E-14	7.4E-16	-4.283E-13	-4.921E-13
Radon-222 (µCi/ml)		1E-09	-3.5E-10	5E-11	-1.6E-09	1E-10	-1.6E-09	-1.6E-09	-3E-11	5.5E-10	7.25E-10	2.5E-10
Gamma (mrem/yr)		7	5	10	-6	-12	-6	-6	-5	8	3	33.4

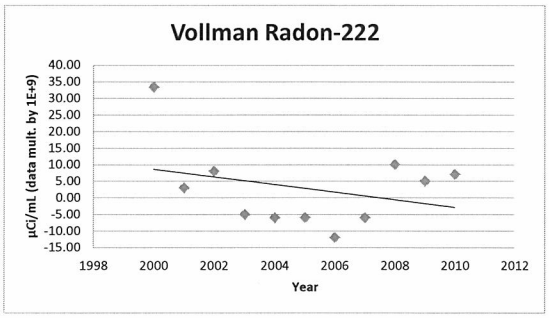
Normalization		2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
1.00E+15	Uranium (µCi/ml)	0.34	0.54	0.28	0.36	0.14	0.36	0.36	10.34	1.38	-4.66	-0.62
1.00E+17	Thorium-230 (µCi/ml)	0.91	6.05	4.00	0.00	0.00	0.00	0.00	0.00	0.00	-8.80	-15.50
1.00E+16	Radium-226 (µCi/ml)	0.21	-0.57	0.45	-0.38	-0.17	-0.38	-0.38	-0.56	0.01	-16.90	-9.90
1.00E+17	Lead-210 (µCi/ml)	-343.25	322.00	-586.00	41.75	192.00	41.75	41.75	2045.00	74.00	-42830.00	-49210.00
1.00E+09	Radon-222 (µCi/ml)	1.00	-0.35	0.05	-1.60	0.10	-1.60	-1.60	-0.03	0.55	0.73	0.25
none	Gamma (mrem/yr)	7.00	5.00	10.00	-6.00	-12.00	-6.00	-6.00	-5.00	8.00	3.00	33.40
		-3.4325	3.22	-5.86	0.4175	1.92	0.4175	0.4175	20.45	0.74	-428.3	-492.1

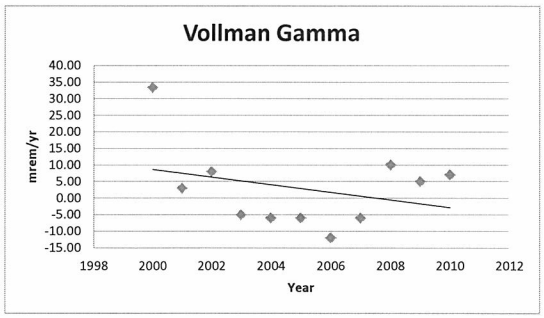












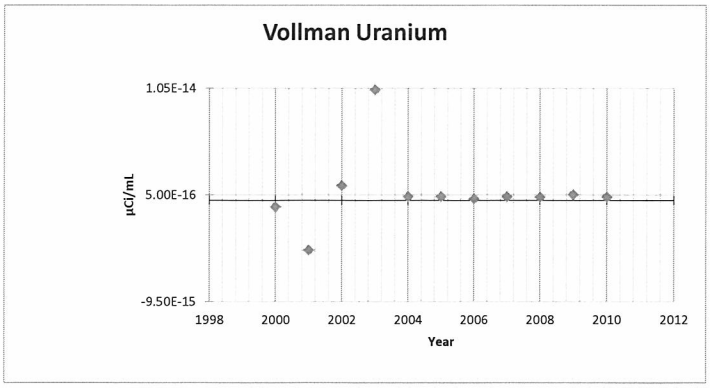


Table 5-13 Net Rn-222 Concentrations at Monitoring Locations AS-2 and AS-3

Year	Average Net Rn-222 Concentration (µCi/ml) AS-3 Vollman Ranch	Percent of Effluent Concentration Guideline (%)	Average Net Rn-222 Concentration (µCi/ml) AS-2 Smith's Ranch Down-Wind Fence Line Boundary	Percent of Effluent Concentration Guideline (%)
1999*	-4.00×10^{-10}	-4.0	-3.00×10^{-10}	-3
2000	-2.25×10^{-10}	-2.3	3.75×10^{-10}	3.75
2001	-5.00×10^{-11}	-0.50	1.00×10^{-10}	1
2002	-3.0×10^{-10}	-3.0	3.0×10^{-10}	3
2003*	-1.5×10^{-10}	-1.5	-5.0×10^{-11}	-0.50
2004	-1.6×10^{-9}	-16	-1.5×10^{-9}	-15
2005	3.0×10^{-10}	3.0	2.5×10^{-10}	2.5
2006	1.5×10^{-10}	1.5	4.5×10^{-10}	4.5
2007*	3.0×10^{-10}	3.0	4.0×10^{-10}	4.0
2008	5.0×10^{-10}	5.0	3.5×10^{-10}	3.5
2009				

* Data for 2007 for AS-2 based on second six-month period. All 1999 data based on last six-month period

Table 5-14 Net Lead-210 Concentrations at Monitoring Locations AS-2 and AS-3

Year	Average net Pb-210 Concentration (µCi/ml) AS-3 Vollman Ranch (µCi/ml)	Percent of Effluent Concentration Guideline	Average Net PB-210 Concentration (µCi/ml) AS-2 Smith's Ranch Down-Wind Fenceline Boundary (µCi/ml)	Percent of Effluent Concentration Guideline
1999	-4.69×10^{-14}	-7.80	-2.32×10^{-14}	-3.80
2000	-4.25×10^{-15}	-0.71	-2.64×10^{-13}	-0.44
2001	1.01×10^{-13}	16.8	-4.00×10^{-15}	-0.70
2002	2.63×10^{-16}	0.04	-1.75×10^{-15}	-0.29
2003*	4.05×10^{-16}	0.07	3.10×10^{-16}	0.05
2004	4.18×10^{-16}	0.07	-5.32×10^{-15}	-0.89
2005	3.39×10^{-15}	0.56	-2.44×10^{-15}	-0.41
2006	1.92×10^{-15}	0.32	-1.01×10^{-15}	-0.17
2007	2.23×10^{-15}	0.37	-3.70×10^{-15}	-0.62
2008	-4.39×10^{-15}	-0.73	-2.81×10^{-15}	-0.47
2009	3.22×10^{-15}	0.54	2.07×10^{-15}	0.34
2010	-3.43×10^{-15}	-0.57	3.34×10^{-15}	0.56
2011*	2.00×10^{-15}	0.33	1.50×10^{-15}	0.25

* All 2003 data based on second six-month period.
* All 2011 data based on first six-month period.

Table 5-15 Surface Water Monitoring Historical Review

Sample Location	Radionuclide	2000				2001			
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
SW-1	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-2	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-3	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-4	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-5	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-6	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-7	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-8	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-9	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SW-10	U_{Nat}	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ra-226	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sage Creek Upstream	U_{Nat}	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Ra226	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Sage Creek Downstream	U_{Nat}	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Ra-226	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Treatment Plant Outfall	U_{Nat}	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
	Ra-226	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

Notes:
N/A – We're not monitored until operations commenced in 2004 upstream of this drainage.
All units in µCi/ml unless otherwise stated.

Table 5-16 Domestic and Livestock Wells in Smith Ranch Groundwater Monitoring Program

Site	Location	Source	Use
GW-1	Sec. 1, T35N, R 74W	Windmill	Livestock
GW-2	Sec. 35, T36N, R74W	Water Well	Livestock
GW-3	Sec. 27, T36N, R74W	Windmill	Livestock
GW-4	Sec. 23, T36N, R74W	Windmill	Livestock
GW-5	Sec. 30, T36N, R73W	Windmill	Livestock
GW-6	Sec. 21, T36N, R73W	Windmill	Livestock
GW-7*	Sec. 27, T36N, R73W	Water Well	Domestic
GW-8	Sec. 23, T36N, R73W	Windmill	Livestock
GW-9	Sec. 14, T36N, R73W	Windmill	Livestock
GW-10	Sec. 14, T36N, R73W	Water Well	Livestock
GW-11	Sec. 11, T36N, R73W	Water Well	Livestock
GW-12	Sec. 7, T36N, R72W	Water Well	Livestock
GW-13	Sec. 9, T36N, R72W	Water Well	Livestock
GW-14	Sec. 10, T36N, R72W	Water Well	Livestock
GW-15	Sec. 15, T36N, R72W	Water Well	Livestock
GW-16	Sec. 11, T36N, R72W	Water Well	Livestock
GW-17	Sec. 8, T36N, R72W	Water Well	Livestock
GW-18	Sec. 2, T36N, R72W	Water Well	Livestock
GW-20	Sec. 27, R36N, R73W	Water Well	Livestock

* GW-7 was dismantled in 2007 and replaced with well GW-20.

Table 5-17 Uranium Results for GW-5 Which Exceeded Effluent Concentration Limit

Site	Quarter and Year	U(nat) Concentration (µCi/ml)	Effluent Concentration Limit (µCi/ml)	% Effluent Concentration Limit
GW-5	3rd / 2003	5.9×10^{-7}	3.0×10^{-7}	197.7
GW-5	4th / 2004	6.0×10^{-7}	3.0×10^{-7}	199.0
GW-5	2nd / 2005	8.4×10^{-7}	3.0×10^{-7}	279.8

Table 5-18 Livestock Wells in North Butte Groundwater Monitoring Program

Site	Location	Source	Use
Red Barrel #1	Sec. 25, T44N, R76W	Water Well	Livestock
CCI #2	Sec. 17, T44N, R75W	Water Well	Livestock
Dobie Hill #1	Sec. 29, T44N, R75W	Water Well	Livestock
Brown #5	Sec. 30, T44N, R75W	Water Well	Livestock
City Service Brown	Sec. 31, T44N, R75W	Water Well	Livestock
Beck Well	Sec. 19, T44N, R75W	Water Well	Livestock
Brown #1	Sec. 11, T44N, R76W	Spring	Livestock

Table 5-19 Mean U-Nat and Radium-226 Concentrations in Soil at the Satellite No. 1 Irrigation Area for the Period 2000-2010

Year	0-6 Inches								6-12 Inches							
	U-Nat				Ra-226				U-Nat				Ra-226			
	Background		Irrigator		Background		Irrigator		Background		Irrigator		Background		Irrigator	
	µCi/g	mg/kg	µCi/g	mg/kg	µCi/g	pCi/g	µCi/g	pCi/g	µCi/g	mg/kg	µCi/g	mg/kg	µCi/g	pCi/g	µCi/g	pCi/g
2000	1.61E-06	2.4	2.70E-06	4.0	1.90E-06	1.9	1.10E-06	1.6	1.03E-06	1.5	9.40E-07	1.4	1.23E-06	1.2	1.10E-06	1.1
2001	1.69E-06	2.5	5.59E-06	8.3	1.40E-06	1.4	1.09E-06	1.6	1.49E-06	2.2	1.10E-06	1.6	1.30E-06	1.3	1.22E-06	1.2
2002	6.89E-07	1.0	4.13E-06	6.1	9.35E-07	0.9	1.08E-06	1.6	5.82E-07	0.9	9.06E-07	1.3	1.18E-06	1.2	1.13E-06	1.1
2003	1.10E-06	1.6	6.03E-06	8.9	1.10E-06	1.1	1.09E-06	1.6	6.00E-06	8.9	3.68E-06	5.4	1.00E-06	1.0	1.18E-06	1.2
2004	7.00E-07	1.0	9.07E-06	13.4	1.00E-06	1.0	1.11E-06	1.6	7.00E-07	1.0	1.35E-06	2.0	1.00E-06	1.0	1.21E-06	1.2
2005	4.00E-06	5.9	6.72E-06	9.9	1.00E-06	1.0	1.36E-06	2.0	7.00E-07	1.0	1.81E-06	2.7	9.00E-07	0.9	1.64E-06	1.6
2006	9.40E-07	1.4	9.76E-06	14.4	4.00E-06	4.0	3.48E-06	5.1	7.30E-07	1.1	2.21E-06	3.3	3.40E-06	3.4	3.42E-06	3.4
2007	9.80E-07	1.4	1.29E-05	19.1	3.30E-06	3.3	3.41E-06	5.0	1.12E-06	1.7	4.80E-06	7.1	2.30E-06	2.3	3.22E-06	3.2
2008	1.70E-06	2.5	7.30E-06	10.8	3.80E-06	3.8	4.50E-06	6.6	1.30E-06	1.9	3.60E-06	5.3	4.80E-06	4.8	4.50E-06	4.5
2009	1.37E-06	2.0	1.20E-05	17.7	1.10E-06	1.1	1.30E-06	1.9	1.02E-06	1.5	2.20E-06	3.2	1.40E-06	1.4	1.40E-06	1.4
2010	1.49E-06	2.2	1.19E-05	17.6	1.80E-06	1.8	1.47E-06	2.2	1.56E-06	2.3	2.54E-06	3.8	1.30E-06	1.3	1.51E-06	1.5
Min =	6.89E-07	1.0	2.70E-06	4.0	9.35E-07	0.9	1.08E-06	1.6	5.82E-07	0.9	9.06E-07	1.3	9.00E-07	0.9	1.10E-06	1.1
Max =	4.00E-06	5.9	1.29E-05	19.1	4.00E-06	4.0	4.50E-06	6.6	6.00E-06	8.9	4.80E-06	7.1	4.80E-06	4.8	4.50E-06	4.5
Mean =	1.48E-06	2.2	8.01E-06	11.8	1.94E-06	1.9	1.91E-06	2.8	1.48E-06	2.2	2.29E-06	3.4	1.80E-06	1.8	1.96E-06	2.0

Table 5-20 Mean U-Nat and Radium-226 Concentrations in Soil at the Satellite No. 2 Irrigation Area for the Period 2000-2010

Year	0-6 Inches								6-12 Inches							
	U-Nat				Ra-226				U-Nat				Ra-226			
	Background		Irrigator		Background		Irrigator		Background		Irrigator		Background		Irrigator	
	µCi/g	mg/kg	µCi/g	mg/kg	µCi/g	pCi/g	µCi/g	pCi/g	µCi/g	mg/kg	µCi/g	mg/kg	µCi/g	pCi/g	µCi/g	pCi/g
2000	1.52E-06	2.2	2.67E-06	3.9	1.20E-06	1.5	1.10E-06	1.6	1.09E-06	1.6	8.85E-07	1.3	1.16E-06	1.1	1.10E-06	0.9
2001	9.48E-07	1.4	5.66E-06	8.4	1.20E-06	0.9	1.20E-06	1.8	8.12E-07	1.2	1.22E-06	1.8	1.20E-06	0.8	1.34E-06	1.2
2002	8.00E-07	1.2	3.57E-06	5.3	1.10E-06	0.8	1.31E-06	1.9	7.03E-07	1.0	1.44E-06	2.1	1.48E-06	0.7	1.37E-06	1.4
2003	1.10E-06	1.6	7.14E-06	10.5	9.30E-07	1.1	1.13E-06	1.7	1.20E-06	1.8	1.31E-06	1.9	1.20E-06	1.2	1.18E-06	1.3
2004	1.40E-06	2.1	4.50E-06	6.6	1.00E-06	1.4	1.00E-06	1.5	1.50E-06	2.2	1.80E-06	2.7	1.00E-06	1.5	1.10E-06	1.8
2005	1.00E-06	1.5	2.75E-06	4.1	9.00E-07	1.0	1.38E-06	2.0	8.00E-07	1.2	1.29E-06	1.9	1.00E-06	0.8	1.50E-06	1.3
2006	1.59E-06	2.3	7.01E-06	10.4	1.80E-06	1.6	2.27E-06	3.4	1.25E-06	1.8	1.89E-06	2.8	1.20E-06	1.3	1.86E-06	1.9
2007	2.10E-06	3.1	1.29E-05	19.1	2.20E-06	2.1	3.13E-06	4.6	2.50E-06	3.7	3.40E-06	5.0	2.40E-06	2.5	3.11E-06	3.4
2008	2.30E-06	3.4	8.50E-06	12.6	5.50E-06	2.3	5.40E-06	8.0	2.90E-06	4.3	2.90E-06	4.3	5.10E-06	2.9	3.70E-06	2.9
2009	7.72E-06	11.4	6.70E-06	9.9	1.30E-06	7.7	1.30E-06	1.9	1.07E-06	1.6	4.50E-06	6.6	1.20E-06	1.1	1.40E-06	4.5
2010	1.35E-06	2.0	3.93E-06	5.8	6.00E-07	1.4	1.38E-06	2.0	1.69E-06	2.5	2.36E-06	3.5	1.00E-06	1.7	1.41E-06	2.4
Min =	8.00E-07	1.2	2.67E-06	3.9	6.00E-07	0.8	1.00E-06	1.5	7.03E-07	1.0	8.85E-07	1.3	1.00E-06	0.7	1.10E-06	0.9
Max =	7.72E-06	11.4	1.29E-05	19.1	5.50E-06	7.7	5.40E-06	8.0	2.90E-06	4.3	4.50E-06	6.6	5.10E-06	2.9	3.70E-06	4.5
Mean =	1.98E-06	2.9	5.94E-06	8.8	1.61E-06	2.0	1.87E-06	2.8	1.41E-06	2.1	2.09E-06	3.1	1.63E-06	1.4	1.73E-06	2.1

Table 5-21 Mean U-Nat and Radium-226 Concentrations in Vegetation at the Satellite No. 1 Irrigation Area for the Period 2000-2010

Year	U-Nat				Ra-226	
	Background		Irrigator		Background	Irrigator
	mCi/kg	mg/kg	mCi/kg	mg/kg	mCi/kg	mCi/kg
2000	2.54E-04	0.38	1.20E-02	17.73	6.10E-05	8.38E-05
2001	1.76E-03	2.60	1.32E-02	19.50	4.30E-05	5.48E-05
2002	8.59E-05	0.13	2.28E-03	3.37	5.90E-05	4.88E-05
2003	<1.00E-5	<0.01	2.82E-03	4.17	8.20E-06	4.80E-05
2004	5.00E-05	0.07	1.75E-02	25.85	2.41E-05	8.95E-05
2005	1.00E-02	14.77	8.15E-03	12.04	2.20E-04	1.48E-04
2006	5.40E-04	0.80	6.20E-04	0.92	1.70E-04	7.50E-05
2007	6.75E-05	0.10	7.08E-05	0.10	1.10E-04	2.70E-05
2008	5.30E-05	0.08	1.50E-04	0.22	8.00E-05	5.60E-05
2009	5.00E-05	0.07	1.70E-03	2.51	1.90E-04	1.60E-04
2010	9.00E-04	1.33	5.20E-03	7.68	1.30E-04	2.40E-04
Min =	<1.00E-5	<0.01	7.08E-05	0.10	8.20E-06	2.70E-05
Max =	1.00E-02	14.77	1.75E-02	25.85	2.20E-04	2.40E-04
Mean =	1.38E-03	2.03	5.79E-03	8.55	9.96E-05	9.37E-05

Table 5-22 Mean U-Nat and Radium-226 Concentrations in Vegetation at the Satellite No. 2 Irrigation Area for the Period 2000-2010

Year	U-Nat				Ra-226	
	Background		Irrigator		Background	Irrigator
	mCi/kg	mg/kg	mCi/kg	mg/kg	mCi/kg	mCi/kg
2000	2.30E-03	3.40	9.61E-03	14.19	1.10E-05	1.40E-05
2001	2.03E-04	0.30	9.15E-03	13.52	8.20E-06	1.37E-05
2002	2.37E-04	0.35	4.50E-03	6.65	6.00E-05	2.35E-05
2003	9.40E-05	0.14	1.24E-02	18.32	1.30E-05	1.53E-05
2004	5.00E-04	0.74	2.50E-02	36.93	4.40E-06	2.07E-05
2005	3.10E-04	0.46	6.20E-03	9.16	1.50E-04	5.98E-05
2006	4.90E-04	0.72	2.87E-02	42.39	2.50E-04	3.94E-04
2007	<1.10E-6	<0.002	3.60E-03	5.32	7.25E-05	6.05E-05
2008	3.80E-04	0.56	5.50E-03	8.12	2.30E-05	6.00E-05
2009	8.50E-04	1.26	2.80E-02	41.36	7.20E-05	8.90E-04
2010	5.00E-04	0.74	1.20E-02	17.73	1.60E-04	5.70E-05
Min =	<1.10E-6	<0.002	3.60E-03	5.32	4.40E-06	1.37E-05
Max =	2.30E-03	3.40	2.87E-02	42.39	2.50E-04	8.90E-04
Mean =	5.86E-04	0.87	1.32E-02	19.43	7.49E-05	1.46E-04

Table 5-23 Radium-226 Concentrations from the Radium Treatment Systems at Satellite Nos. 1, 2, and 3 and Selenium Treatment Plant for the Period 2000 through 2010

Satellite No. 1		Satellite No. 2		Satellite No. 3		Se Treatment Plant	
Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)
11-Jan-00	1.70E-09	6-Jan-00	2.10E-09	6-Jan-00	7.70E-09		
1-Feb-00	1.15E-08	7-Feb-00	1.90E-09	7-Feb-00	5.90E-09		
2-Mar-00	2.00E-09	14-Mar-00	2.50E-09	14-Mar-00	3.80E-08		
N/A		4-Apr-00	2.77E-08	4-Apr-00	1.30E-08		
N/A		10-May-00	4.10E-09	9-May-00	3.60E-09		
2-Jun-00	1.18E-08	5-Jun-00	1.70E-08	29-Jun-00	4.70E-09		
5-Jul-00	4.50E-09	12-Jul-00	2.10E-08	12-Jul-00	4.28E-08		
2-Aug-00	4.00E-09	7-Aug-00	5.40E-09	7-Aug-00	1.10E-09		
5-Sep-00	3.51E-08	7-Sep-00	1.69E-08	7-Sep-00	5.29E-07		
9-Oct-00	7.00E-09	2-Oct-00	4.00E-09	2-Oct-00	8.50E-09		
9-Nov-00	1.41E-07	8-Nov-00	1.64E-08	15-Nov-00	1.03E-08		
7-Dec-00	5.10E-09	14-Dec-00	1.50E-09	15-Dec-00	1.07E-08		
4-Jan-01	1.40E-09	8-Jan-01	1.25E-08	8-Jan-01	4.97E-08		
12-Feb-01	1.38E-08	12-Feb-01	2.00E-08	12-Feb-01	2.25E-07		
5-Mar-01	2.50E-09	15-Mar-01	7.40E-09	14-Mar-01	2.26E-07		
9-Apr-01	2.30E-09	2-Apr-01	1.31E-08	6-Apr-01	1.41E-07		
7-May-01	2.26E-08	9-May-01	1.10E-07	24-May-01	5.85E-08		
5-Jun-01	4.00E-09	6-Jun-01	2.40E-09	25-Jun-01	2.46E-08		
1-Jul-01	2.60E-09	2-Jul-07	3.00E-09	2-Jul-01	6.91E-08		
7-Aug-01	3.00E-09	3-Aug-01	3.20E-09	3-Aug-01	9.40E-08		
7-Aug-01	1.90E-09	4-Sep-01	2.20E-09	12-Sep-01	1.50E-09		
11-Oct-01	2.30E-09	12-Oct-01	1.70E-09	12-Oct-01	ND		
8-Nov-01	2.70E-09	1-Nov-01	3.30E-09	1-Nov-01	1.50E-08		
18-Dec-01	1.25E-08	4-Dec-01	2.50E-09	4-Dec-01	6.00E-09		
15-Jan-02	6.50E-09	8-Jan-02	2.40E-09	8-Jan-02	2.39E-08		
25-Feb-02	2.50E-09	6-Feb-02	1.10E-09	6-Feb-02	3.00E-10		
12-Mar-02	3.50E-09	7-Mar-02	1.20E-09	7-Mar-02	2.33E-08		
11-Apr-02	2.90E-09	5-Apr-02	3.00E-09	5-Apr-02	7.04E-08		
29-May-02	7.90E-09	3-May-02	7.00E-10	3-May-02	1.85E-08		
10-Jun-02	1.06E-08	3-Jun-02	2.90E-09	3-Jun-02	1.16E-08		
18-Jul-02	3.00E-09	8-Jul-02	2.80E-09	8-Jul-02	1.50E-09		
5-Aug-02	3.40E-09	5-Aug-02	1.50E-09	5-Aug-02	2.60E-09		
4-Sep-02	8.20E-09	4-Sep-02	2.48E-08	4-Sep-02	1.30E-09		
7-Oct-02	2.30E-09	10-Oct-02	1.44E-08	10-Oct-02	4.60E-09		
4-Nov-02	2.10E-09	5-Nov-02	3.00E-10	5-Nov-02	5.20E-09		
2-Dec-02	1.94E-08	5-Dec-02	2.20E-09	5-Dec-02	5.90E-09		
6-Jan-03	8.19E-08	6-Jan-03	9.00E-10	6-Jan-03	7.50E-09		
3-Feb-03	5.00E-09	10-Feb-03	9.00E-10	10-Feb-03	1.10E-09		
3-Mar-03	8.80E-09	7-Mar-03	1.30E-09	7-Mar-03	1.00E-09		
7-Apr-03	4.20E-09	2-Apr-03	9.00E-10	2-Apr-03	1.90E-09		
5-May-03	9.10E-09	5-May-03	1.00E-09	5-May-03	1.80E-09		
2-Jun-03	1.70E-09	4-Jun-03	9.00E-10	4-Jun-03	6.00E-10		
7-Jul-03	2.90E-09	24-Jul-03	1.20E-09	24-Jul-03	1.82E-08		
5-Aug-03	5.50E-09	5-Aug-03	1.60E-09	7-Aug-03	2.70E-09		
2-Sep-03	6.60E-09	10-Sep-03	2.50E-09	10-Sep-03	3.08E-08		
6-Oct-03	2.55E-08	2-Oct-03	5.00E-10	2-Oct-03	1.79E-08		
3-Nov-03	1.30E-09	5-Nov-03	9.00E-10	5-Nov-03	1.40E-09		
1-Dec-03	3.10E-09	1-Dec-03	9.00E-10	1-Dec-03	3.30E-09		
8-Jan-04	2.75E-08	1-Jan-04	5.00E-10	1-Jan-04	7.00E-10		
2-Feb-04	4.82E-07	2-Feb-04	1.80E-09	2-Feb-04	1.50E-09		

Table 5-23 Radium-226 Concentrations from the Radium Treatment Systems at Satellite Nos. 1, 2, and 3 and Selenium Treatment Plant for the Period 2000 through 2010

Satellite No. 1		Satellite No. 2		Satellite No. 3		Se Treatment Plant	
Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)
4-Mar-04	1.37E-07	4-Mar-04	1.90E-09	4-Mar-04	1.40E-09		
5-Apr-04	5.43E-08	5-Apr-04	5.00E-10	5-Apr-04	5.57E-08		
13-May-04	5.66E-08	13-May-04	1.60E-09	13-May-04	6.58E-08		
14-Jun-04	2.66E-08	14-Jun-04	5.90E-09	14-Jun-04	7.10E-09		
		12-Jul-04	9.00E-10	12-Jul-04	1.86E-08		
		9-Aug-04	7.40E-09	9-Aug-04	2.40E-08		
		2-Sep-04	2.80E-09	9-Aug-04	7.97E-08		
		7-Oct-04	2.20E-09	7-Oct-04	5.64E-08		
		16-Nov-04	7.50E-09	16-Nov-04	2.00E-09		
		13-Dec-04	1.50E-09	13-Dec-04	3.00E-09		
		14-Jan-05	3.20E-09	14-Jan-05	9.70E-09		
		15-Feb-05	2.20E-09	15-Feb-05	1.32E-08		
		16-Mar-05	2.60E-09	16-Mar-05	1.40E-09		
		11-Apr-05	2.00E-09	11-Apr-05	1.66E-08		
		10-May-05	1.30E-09	10-May-05	1.10E-08		
		17-Jun-05	2.00E-09	17-Jun-05	9.00E-10		
		11-Jul-05	4.90E-09	11-Jul-05	1.50E-09		
		4-Aug-05	3.50E-09	4-Aug-05	2.90E-09		
		13-Sep-05	1.40E-09	13-Sep-05	7.60E-09		
		17-Oct-05	2.50E-09	17-Oct-05	1.79E-08		
		8-Nov-05	1.40E-09	8-Nov-05	2.70E-09		
		5-Dec-05	3.50E-09	5-Dec-05	1.19E-08		
		3-Jan-06	1.80E-09	3-Jan-06	1.40E-09		
		2-Feb-06	1.56E-08	6-Feb-06	4.90E-09		
		1-Mar-06	1.28E-08	1-Mar-06	8.00E-10		
		10-Apr-06	5.80E-09	10-Apr-06	4.00E-10		
		11-May-06	2.90E-09	11-May-06	9.00E-10		
		27-Jun-06	3.79E-09	27-Jun-06	5.80E-09		
		14-Jul-06	7.70E-09	14-Jul-06	1.00E-09		
		15-Aug-06	1.90E-09	15-Aug-06	5.50E-09		
		15-Sep-06	3.00E-09	15-Sep-06	5.11E-10		
		17-Oct-06	1.90E-09	17-Oct-06	1.31E-08		
		13-Nov-06	4.20E-09	13-Nov-06	9.40E-09		
		15-Dec-06	2.30E-09	15-Dec-06	3.99E-08		
		12-Jan-07	3.70E-09	12-Jan-07	1.80E-09		
		20-Feb-07	5.10E-09	20-Feb-07	1.10E-09		
		14-Mar-07	2.20E-09	14-Mar-07	1.34E-08		
		11-Apr-07	4.90E-09	11-Apr-07	9.00E-10		
		11-May-07	5.70E-09	11-May-07	9.00E-10		
		7-Jun-07	2.80E-09	7-Jun-07	6.80E-09		
		23-Jul-07	1.60E-09	23-Jul-07	1.70E-09		
		10-Aug-07	3.10E-09	10-Aug--07	2.30E-09		
		18-Sep-07	5.60E-09	18-Se[-07	8.00E-10		
		12-Oct-07	1.30E-09	12-Oct-07	9.00E-09		
		15-Nov-07	2.50E-09	15-Nov-07	3.40E-09		
		18-Dec-07	5.70E-09	18-Dec-07	1.71E-08		
		25-Jan-08	4.90E-09	25-Jan-08	6.00E-10		
		14-Feb-08	3.40E-09	14-Feb-08	4.10E-09		
		19-Mar-08	5.20E-09	19-Mar-08	2.00E-10		
		15-Appr-08	2.70E-09	15-Apr-08	8.00E-10		

Table 5-23 Radium-226 Concentrations from the Radium Treatment Systems at Satellite Nos. 1, 2, and 3 and Selenium Treatment Plant for the Period 2000 through 2010

Satellite No. 1		Satellite No. 2		Satellite No. 3		Se Treatment Plant	
Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)	Date	Ra-226 (µCi/ml)
		15-May-08	2.00E-09	15-May-08	2.00E-10		
		10-Jun-08	3.40E-09	10-Jun-08	1.50E-09		
		1-Jul-08	1.90E-09	1-Jul-08	4.70E-10		
		1-Aug-08	4.30E-09	1-Aug-08	3.40E-10		
		1-Sep-08	7.50E-10	1-Sep-08	3.00E-11		
		1-Oct-08	1.20E-09	1-Oct-08	6.80E-10		
		1-Nov-08	2.20E-09	1-Nov-08	2.60E-08		
		1-Dec-08	1.50E-08	1-Dec-08	9.80E-10		
		1-Jan-09	7.50E-09	1-Jan-09	3.30E-09		
		1-Feb-09	3.20E-09	1-Feb-09	3.20E-08		
		1-Mar-09	1.80E-08	1-Mar-09	8.50E-09		
		1-Apr-09	9.50E-10	1-Apr--09	4.80E-09		
		1-May-09	2.50E-09	1-May-09	3.20E-08		
		1-Jun-09	6.00E-08	1-Jun-09	3.40E-09		
		1-Jul-09	3.40E-09	1-Jul-09	3.40E-09		
		1-Aug-09	5.00E-09	1-Aug-09	2.70E-08		
		1-Sep-09	3.90E-09	1-Sep-09	6.00E-09		
		1-Oct-09	2.70E-09	1-Oct-09	2.90E-10		
		1-Nov-09	7.70E-10	1-Nov-09	ND		
		1-Dec-09	1.20E-09	1-Dec-09	3.30E-09		
		1-Jan-10	1.10E-09	1-Jan-10	6.50E-08		
		1-Feb-10	3.80E-09	1-Feb-10	1.50E-09		
		1-Mar-10	1.50E-09	1-Mar-10	4.80E-08		
		1-Apr-10	1.50E-09	1-Apr-10	1.80E-09		
		1-May-10	1.10E-08	1-May-10	2.30E-08		
		1-Jun-10	2.10E-10	1-Jun-10	4.60E-08		
						1-Jul-10	2.40E-10
						1-Aug-10	5.60E-10
						1-Sep-10	3.40E-10
						1-Oct-10	1.30E-08
						1-Nov-10	5.70E-10
						1-Dec-10	8.60E-09
						1-Jan-11	1.60E-09
						1-Feb-11	1.10E-08
						1-Mar-11	5.50E-09
						1-Apr-11	7.20E-09
						1-May-11	2.40E-09
						1-Jun-11	1.40E-09
Min=	1.30-09	Min =	2.10E-10	Min =	0.00E+00	Min =	2.40E-10
Max =	4.82E-07	Max =	1.10E-07	Max =	5.29E-07	Max =	1.30E-08
Mean =	2.51E-08	Mean =	5.72E-09	Mean =	2.20E-08	Mean =	4.37E-09

ND – Not detectable.

Table 5-24 Effluent Monitoring for Irrigation Area No. 1

	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)	Weighted Average (mg/L)	Estimate (mg/L)	Total (lbs)	Total (lbs/acre)	Estimate (lbs/acre)	Percent Permit Estimate
Volume of Irrigation (acre-feet)							370.76	557.2	67
Major Ions									
Calcium	136	339	235	226	227	227,325	4,210	6,355	66
Magnesium	47.8	86.7	70	68	8.8	68,777	1,274	247	516
Sodium	82.2	198	129	128	262	128,822	2,386	7,333	33
Potassium	14.7	22.2	19	19	--	19,155	355	--	--
Bicarbonate	43	355	186	167	633	168,551	3,121	17,745	18
Sulfate	213	617	267	259	162	260,861	4,831	4,547	106
Chloride	325	729	540	540	316	544,262	10,079	8,866	114
Non-Metals									
TDS @ 180 C	1000	2200	1536	1540	1491	1,552,003	28,741	41,800	69
Cond (µmhos)	1910	3040	2503	--	--	--	--	--	--
pH	7.64	9.4	8.02	--	--	--	--	--	--
SAR	1.13	2.83	1.90	--	--	--	--	--	--
Trace Metals									
Arsenic	<0.001	0.02	0.01	--	--	--	--	--	--
Barium	<0.1	0.8	0.25	--	--	--	--	--	--
Boron	<0.1	0.2	0.11	--	--	--	--	--	--
Selenium	0.068	0.917	0.550	0.567	0.263	571	11	7.37	144
Radionuclides									
Uranium	0.0063	0.665	0.20	0.18	2.05	184	3	57.4	6
Radium-226	1.00	17.3	4.3	4.2	30	1.94E+09	3.59E+07	3.83E+08	9

Table 5-25 Effluent Monitoring for Irrigation Area No. 2

	Minimum (mg/L)	Maximum (mg/L)	Average (mg/L)	Weighted Average (mg/L)	Estimate (mg/L)	Total (lbs)	Total (lbs/acre)	Estimate (lbs/acre)	Percent Permit Estimate
Volume of Irrigation (acre-feet)							1421.03	1570	91
Major Ions									
Calcium	211	452	298	296	233	1,145,228	9,873	8,574	115
Magnesium	71.2	136	104	105	83	405,878	3,499	3,054	115
Sodium	71	130	92	93	160	357,984	3,086	5,888	52
Potassium	18.8	34	25	25	84	98,043	845	3,091	27
Bicarbonate	47	237	148	133	229	515,321	4,442	8,427	53
Sulfate	268	944	707	713	598	2,755,016	23,750	22,005	108
Chloride	0.2	618	382	384	508	1,484,592	12,798	18,693	68
Non-Metals									
TDS @ 180 C	1560	2830	1983	1979	1850	7,646,369	65,917	68,075	97
pH	8	8.25	8	8	7.4	NA	NA	NA	NA
SAR	0.43	3.67	1.33	1	1.4	NA	NA	NA	NA
Trace Metals									
Arsenic	<0.001	0.044	0.007	0.006	<0.001	22	0.2	NA	NA
Barium	<0.10	<0.10	<0.10	<0.1	<0.1	NA	NA	NA	NA
Boron	<0.10	0.3	0.14	0.14	0.1	531	4.6	3.7	124
Selenium	0.009	1.53	0.543	0.473	1.1	1,828	15.8	40	39
Radionuclides									
Uranium	3.399E-07	1.110	0.500	0.522	2.0	2,015	17.4	74	24
Radium-226	<0.2	2100.0	45.0	51.1	3.3	8.96E+10	7.73E+08	5.51E+07	1403

Table 5-26 Satellite No. 1 Land Application Facility (Irrigator No. 1) Annual Soil Water Data

Sample Site NW¼, NE¼, SW¼, SE¼ Lysimeter Composite															
Sample Date		2'				4'				6'					
		6/24/1999	2000-2002*	6/18/2003	2004-2010*	6/24/1999	2000-2002*	6/18/2003	2004-2010*	6/24/1999	6/21/2000	6/8/2001	6/2/2002	6/18/2003	2004-2010*
	Laboratory Rep. Limit														
Major Ions (mg/L)															
Bicarbonate	1.0	1.71.0		204		381		309		597	492	452	409	382	
Sulfate	1.0	365.0		458		476		585		1120	1050	1340	1120	950	
Chloride	1.0	816.0		685		751		919		1150	1540	NA	408	2130	
Non-Metals															
Cond (µmho/cm)	1.0	3690.0		3000		3830		3930		6180	7740	8230	7670	7630	
pH (standard units)	0.010	8.000		8.22		8.13		8.21		8.01	7.91	7.80	7.99	7.46	
Trace Metals (mg/L)															
Boron	0.10	0.15		0.16		0.21		0.19		0.45	0.41	0.33	0.43	0.36	
Selenium	0.001	0.081		0.331		0.032		0.542		0.031	0.214	0.236	0.471	0.462	
Radiometric															
U-nat (mg/L)	0.0003			0.0401				0.217				0.150	0.117	0.223	
Ra-226 (pCi/L)	0.2			0.7				0.7				1.4	1.8	1.3	
Ra Err. Est. +/-				0.2				0.2				0.2	0.2	0.2	
U-nat (µCi/mL)	2.03E-10	8.80E-09		2.71E-08		2.84E-08		1.47E-07		1.37E-07	1.27E-07	1.02E-07	7.92E-08	1.51E-07	
Ra-226 (µCi/mL)	2.00E-10	2.10E-08		7E-10		1.00E-08		7E-10		8.00E-09	1.7E-09	1.4E-09	1.8E-09	1.3E-09	
Ra Err. Est. +/-		1.8E-09		2E-10		7.00E-10		2E-10		6.00E-10	2E-10	2E-10	2E-10	2E-10	
Note: Insufficient water for sampling.															

Table 6-1 Smith Ranch Restoration Target Values

		MU_1			MU_4/4A			MU_C			MU_D			MU_E		
MAJOR IONS	**(mg/l):**	**Mean**	**Standard Deviation**	**Reclamation Target Value**	**Mean**	**Standard Deviation**	**Reclamation Target Value**	**Mean**	**Standard Deviation**	**Reclamation Target Value**	**Mean**	**Standard Deviation**	**Reclamation Target Value**	**Mean**	**Standard Deviation**	**Reclamation Target Value**
Calcium	(Ca)	72.2	3.85	79.9	38.2	26.7	91.6	81.6	7.81	97.2	90.3	4.82	100	95.1	7.17	109
Magnesium	(Mg)	17.3	1.13	19.6	11.0	7.16	25.3	15.8	1.98	19.8	19.2	1.90	23.0	20.5	1.83	24.2
Sodium	(Na)	24.6	8.93	42.5	16.4	11.1	38.6	45.8	5.31	56.4	39.5	2.59	44.7	38.6	2.18	43.0
Potassium	(K)	7.4	0.72	8.8	5.5	3.2	12	14	6.0	26	11	3.7	18	10	2.7	15
Carbonate	(CO3)	0.01	0.03	0.1	0.7	0.2	1	0.08	0.5	1	0.01	0.004	0.02	0.02	0.01	0.04
Bicarbonate	(HCO3)	231	17.4	266	127	92.2	311	201	32.6	266	197	4.97	207	195	10.2	215
Sulfate	(SO4)	114	4.58	123	107	15.7	138	208	28.3	265	230	11.5	253	245	23.9	293
Chloride	(Cl)	4.4	1.3	7.0	3.7	1.0	5.7	5.0	2.5	10	2.8	0.65	4.1	3.6	1.2	6.0
Ammonium	(NH4)	0.05	0.02	0.1	0.07	0.04	0.2	0.1	0.03	0.2	0.1	0.02	0.1	0.1	0.03	0.2
Nitrite & Nitrate	(NO2) (NO3)	0.1	0.2	0.5	0.07	0.02	0.1	0.2	0.01	0.2	0.01	0.005	0.02	0.02	0.02	0.1
Fluoride	(F)	0.32	0.036	0.39	0.38	0.20	0.78	0.22	0.084	0.39	0.20	0.032	0.26	0.19	0.046	0.28
Silica	(SiO2)	17.0	0.849	18.7	10.8	7.02	24.8	17.5	1.37	20.2	20.2	3.01	26.2	17.4	1.57	20.5
Dissolved Solids @ 180 C	(TDS)	334	60.5	455	329	32.3	394	486	35.9	558	501	20.0	541	521	33.3	588
Conductivity	(uMhos/cm)	578	30.4	639	499	26.4	552	721	42.3	806	792	31.5	855	803	46.4	896
Alkalinity as CaCO3	(Alk)	188	13.3	215	158	6.38	171	165	27.3	220	161	5.83	173	161	8.28	178
pH		7.4	0.18	7.0 - 7.8	7.6	0.14	7.3 - 7.9	7.8	0.36	7.1-8.5	7.9	0.17	7.6 - 8.2	8.0	0.16	7.7 - 8.3
TRACE METALS	**(mg/l):**															
Aluminum	(Al)	N/A	N/A	N/A	N/A	N/A	N/A	0.1	0.1	0.3	<0.1	0	<0.1	<0.1	0	<0.1
Arsenic	(As)	0.002	0.002	0.006	0.002	0.001	0.004	0.003	0.004	0.01	0.002	0.001	0.004	0.001	0.001	0.003
Barium	(Ba)	N/A	N/A	N/A	N/A	N/A	N/A	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1
Boron	(B)	<0.1	0	<0.1	0.07	0.02	0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1
Cadmium	(Cd)	<0.01	0	<0.1	0.003	0.001	0.005	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01
Chromium	(Cr)	<0.05	0	<0.05	0.03	0.01	0.05	<0.05	0	<0.05	0.03	0.03	0.09	<0.05	0	<0.05
Copper	(Cu)	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.005	0.02	0.01	0.005	0.02	0.01	0.01	0.03
Iron	(Fe)	0.09	0.1	0.3	0.04	0.03	0.1	0.06	0.02	0.1	0.07	0.02	0.1	0.07	0.04	0.2
Lead	(Pb)	N/A	N/A	N/A	N/A	N/A	N/A	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
Manganese	(Mn)	0.02	0.01	0.04	0.01	0.01	0.03	0.03	0.01	0.1	0.03	0.01	0.05	0.03	0.01	0.05
Mercury	(Hg)	N/A	N/A	N/A	N/A	N/A	N/A	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001
Molybdenum	(Mo)	<0.1	0	<0.1	0.04	0.02	0.08	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1
Nickel	(Ni)	N/A	N/A	N/A	N/A	N/A	N/A	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05
Selenium	(Se)	0.001	0.001	0.003	0.001	0.0001	0.001	0.03	0.1	0.2	0.003	0.002	0.007	0.001	0.001	0.003
Vanadium	(V)	<0.1	0	<0.1	0.07	0.02	0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1
Zinc	(Zn)	0.01	0.003	0.02	0.007	0.002	0.01	0.02	0.01	0.04	0.01	0.004	0.02	0.01	0.004	0.02
RADIOMETRIC	**(pCi/l):**															
Uranium (Unat as mg/l U)	(U)	0.37	1.3	3.0	0.044	0.038	0.12	2.1	5.4	13	1.1	3.3	7.7	0.060	0.060	0.18
Radium-226	(Ra-226)	764	429	1.62E+03	605	406	1.42E+03	682	393	1.47E+03	651	385	1.42E+03	633	286	1.21E+03

N/A: Not Analyzed

< Indicates All Measured Values Below Method Detection Limit

Table 6-2 Groundwater Restoration Monitoring Parameters

Total Alkalinity	Dissolved Magnesium
Ammonia Nitrogen as N	Total Manganese
Dissolved Arsenic	Mercury
Barium	Dissolved Molybdenum
Bicarbonate	Nickel
Boron	Nitrate + Nitrite as N
Dissolved Cadmium	pH
Dissolved Calcium	Dissolved Potassium
Carbonate	Radium-226
Dissolved Chloride	Dissolved Selenium
Dissolved Chromium	Dissolved Sodium
Copper	Sulfate
Electrical conductivity @25 degrees C	Total Dissolved Solids
Fluoride	Uranium
Total and Dissolved Iron	Vanadium
Lead	Dissolved Zinc

Table 7-1 Noise Range Levels of Typical Construction Equipment

Equipment Type	Noise Levels in dBA L_{eq} at 50 feet[a]
Front Loader	73-86
Truck	82-95
Crane (moveable)	75-88
Crane (derrick)	86-89
Vibrator	68-82
Saw	72-82
Pneumatic Impact Equipment	83-88
Jackhammer	81-98
Pump	68-72
Generator	71-83
Compressor	75-87
Concrete Mixer	75-88
Concrete Pump	81-85
Backhoe	73-95
Pile Driving (peaks)	95-107
Tractor	77-98
Scraper/Grader	80-93
Paver8	85-88

Source: U.S. EPA 1971

[a] Machinery equipped with noise control devices or other noise-reducing design features does not generate the same level of noise emissions as that shown in this table.

Table 7-2 Parameters Used to Estimate and Characterize Source Terms at Smith Ranch

Parameter	Value	Unit	Source
Ore radium-226 concentration	574	pCi/g	Application
Mine Unit Area (varies see MILDOS report)	2.6E+04 to 5.45E+05	m^2	Application
Ore formation thickness (varies, see MILDOS report)	4.6 to 7.0	m	Application
Radon-222 emanation factor	0.2	NA	NUREG 3.59
Volume of process water in circulation (varies, see MILDOS report)	9.00E+06 to 1.03E+09	L	Application
Fraction of radon-222 in process water	0.8	NA	Estimate based on planned activities
Rate of radon-222 venting from process water	0.01	Day^{-1}	Estimate based on process
Treated water purge rate (varies, see MILDOS report)	2.40E+05 to 1.21E+06	L/day	Estimate based on planned activities
IX column volume (varies, see MILDOS report)	6.37E+04 to 1.13E+05	L	Estimate based on planned activities
IX column unloading rate	5.00E-01	Day^{-1}	Estimate based on planned activities
Porosity of IX resin	0.4	NA	NUREG 3.59

Table 7-3 Parameters Used to Estimate and Characterize Source Terms at North Butte Satellite

Parameter	Value	Unit	Source
Ore radium-226 concentration	574	pCi/g	Application
Mine Unit Area (MU-1)	1.70E+05	m^2	Application
Mine Unit Area (MU-2)	3.16E+05	m^2	Application
Mine Unit Area (MU-3)	2.14E+05	m^2	Application
Mine Unit Area (MU-4)	2.50E+05	m^2	Application
Mine Unit Area (MU-5)	2.90E+05	m^2	Application
Operating days per year	365	Days	Application
Ore formation thickness	5	m	Application
Ore formation rock density	1.91	g/cm^3	Application
Radon-222 emanation factor	0.2	NA	NUREG 3.59
Volume of process water in circulation (MU-1)	2.29E+08	L	Application
Volume of process water in circulation (MU-2)	4.25E+08	L	Application
Volume of process water in circulation (MU-3)	2.99E+08	L	Application
Volume of process water in circulation (MU-4)	3.37E+08	L	Application
Volume of process water in circulation (MU-5)	3.92E+08	L	Application
Fraction of radon-222 in process water	0.8	NA	Estimate based on planned activities
Rate of radon-222 venting from process water	0.01	Day^{-1}	Estimate based on process
Treated water purge rate	9.81E+05	L/day	Estimate based on planned activities
IX column volume	2.26E+04	L	Estimate based on planned activities
IX column unloading rate	5.00E-01	Day^{-1}	Estimate based on planned activities
Porosity of IX resin	0.4	NA	NUREG 3.59

Table 7-4 Estimated Total Effective Dose Equivalent to Receptors within 80 kilometers of Smith Ranch

Radon Sources Location	Total Dose 222 gpm 25% Well Field and 75% Satellite (mrem/year)	Total Dose at 222 gpm 10% Well Field and 90% Satellite (mrem/year)
North Property Boundary	4.8	4.7
South property Boundary	2.0	2.0
East Property Boundary	3.5	3.5
West Property Boundary	2.0	2.0
Sunquest Ranch	39.5	44.7
Vollman Ranch	4.0	4.3
Casper	0.2	0.6
Douglas	0.6	0.6
Glenrock	0.6	0.3
Midwest	0.3	0.3
Gillette	0.1	0.1
Wright	0.3	0.3

Table 7-5 Estimated Total Effective Dose Equivalent to Receptors within 80 kilometers of Reynolds Ranch

Radon Sources Location	Total Dose at 200 gpm 25% Well Field and 75% Satellite (mrem/year)	Total Dose at 200 gpm 10% Well Field and 90% Satellite (mrem/year)	Total Dose at 352 gpm 25% Well Field and 75% Satellite (mrem/year)
North Property Boundary	8.0	4.2	41.7
South property Boundary	4.6	4.5	6.2
East Property Boundary	24.8	11.2	42.2
West Property Boundary	3.8	2.6	49.9
Duck Creek Ranch	3.9	3.6	7.8
Casper	0.3	0.3	0.3
Douglas	0.5	0.5	0.5
Glenrock	0.6	0.6	0.5
Midwest	0.2	0.2	0.4
Gillette	0.4	0.4	0.4
Wright	0.8	0.8	0.9

Table 7-6 Estimated Total Effective Dose Equivalent to Receptors within 80 kilometers of the North Butte Remote Satellite

Radon Sources Location	Total Dose from North Butte at 44 gpm 25% Well Field and 75% Satellite (mrem/year)	Total Dose from North Butte at 44 gpm 10% Well Field and 90% Satellite (mrem/year)	Total Dose from North Butte at 222 gpm 25% Well Field and 75% Satellite (mrem/year)
North Property Boundary	14.0	11.0	17.5
South property Boundary	20.4	20.3	25.5
East Property Boundary	45.0	47.0	56.1
West Property Boundary	15.8	9.9	19.5
Casper	0.0	0.0	0.1
Douglas	0.1	0.1	0.1
Glenrock	0.1	0.1	0.1
Midwest	0.1	0.1	0.1
Gillette	0.1	0.1	0.1
Wright	0.4	0.4	0.4
Pfister Ranch	10.0	9.5	12.5

Table 10-1 Smith Ranch Required Permits

Permit or License	Regulatory Agency	Status
Source Material License SUA-1548	U.S. NRC	Approved
Permit to Mine No. 633 and 603	WDEQ/LQD	Approved; Amendment to combine 603 with 633 pending approval
License to MIne	WDEQ/LQD	Approved
Drilling Notification No. 236	WDEQ/LQD	Approved
Public Water Supply Permit	WDEQ/WQD U.S. EPA	Approved
Industrial Storm Water Discharge Permit	WDEQ/WQD	Approved
UIC Aquifer Exemption	WDEQ/LQD U.S. EPA	Approved (Reynolds Ranch Pending)
Radio Communications Permit	U.S. FCC	Approved
Transport License/Permit	U.S. DOT	Approved
UIC Class I Injection Wells (10 wells total)	WDEQ/WQD	Approved
Domestic Sewage (7 permits)	Converse County and/or WDEQ/WQD	Approved (Highland CPF and Sat 1 inactive)
Air Quality (2 permits)	WDEQ/AQD	Approved (Highland permit inactive)
Class III Well Permits	WSEO	Approved; permitting on-going
Domestic Landfill Permit	WDEQ/HSWD	Expired; landfill reclaimed
CPP Storage Ponds Permit	WSE0/WDEQ/WQD	Approved
Sat No. 1 Radium Settling Basins Permit	WSE0/WDEQ/WQD	Approved (inactive)
Sat No. 1 PSR Permit	WSEO/WDEQ/WQD	Approved (inactive)
Sat No. 1 Land Application 1A & 1B Permit	WDEQ/WQD	Approved (inactive)
PSR-2 Permit	WSE0/WDEQ/WQD	Approved
PSR-2 Land Application Permit	WDEQ/WQD	Approved
County Development Permit	Converse County	Approved

Table 10-2 North Butte Required Permits

Permit or License	Regulatory Agency	Status
Source Material License SUA-1548	U.S. NRC	Amendment received – Operating Plan update submitted with SUA-1548 renewal
Permit to Mine	WDEQ/LQD	Permit received – Permit update submitted
License to Mine	WDEQ/LQD	Approved
Aquifer Exemption	WDEQ/LQD, U.S. EPA	Exemption received
UIC Class I Disposal Well Permit (2 wells total)	WDEQ/WQD	Approved – amendment due 2012
Surge Pond Permit	WDEQ/WQD, SEO	To be prepared
Class III Well Permits	SEO	Approved; permitting on-going
Air Quality Permit	WDEQ/AQD	To be prepared
Domestic Sewage Permit	WDEQ/WQD	To be prepared
Industrial Storm Water Discharge	WDEQ/WQD	Construction permit received
County Development Permit	Campbell County Planning Commission	To be prepared
Radio Communications Permit	U.S. FCC	Permit received

Table 10-3 Gas Hills Required Permits

Permit or License	Regulatory Agency	Status
Source Material License SUA-1548	U.S. NRC	Amendment approved – Operations Plan update submitted with SUA-1548 renewal
Permit to Mine	WDEQ/LQD	Permit received – Permit update submitted; Approval pending
License to Mine	WDEQ/LQD	Approved
Aquifer Exemption	WDEQ/LQD, U.S. EPA	Exemption received
UIC Class V – Permit for 2 Test Wells	WDEQ/WQD	Permit received
UIC Class I Permit for 2 Deep Disposal Wells	WDEQ/WQD	Approval pending
Evaporation Ponds Permit	WDEQ/LQD, WQD, WSEO	To be prepared
Class III Well Permits	WSEO	Approved – Permitting on-going
Public Water Supply Permit	WSEO, EPA	To be prepared
Air Quality Permit (Construction and Operations for fugitive dust and particulates)	WDEQ/AQD	To be prepared
Domestic Sewage Permit	WDEQ/WQD	To be prepared
Stormwater Discharge Permit (Construction and Operational)	WDEQ/WQD	Construction permit approved
County Development Permit	Natrona and Freemont Counties Planning Commissions	To be prepared
Radio Communications Permit	US FCC	Permit received
Plan of Operations	US BLM	Approval pending
Environmental Impct Statement	US BLM	In Progress

Table10-4 Ruth Required Permits

Permit or License	Regulatory Agency	Status
Source Material License SUA-1548	U.S. NRC	Amendment received – Operating Plan update to be prepared and submitted at a later dater
Permit to Mine	WDEQ/LQD	Permit received – Permit update required
License to Mine	WDEQ/LQD	Approved
Aquifer Exemption	WDEQ/LQD, U.S. EPA	Exemption received
UIC Class I Permit for Deep Disposal Wells	WDEQ/WQD	To be prepared
Evaporation Pond Permit	WDEQ/LQD, WQD, WSEO	Existing ponds approved
Class III Well Permits	WSEO	To be prepared
Public Water Supply Permit	WSEO, EPA	To be prepared
Air Quality Permit (Construction and Operations for fugitive dust and particulates)	WDEQ/AQD	To be prepared
Domestic Sewage Permit	WDEQ/WQD	To be prepared
Stormwater Discharge Permit (Construction and Operational)	WDEQ/WQD	To be prepared
County Development Permit	Johnson County Planning Commission	To be prepared
Radio Communications Permit	US FCC	To be prepared
Plan of Operations	US BLM	To be prepared

Table 10-5 Agency Consultations

Facility	Agency Consulted	Date	Content
Smith Ranch/Highland and Reynolds	Wyoming Game and Fish Department	April 15, 2011	Species of concern list; review of draft wildlife and vegetation survey plans
Smith Ranch/Highland and Reynolds	US Army Corps of Engineers	April 8, 2011	Review of survey protocol for aquatic resource inventory.
Smith Ranch/Highland	US Fish and Wildlife Service	June 23, 2010	Review of the Combined Permit.
Smith Ranch/Highland	Wyoming Game and Fish Department	June 3, 2010	Review of the Combined Permit.
Reynolds Satellite	US Fish and Wildlife Service	July 20, 2009	Review of Reynolds Amendment to Permit 633
Reynolds Satellite	US Fish and Wildlife Service	December 20, 2007	Information on threatened and endangered species, migratory birds, and wetlands.
North Butte Remote Satellite	US Army Corps of Engineers	January 24, 2011	Verification of wetland delineation.
North Butte Remote Satellite	Wyoming Game and Fish Department	December 17, 2010	List of recommended wildlife surveys.
North Butte Remote Satellite	Wyoming State historic Preservation Office	November 5, 2010	Review of project report.
North Butte Remote Satellite	US Fish and Wildlife Service	August 19, 2010	Presence of threatened and endangered species; protective measures for migratory birds.
Gas Hills Remote Satellite	US Bureau of Land Management	April 6, 2010	Approval of Wildlife Plan (email) incorporating Wyoming Game and Fish Department comments.
Gas Hills Remote Satellite	Wyoming Game and Fish Department	October 29, 2008	Review of BLM EA.
Gas Hills Remote Satellite	US Fish and Wildlife Service	June 12, 2009	Recommendations for protection of migratory birds and wildlife concerns related to uranium ISR.
Gas Hills Remote Satellite	US Bureau of Land Management	May 1, 2007	Record of site visit and recommendation for archeological clearance.
Gas Hills Remote Satellite	Wyoming State Historic Preservation Office	May 24, 2001	Letter providing clearance of cultural resource sites within Mine Unit 2.
Gas Hills Remote Satellite	Wyoming State Historic Preservation Office	August 23, 2000	Determination of site eligibility and recommendations.
Gas Hills Remote Satellite	Wyoming State Historic Preservation Office	August 17, 2000	Determination of site eligibility and recommendations.
Gas Hills Remote Satellite	Wyoming Game and Fish Department	May 13, 1999	Wildlife baseline data requirements.
Gas Hills Remote Satellite	US Army Corps of Engineers	October 30, 1998	Recommendations for avoidance of wetlands.
Gas Hills Remote Satellite	US Bureau of Land Management	January 23, 1997	Cattle grazing practices.
Gas Hills Remote Satellite	US Bureau of Land Management	December 5, 1996	Letter describing lands still needing cultural resource surveys.
Gas Hills Remote Satellite	Wyoming Game and Fish Department	October 14, 1996	Comments on Wildlife appendix of the DEQ Permit to Mine
Gas Hills Remote Satellite	US Bureau of Land Management	January 21, 1993	Review of archeological report.
Ruth Remote Satellite	NA	NA	No consultations have been held with any state or federal agencies since license approval in 1990.