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IE HQ (2)
JPohle
JJLinehan
HJPettengill

MEMORANDUM FOR: Leo Higginbotham, Assistant Director
Division of Fuel Facility & Materials
Safety Inspection, IE

Glen D. Brown, Chief
Fuel Facilities and Material Safety Branch
Office of Inspection and Enforcement, Region IV

FROM: John J. Linehan, Section Leader
Operating Facilities Section I
Uranium Recovery Licensing Branch

SUBJECT: DRAFT LICENSE CONDITIONS FOR ARIZONA PUBLIC SERVICE
CO. R&D IN-SITU FACILITY.

Enclosed are drafts of environmental license conditions for an R&D in- situ
facility proposed by Arizona Public Service Co. Comments received by
August 19, 1981 will be considered for incorporation in the final
license conditions.

Original Signed by:
J. J. Linehan

John J. Linehan, Section Leader
Operating Facilities Section I
Uranium Recovery Licensing Branch
Division of Waste Management

Enclosures:
As Stated



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OFFICE	WMUR	WMUR					
SURNAME	JPohle	JJLinehan					
DATE	8/4/81	8/4/81					

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Open-pit, underground, and solution extraction (in situ leaching) methods were considered, as well as a comparison of impacts associated with each. Solution extraction is the selected method for mining the designated ore deposits. The surface impacts associated with in situ leaching will be much less severe than the impacts that would result with open-pit or underground uranium mining accompanied by conventional milling. With proper well field management and monitoring, the impacts to groundwater and surface water should also be considerably less.

(2) Alternative leach solutions.

An alkaline rather than an acid leach solution will be utilized. A sodium bicarbonate solution containing an oxidant will be used to solubilize the uranium underground. The staff concludes there are no overriding environmental advantages with alternative leach solutions.

(3) Alternative of no licensing action.

The denial of a source material license is an alternative available to the NRC. If denied, the designated ore deposits could not be mined using the solution extraction method. The staff concludes that this project can be conducted in a manner which protects public health and safety and the environment.

5. The Environmental Appraisal will be made available to the public, to the Environmental Protection Agency, and to other specified agencies in July 1981.

6. From the analysis and evaluation made in this statement, it is proposed that the source material license contain the following conditions:

(1) Authorized Use: For uranium recovery from pregnant lixiviant in accordance with statements, representations and conditions contained in (1) the licensee's application dated June 5, 1980; (2) portions of the licensee's June 5, 1980 Environmental Report as follows: Figures 3.2, 3.3, 3.7, 3.8, 3.9; Sections 3 and 4, Page 4-2; ~~Section 3.1, Figure 3.1, and Section 3.2, Figure 3.2 of the licensee's June 5, 1980 Environmental Report~~ for a Source Material and Byproduct Material License. Notwithstanding the above, the following conditions shall override any conflicting statements contained in the licensee's application and supplements.

(2) The uranium in-situ solution mining operations and uranium recovery from the pregnant basic lixiviant shall be performed on a maximum well field area of 1.4 acres within the forty-nine (49.0) acre site project area shown in Figure 3.8 of the June 5, 1980 Environmental Report submitted by APS to the NRC.

(3) Variation from the sodium bicarbonate leach procedure presented in ~~Section 3.1 of the licensee's June 5, 1980 Environmental Report~~ Section 3, ~~Figure 3.1 of the licensee's June 5, 1980 Environmental Report~~ of the

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Environmental Report, shall require prior NRC approval through amendment of this license. The licensee shall discuss why he proposes the variation and how it will affect groundwater quality, the pond water characteristics, restoration methods and criteria, and monitoring requirements.

- (4) The six (6) perimeter ore-zone monitor wells and the four (4) wellfield monitor wells in the locations shown in Figure 3.9 of the June 5, 1980 Environmental Report shall be constructed and used to monitor and establish the premining groundwater levels and baseline water quality in the test area. Well completion data for these ten (10) wells, in the form of Table 2.10 of the June 5, 1980 Environmental Report, shall be submitted to the NRC. All of the monitor wells, and at least 1 injection/production well from each wellfield, shall be sampled (with water levels measured prior to sampling) at least four (4) times, at a minimum of weekly intervals, prior to injection of leach solution and analyzed for all the parameters listed in Table 2.2.1.02 of the EIA. All other injection/production wells in each wellfield shall be sampled ~~on~~ at weekly intervals at least three separate occasions prior to injection ~~and analyzed for all excursion parameters listed in Condition (6).~~ *

~~All X-100 shall be submitted to the NRC in the first quarterly report of the first quarter (1981) below.~~

- (5) At least NINETY ~~90~~ days prior to termination of mining activities, in either wellfield, ~~the licensee shall file with the NRC a specific plan for groundwater quality restoration at the test site including a description of restoration steps, projected schedule of activity, and plans for restoration and post-restoration monitoring. Specific plans for restoration and post-restoration monitoring shall require NRC approval. Restoration of the production aquifer groundwater in each well field and any other groundwaters that may be affected by mining operations shall be initiated within sixty (60) days after solution mining operations have been terminated. The licensee shall provide written notification to NRC, Division of Waste Management, that restoration activities are being initiated.~~ *

MUST BE APPROVED

Proposed restoration criteria shall be submitted to the NRC for review and ~~approval~~ in the form of a license amendment and ~~received~~ prior to injection of lixiviant.

- (6) During ~~mining~~ solution mining operations, the monitor wells identified in condition (4) above shall be sampled for chloride and TDS every two (2) weeks and analyzed for chloride, alkalinity, ~~carbonate~~ bicarbonate, selenium, sodium, uranium, sulfate and TDS once every month. Water level elevations in these wells shall also be measured once every two weeks prior to sampling. Once per quarter, a set of samples from all of the monitor wells shall be analyzed for the full suite of water quality parameter values as listed in Table 2.2.1.02 of the EIA. Results shall be reported graphically and in tabular ~~form in the quarterly reports required in Condition 22~~ 22-1.02 below. *

PROPOSED UPPER CONTROL LIMIT
AND BASELINE WATER QUALITY DATA

MUST BE APPROVED

- (7) Upper control limit (UCL) criteria to be applied to monitor wells to determine when action must be taken to control excursions during mining shall be based upon the premining baseline water quality data collection outlined in Condition (4) above. ~~The UCLs for the excursion parameters listed in Condition (6) above shall be determined by the applicant and submitted to the NRC for review and approval in the form of a license amendment prior to injection of lixiviant.~~ ^{Eight} If two UCL values are exceeded in a well, or if one UCL value is exceeded by 20%, the licensee shall take another water sample within forty-eight (48) hours and analyze it for at least the ~~five~~ ^{nine} parameters listed in Condition (6) above. An excursion is confirmed if two or more UCL values are exceeded or if one UCL value is exceeded by 20% or more. Corrective action to mitigate the situation shall be initiated by the licensee when an excursion is confirmed. Corrective actions shall be maintained until the excursion is concluded. In addition to corrective actions, monitoring shall be intensified; sampling frequency and analysis ~~for UCL parameters~~ of excursion status wells shall be at least once every seven (7) days for the nine parameters listed in Condition (6) above, as long as those wells are on excursion status. Written notification shall be provided to the NRC, Division of Waste Management, within thirty (30) days of confirming an excursion describing the condition, the corrective action taken, and the results obtained. If corrective action is ongoing at the time the report is filed, ~~additional reports shall be submitted describing the progress and results of the corrective actions.~~ Written progress reports concerning the excursion shall be sent to the NRC monthly until the monitor wells are no longer on excursion status. An excursion is considered concluded when all elements of the excursion parameter set are below their respective UCL's.

If corrective actions have not been effective (there are no corrective actions) ~~existing or decreasing in concentrations (s) of those parameters (s) above their respective MCLs~~ within 90 days of excursion confirmation, the injection of lixiviant shall be terminated. Resumption of injection shall require NRC approval in the form of a license amendment.

- (8) A formal report of events describing the corrective actions taken and detailed graphs and tables of all sample analyses shall be maintained during excursions as described in Condition (7) above to document actions and the ensuing results. ~~After excursions end, data on data obtained from the analysis of the corrective actions shall be included in the final summary report submitted to the NRC.~~
- (9) Baseline water level elevations for each monitor well shall be defined and submitted to the NRC for review and approval prior to the injection of lixiviant. The potentiometric level of each monitor well shall be monitored once daily for the first two (2) weeks of continuous operation of that particular well field. After the initial two weeks, water level monitoring can be decreased to once every two weeks and measured just prior to water quality sampling.

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Net flow rates for the well field shall be recorded whenever monitor well water levels are measured, ~~and if possible~~ barometric pressure at the site or vicinity and its effect on water levels should also be recorded. Hydrologic monitoring shall continue as described in this condition until restoration of the ore zone begins. Water level data, in graphical and tabular form, shall be kept for reporting to the NRC as prescribed in Condition (10) below.

WATER QUALITY AND WATER LEVEL

- (10) Results of the ~~hydrologic~~ monitoring program shall be submitted in a separate section of each quarterly report, as described in Condition 22 (25) below, until the monitoring is discontinued. Monitoring data (including baseline data) along with net flow from the well fields shall be reported. In the first quarterly report, the licensee shall provide a discussion that presents, summarizes and quantitatively evaluates the water level and water quality data with respect to the degree of confinement of the ore zone.

- (11) ~~Monitoring potential for leaks in the standpipes of the pond leak detection systems shall be provided by the licensee. The licensee shall maintain a log of the monitoring results.~~

Should the potentiometric level in any of the ore zone ~~monitor wells~~ **PERIMETER** fluctuate significantly, ~~particularly if the level is~~ **LEVELS**, the NRC shall be notified ~~immediately~~ and the licensee ~~shall~~ **take steps to** determine the cause of the potentiometric changes ~~if the change is due to well field operations, the licensee shall take steps to correct potentiometric levels in the monitor wells by well field adjustment.~~ Within thirty (30) days after first notifying the NRC of a potentiometric level problem, the licensee shall submit a report to the NRC, Division of Waste Management, describing the situation from the time the NRC was initially notified until the time of report submittal. The corrective actions taken and the results of those actions shall also be a part of the report.

- (12) The volume of ~~discharged permeable solution~~ **DISCHARGES TO THE EVAPORATION Ponds** shall be ~~recorded~~ **RECORDED**. **QUARTERLY** ~~Monthly~~ samples of bleed solution shall be analyzed for calcium, chloride, alkalinity, sodium, ~~gross alpha and gross beta~~ uranium, radium-226, selenium, arsenic, sulfate and TDS.

- (13) The two evaporation ponds shall be monitored for leaks on a daily basis. ~~Any fluid detected in the standpipes of the pond leak detection systems (see Figure 3.6.2.01 of the EIA) shall be analyzed initially for chloride and TDS. If these concentrations exceed Wyoming DEQ drinking water standards, then waters shall be analyzed for calcium, chloride, alkalinity, sodium, uranium, gross alpha and gross beta, radium-226, selenium, arsenic, sulfate and TDS. All standpipe analyses shall be taken at the standpipe.~~ **NO F**

shall be sampled for all ~~the~~ **TEN** ~~(12)~~ **10** parameters at least every seven (7) days during the leak period and for at least two weeks following repair, if any residual liquid remains in the stand pipes. The results of all standpipe analysis shall be reported to the NRC in the quarterly report as per ~~Condition~~ **Condition** (22) below.

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The NRC shall be notified within forty-eight (48) hours if the chemical quality of the fluid found in the standpipe exceeds Wyoming drinking water standards for any of the parameters tested. The licensee must take immediate steps to repair the leak and not only rely on a leak "pump-back" system to intercept leakage. A report shall be filed with the NRC describing the actions taken by ~~the licensee~~ APS to repair the pond. The results of those actions shall be submitted to the NRC within thirty (30) days after initially notifying NRC. If the leakage problem is not corrected at the time the report is filed, monthly reports shall be submitted until the leak is repaired.

TO THE NRC

(14) APS shall submit the additional information, regarding the design details of the solar evaporation ponds, diversion ditches and leak detection system, requested in the letter from J. Linehan (NRC) to B. Ward (NAC) dated March 27, 1981, for review and ~~approval~~ appropriate ~~approval~~ prior to construction of the solar evaporation ponds. ~~Design of the solar evaporation ponds shall be based on criteria in U.S. Nuclear Regulatory Commission Regulatory Guide 1.101, Design, Construction, and Inspection of Embankment Retention Systems.~~

(15) Final disposition of radioactive solid process and evaporation pond residues (byproduct material) shall be at a licensed NRC tailings disposal site.

~~(16) The licensee is exempted from the requirements of Section 20.203 of 10 CFR Part 20 provided all entrances to the site are conspicuously posted with the warning: "CAUTION. ANY AREA OR ROOM WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL."~~

16 (27) The uranium recovery plant shall be operated at a maximum average flow rate of one-hundred (100) gpm. Pressures at the well heads of injection wells in the B ore zone shall not exceed 100 psi.

17 (28) Flow rates on each injection and production well and injection pressures on injection wells shall be measured at least once per day and recorded graphically on a daily operating log.

18 (29) The licensee shall perform the radiological environmental monitoring program as outlined in Table ~~1~~ 5.2.01 of the EIA. Preoperational data from this program shall be provided to the NRC in the first quarterly report discussed in Condition (22) condition below.

19 (30) Exploration boreholes, post-test boreholes, and all wells within the well field area not used in production or monitoring and not properly cased or sealed within a specific unit shall be plugged prior to injecting lixiviant to comply with Wyoming Department of Environmental Quality (DEQ) requirements. All wells shall be plugged prior to decommissioning the site for unrestricted use.

20 (31) The licensee shall conduct mechanical well integrity tests on each well that will be used for injection before leach solution injection commences. Bottom hole pressures cannot exceed 200 psi because the

APPROVAL IN FORM
OF A LICENSE AMENDMENT
MUST BE RECEIVED

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PVC casing used for injection and recovery wells is rated at 200 psi. During the well integrity test, a packer will be placed within the casing and immediately above the well screen. The second packer will be placed immediately below the well head. Groundwater derived from another well will be discharged under pressure into the well casing between the two packers so that a pressure of 100 psi is achieved in the well. After this pressure is achieved, the well will be shut in and the psi reading on the pressure gauge will be recorded every 30 seconds for a ten to thirty minute time period. If the pressure drops 2 to 3 psi over this time period, the well casing shall be considered suspect and checked for cracks or holes via a down-hole TV camera or other method. If possible, the well will be repaired and the packer test will be repeated. If any well casing cannot be repaired or corrected, the well shall be plugged, abandoned and reclaimed. The results of the well integrity tests shall be submitted to the NRC for review and approval prior to well field operation and injection of lixiviant.

21 (22) During well ^{SHALL} field operations injection pressures ^{SHALL} ~~will~~ be monitored daily and ~~will~~ not exceed 100 psi at the injection well heads. This will assure that both pipe design pressure and fracture pressure in the ore zone and adjacent confining layers are not exceeded.

22 (23) A quarterly report shall be submitted to the NRC Waste Management Division that summarizes the status of the R&D in situ test program, with supporting analytical data and evaluations regarding important environmental aspects of the operations such as pre-operational data, water quality and water level baseline data, monitor well analyses, lixiviant migration control, waste generation volumes, volumes and representative chemical analyses of injected lixiviant and pregnant solution produced. The quarterly report shall include all data on environmental monitoring as well as ground water data. All water quality and water level data shall be presented in tabular and graphical form, with a written summary explaining what the data show. Quarterly reports shall continue to be submitted at least until completion of all restoration operations.

~~(24) Notwithstanding any conflicting statements in APS's application or supplements, all liquid discharges from the above-ground processing facility shall be to the hypalon-lined evaporation ponds.~~

23 (25) APS shall reclaim and decommission the well field and process facility sites as discussed in Section 3.7.2 of the EIA.

24 (26) APS shall maintain a surety to cover all groundwater ^{COST} restoration, reclamation and decommissioning including the ~~cost~~ of offsite disposal of radioactive solid process or evaporation pond residues. APS shall provide a copy of the surety along with a cost breakdown to the NRC and receive NRC approval of the surety prior to injection of lixiviant.

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25 (27) This license shall not be terminated until the NRC has determined that all site reclamation, decommissioning, and well field restoration has met all applicable standards and regulations. *

7. The position of the NRC is as follows:

~~Solution extraction of uranium is a developing technology. Uncertainties regarding environmental impacts, particularly with respect to groundwater contamination and the effectiveness of groundwater restoration techniques, have been recognized. Testing and data collection in a research and development project is proposed by the applicant to eliminate the uncertainties. The scope of the proposed project is sufficiently limited in size to enable continued development of solution mining technology without significant environmental risk.~~

~~The position of the Nuclear Regulatory Commission is that, after weighing the environmental, economic, technical, and other benefits of the APS Peterson Project Site against environmental considerations, and considering available alternatives, the action called for under the National Environmental Policy Act of 1969 (NEPA) and 10 CFR Part 51 is the issuance of a Source Material and Byproduct Material License to the applicant subject to conditions 6 (1) through 6 (27) above.~~ *

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