UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 21, 1999

Mr. John E. Trummel
Kennecott Energy Company
505 South Gillette Ave
Gillette, Wyoming 82717

SUBJECT: ACCEPTANCE OF GROUNDWATER ALTERNATE CONCENTRATION LIMITS FOR THE L-BAR SITE, AMENDMENT 31 TO LICENSE SUA-1472

Dear Mr. Trummel:

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of Sohio Western Mining Company's (SWMC'S) requested amendment of Source Material License SUA-1472 to approve alternate concentration limits (ACLs) for groundwater at the L-Bar uranium mill and tailings site located in Cibola County, New Mexico. The staff review included SWMC's ACL application dated August 28, 1998, and supplemental information provided by letters dated October 26 and November 25, 1998, and March 2, 1999.

Based on its review, as documented in the Technical Evaluation Report (TER, Enclosure 1), the NRC staff concludes that the ACLs proposed by SWMC will not pose a substantial present or future hazard to human health and the environment and are as low as reasonably achievable. Therefore, the staff has determined that the proposed ACLs are acceptable.

In accordance with Title 10 of the Code of Federal Regulations (10 CFR) Part 40, Source Material License SUA-1472 is amended by modifying License Condition (LC) No. 31.B to incorporate the proposed ACLs for uranium and selenium. LC No. 31.D has been added to require SWMC to propose a new corrective action program in the event the ACLs are exceeded in the future, prior to license termination. All other conditions of the license shall remain the same. The license is being reissued as Amendment No. 31 to incorporate the modifications to LC No. 31 (Enclosure 2).

The NRC staff determined that this action would result in no significant environmental impacts and documented this finding in an Environmental Assessment (Enclosure 3). The NRC issued a Finding of No Significant Impact (FONSI), in accordance with 10 CFR Part 51.32, by Federal Register Notice on March 3, 1999 (Volume 64, Number 41, Pages 10331-10332). The notice stated the NRC's intent to issue the license amendment, the availability of the EA, and the opportunity for a hearing of affected individuals.

As discussed between yourself and Ken Hooks of the NRC staff, approval of the ACLs is conditional upon SOHIO successfully completing the property acquisition noted on page ii of SOHIO's August 28, 1998, letter, since the property is within the site boundary specified in the ACL application.

If you have any questions regarding this letter or the enclosures, please contact the NRC Project Manager for the L-Bar site, Ken Hooks at (301) 415-7777.

Sincerely,

N. King Stablein, Acting Chief
Uranium Recovery
and Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 40-8904
License No. SUA-1472
Amendment No. 31

Enclosures: As stated

cc: Russel Edge, DOE, Grand Junction
Katherine Yuhas, NMED, Santa Fe

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Sincerely,

[Signed by]

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**Case closed: L51721**

cc: Russel Edge, DOE, Grand Junction
Katherine Yuhas, NMED, Santa Fe

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# TECHNICAL EVALUATION REPORT

**DATE:** May 4, 1999

**DOCKET NO.:** 40-8904 **LICENSE NO. SUA-** 1472

**LICENSEE:** SOHIO Western Mining Company

**FACILITY:** L-Bar Site

**PROJECT MANAGER:** Kenneth Hooks

**TECHNICAL REVIEWER:** Jane M. Gunn

## SUMMARY AND CONCLUSIONS:

SOHIO Western Mining Company (SOHIO) requested, by letter dated August 28, 1998, and supplemented by letter dated March 2, 1999, that Source Material License SUA-1472 be amended to allow Alternate Concentration Limits (ACLs) for groundwater at its tailings site approximately three miles due east of Seboyeta, New Mexico. In a letter of September 24, 1998, the NRC staff informed the licensee that based on initial review, the ACL application contained sufficient information for a detailed review; however, U.S. Nuclear Regulatory Commission (NRC) staff would require additional information as noted to complete the review. The licensee provided the requested information by letters dated October 26, and November 25, 1998. Based on its review of the information provided by the licensee, the staff concludes that the ACLs proposed by SOHIO are acceptable.

The staff considers the proposed ACL values for the L-Bar site to be protective of public health and safety. As required by 10 CFR Part 40, Appendix A, Criterion 5B(6), the licensee has demonstrated that the proposed limits are as low as reasonably achievable (ALARA), considering practicable corrective actions. Therefore, the licensee's request for ACLs has resulted in an amendment to License Condition 31 (LC31) of the SOHIO license where LC31B has been modified to incorporate the ACLs, LC 31C deleted, and LC31D added to require SOHIO to propose a new corrective action program in the event the ACLs are exceeded in the future, prior to license termination.

## DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

SOHIO has requested ACLs for uranium and selenium; all other site specific hazardous constituents are below license limits. Flow and transport models predict that the Point of Exposure (POE) wells will not see elevated levels of any constituents within the next 1000 years, the required design life of the facility, irrespective of groundwater corrective actions applied at the site. The licensee has requested ACL values of 2.0 mg/l for selenium and 13.0 mg/l for uranium, based on site-specific geochemical studies. These values are the maximum expected concentrations anticipated at some of the Point of Compliance (POC) wells. Other POC wells are already within license limits and not expected to exceed current license limits at any time in the future.

**TECHNICAL EVALUATION:**

Background:

SOHIO has requested ACLs for its tailings site near Seboyeta, New Mexico. Approximately 1.7 million tons of tailings are on the L-Bar site. The uranium mill was in operation from 1977 to 1981, when it was shut down due to depressed uranium prices. Following plant shutdown, a Detection and Monitoring Program (DMP) was implemented. The mill was demolished in 1986 - 1987, and interim reclamation construction took place in 1989 and 1990 to regrade the tailings, excavate diversion channels, and place an interim radon barrier, in accordance with the site reclamation plan. A Corrective Action Program (CAP) removed most of the tailings fluid that was seeping into the groundwater. The remaining tailings fluid is contained in the slimes (fine grained tailings), and drainage of the slimes cannot be accelerated by any practicable technology.

The Groundwater Protection Standards (GPS) established in the license are exceeded for selenium and/or uranium in several POC wells. It is anticipated that these exceedances will continue in the future. However, the current site CAP has not been effective in remedying this condition. Groundwater modeling by the licensee has shown that continuation of the CAP is not expected to result in additional improvement of the groundwater quality. To achieve compliance with applicable regulations over the long term and allow site transfer to the long-term custodian that is expected to be the U.S. Department of Energy (DOE) under NRC guidelines, SOHIO has applied for ACLs for uranium and selenium. The ACL application was submitted in accordance with 10 CFR Part 40, Appendix A, Criterion 5B(6). This provision allows the NRC to establish site specific ACLs for hazardous constituents if it is shown that the constituents will not pose a present or future hazard to human health or the environment as long as the ACLs are not exceeded. It must also be demonstrated that the proposed ACLs are ALARA.

The proposed ACLs apply to the POC locations; however, the concentrations at the POE are expected to remain at background levels and, therefore, will not impact human health or the environment. As the contaminants move across the distance between the POC and POE, natural processes of groundwater movement and geochemical interactions of the plume with the sediments will attenuate the hazardous constituents along the flow path. The ACLs are required because the POC concentrations are anticipated to be greater than the GPS values for selenium and uranium. SOHIO has conducted studies of the site hydrogeology, geochemistry, and groundwater flow and transport. According to the results of these studies and the modeling conducted as part of the studies, the site groundwater quality impacts are and will remain ALARA.

Technical Assessment:

The physical characteristics of the tailings pile control the groundwater flow within the pile. The tailings were placed hydraulically; sands and slimes were placed separately. This created a random stratification in the tailings pond where higher permeability sands are not interconnected, and lower permeability slimes slow the movement of tailings fluid out of the pile. The result is that the more easily drained tailings fluids have been drained from the pile, and the

remaining tailings fluids are contained in the slimes and will require 10 - 20 years for the drainable portion to seep out of the tailings pile. Alternate methodologies to enhance drainage were considered, but were demonstrated by the licensee to have little promise in changing the time required to drain the tailings. NRC staff analysis concurs with the licensee's findings.

The tailings pile has been drained of approximately three-quarters of the original tailings fluid through operation of the CAP; the remaining quarter of the original tailings fluid is concentrated in the slimes. The low permeability of the slimes prevents effective fluid drainage from these areas, except for the small percentage of slimes in direct contact with drainage features. Therefore, any effective CAP would have to contain drainage features in direct contact with all areas of the slimes to be effective in draining the slimes. Undertaking a program to drain the slimes would be technically impractical, and would result in excavation of significant amounts of tailings which would require proper disposal.

After the fluid drains from the tailings pile, the hazardous constituents will attenuate as they encounter the calcite cemented sandstones in the Tres Hermanos Aquifer system. The slow rate of groundwater movement in this area aids constituent attenuation by allowing greater contact time between the contaminant plume and the sediments that have the capacity to buffer the pH in the plume and decrease uranium and selenium to background standards.

Several alternatives to ACLs were evaluated by the licensee prior to submittal of the ACL request. Three of the alternatives were considered to have the most promise of being both effective and economically feasible. First, the licensee considered continuation of the current CAP. Modeling projected that at least 20 years will be required to finish draining the drainable portion of the tailings fluid from the tailings pile. The drainable portion is considered to be roughly 50% of the remaining tailings fluid. The other 50% of the remaining tailings fluid will not leave the tailings pile. The DMP and subsequent CAP have drained about 75% of the tailings fluid from the pile since startup in 1981. Current cost estimates showed that continuation of the current CAP would require $4,540,000 in funding over the next 18 years, the duration of the current license.

Two other options were also presented by SOHIO as possibilities to enhance drainage of the slimes and meet license conditions for selenium and uranium. Both possibilities presented incur significant cost without providing any benefit in the long run, and limited potential benefit in the near future. Both additional options would also require excavation of tailings to install new drainage systems, which will have the undesirable effect of creating a tailings disposal question from the excavation that will have to take place to install either additional system.

The first option considered was installation of additional horizontal drains. The additional drains would only impact the slimes directly in contact with them. Therefore, it would still require 10 - 20 years for the tailings to finish draining, which does not represent an improvement over the currently approved CAP. A second option for additional corrective action was also considered; installation of vertical drainage walls. The strength of this option is that it would provide more contact with the different slimes strata in the tailings pile. However, the physical limitation of the slimes ability to transmit water will make the vertical drainage walls only effective where they are in direct contact with the slimes. Additionally, the installation of vertical drainage walls would necessitate considerable excavation of tailings, giving the same disposal question as the previous alternative. Drainage time could be shortened to 10 years, which is still a substantial length of effort for no tangible benefit in the long run.

NRC staff has determined that in either case, this additional drainage is not likely to affect the constituent concentrations at the POC or POE, and, therefore, would have no tangible benefit to human health or the environment. Site geochemistry is ideal for natural attenuation of the remaining plume through neutralization of the acidic plume and sorption of constituents of concern. Geochemical modeling by the licensee has shown more than sufficient capacity for neutralization in the acid plume over the area of the tailings basin. Discontinuing the CAP will allow groundwater gradients to return to normal velocities, which are lower than the groundwater velocities in the area during active pumping. This slower groundwater movement will allow for more contact time between the sediments and the remaining tailings fluid as the drainable portion seeps out of the tailings, allowing more opportunity for acid neutralization and sorption of the constituents of concern. Considering the natural attenuation that will take place while the site is under DOE control, there will be no impact from previous site activities on the groundwater quality at the POE. Therefore, the current CAP should be discontinued.

ACL limits requested by SOHIO were developed by evaluating geochemical controls. The 13.0 mg/l uranium and 2.0 mg/l selenium values are conservative values; the actual highest concentrations at the POC will probably be somewhat lower. These ACL values are considered maximums given the geochemistry of the plume, and the values do not take into consideration some natural attenuation that will have begun by the time the fluid reaches the POC. SOHIO's modeling of contaminant transport to the POC without considering natural attenuation allows for a worst case evaluation of health risk and environmental impacts of the constituents. A finite element mesh flow model was run for the site, considering only effects of advective movement of the constituents, and there was no effect at the POE at the end of the 1000-year design life required for the site. NRC staff finds the requested ACL values appropriate and protective of human health and the environment.

The regional and local hydrogeologic regime affects flow and transport of groundwater and tailings fluid seepage. This is affected by both surface and subsurface features. Recharge is affected by surface soil character and annual rainfall. The local hydrogeologic regime was used as the basis for predictive modeling conducted by the licensee. This modeling indicates that the distance between the POC and POE of 2600 feet is more than adequate to attenuate the residual amounts of uranium and selenium. The aquifer influenced by the tailings fluids is not currently used as a drinking water source and not expected to be a future source of drinking water, as better quality and more dependable water supply is located in a deeper aquifer.

Alternatives:

NRC staff have three available options to the licensing action: (1) approve the application; (2) approve the application with modifications; or (3) deny the application.

Any option for increased intervention and remediation would involve disturbing the tailings to install new draining technology. This disturbance would result in some of the tailings being excavated and pose a disposal question. Additionally, even aggressive intervention will not ensure a more rapid draining of the slimes or a more rapid return to background conditions beneath the tailings pile. The extremely limited potential benefit of increased remediation through technology that will invade the tailings pile and radon barrier integrity is not sufficient to warrant the additional environmental impacts of undertaking the additional corrective action measures.

**RECOMMENDED LICENSE CHANGE:**

It is recommended that the license be amended to incorporate the ACL values as requested; 13.0 mg/liter for uranium, and 2.0 mg/l for selenium at the POC wells.

It is recommended that LC No. 31.B be changed to read:

31.B. Comply with the following groundwater protection standards in mg/l (unless otherwise noted) at point of compliance wells 17B, 1A, 69, and 81, with background being recognized in well 29A:

nickel = 0.05, selenium = 2.0, combined radium-226 and -228 = 11.01 pCi/l, thorium-230 = 3.12 pCi/l, and uranium = 13.0.

That LC No. 31. C be deleted by this amendment.

And that LC No. 31. D be added as follows:

31.D In the event the limits for the constituents in Subsection B are exceeded, the licensee shall propose a new corrective action program with the objective of returning concentrations of those constituents to the limits specified in Subsection B.

**ENVIRONMENTAL IMPACT EVALUATION:**

The staff's review was documented in an Environmental Assessment (EA) in accordance with the requirements of 10 CFR Part 51. The conclusion of the EA is a Finding of No Significant Impact (FONSI) for the proposed licensing action. The staff issued the FONSI in accordance with 10 CFR 51.32 and published that finding in the Federal Register on March 3, 1999 (Volume 64, Number 41, Pages 10331-10332). The Federal Register notice stated the NRC's intent to issue the license amendment, the availability of the EA, and the opportunity for a hearing of affected individuals.

**References:**

Report: Balleau Groundwater, Inc., 1997. Projected Long-Term Flow and Quality of Groundwater at the L-Bar, New Mexico Site

Letter (with enclosures) from J. Trummel, SOHIO, to J. Holonich, NRC, Subject : Sohio Western Mining Company; L-Bar; Alternate Concentration Limits (ACL) Application, dated August 28, 1998.

Letter (with enclosure) from J. Trummel, SOHIO, to C. Abrams, NRC, Subject: L-Bar ACL Application, license SUA-1472, Docket 40-8904, dated October 26, 1998.

Letter (with enclosure) from J. Trummel, SOHIO, to C. Abrams, NRC, Subject: L-Bar ACL Application, license SUA-1472, Docket 40-8904, dated November 25, 1998.

ENVIRONMENTAL ASSESSMENT
ALTERNATE CONCENTRATION LIMITS FOR GROUND WATER
AMENDMENT REQUEST FOR SOHIO WESTERN, L-BAR FACILITY

## 1.0 INTRODUCTION

### 1.1 Background

The L-Bar site is a uranium mill tailings site located in central New Mexico owned by Sohio Western Mining Company (Sohio). The mill was in operation from 1977 through 1981, when it was shut down due to depressed uranium prices. A Detection and Monitoring Program (DMP) was in place from 1981 until 1990, when the current ground water Corrective Action Program (CAP) was implemented. The DMP included not only detection and monitoring of ground-water contaminants but also removal of approximately 38 million gallons of tailings seepage. This removal of tailings seepage continued under the U.S. Nuclear Regulatory Commission (NRC) approved CAP. The mill was demolished in 1986 - 1987, and interim reclamation construction took place in 1989 and 1990 to regrade the tailings, excavate diversion channels, and place an interim radon barrier on the tailings pile.

The L-Bar mill used a sulfuric acid-leach process to extract uranium from the ore. This process resulted in a tailings solution with average total dissolved solids concentrations of approximately 50,000 milligrams per liter and a pH as low as 1.0. The primary constituents in the tailings solution were sulfate, sodium, and chloride.

Prior to disposal of tailings in the clay-bottomed tailings basin, and seepage of liquid from that basin, shallow sediments underlying the tailings disposal area contained little water which was of poor quality. Better ground-water sources for the area are found in deeper aquifers; therefore, the First Tres Hermanos aquifer is not a viable ground-water source.

### 1.2 Proposed Action

By letter dated September 24, 1998, Sohio requested that Source Material License SUA-1472 be amended to allow alternate concentration limits (ACLs) for the ground-water constituents uranium and selenium. On October 26 and November 25, 1998, Sohio provided additional information that was requested by NRC. Based on its evaluations of the information provided, NRC staff has concluded that the ACLs proposed by Sohio are acceptable.

### 1.3 Review Scope

In accordance with Title 10, Code of Federal Regulations, Part 51, this Environmental Assessment (EA) serves to : (1) present information and analyses for determining whether to issue a Finding Of No Significant Impact (FONSI) or to prepare an Environmental Impact Statement (EIS); (2) fulfill NRC's compliance with the National Environmental Policy Act when no EIS is necessary; and (3) facilitate preparation of an EIS when one is necessary. Should

NRC issue a FONSI, no EIS would be prepared and the commercial source material license, or amendment thereof, would be granted subject to operating conditions contained in the existing source and byproduct material license.

## 2.0 SITE CHARACTERISTICS

The L-Bar uranium mine, mill, and tailings site is located in Cibola County, New Mexico, approximately 47 miles west of Albuquerque and approximately 3 miles due east of Seboyeta. Ore processed at the mill consisted of ore produced by the on-site L-Bar mine and toll ore from other nearby uranium mines.

Ground-water contaminants at the site have impacted two formations, the Mancos Shale and the First Tres Hermanos Sandstone. The shale has greater natural attenuation potential and extremely slow ground-water movement, therefore, the contaminant migration will be limited in the shale. The First Tres Hermanos Sandstone also has high potential for natural attenuation of constituents of concern; however, the more permeable sandstone will allow contaminants to move further from the tailings pile before attenuation is complete. In either formation, the constituents will not be able to reach the site boundary, location of the Point of Exposure (POE) wells.

## 3.0 OPERATIONS

The L-Bar mill was in operation from 1977 through 1981 when it was shut down due to depressed uranium prices. The L-Bar mill used a sulfuric acid-leach process to extract uranium from the ore. This process resulted in a tailings solution with average total dissolved solids concentrations of approximately 50,000 milligrams per liter and a pH as low as 1.0. The primary constituents in the tailings solution were sulfate, sodium, and chloride.

## 4.0 ENVIRONMENTAL EFFECTS

The L-Bar site is licensed by the NRC under Materials License SUA-1472 to possess byproduct material in the form of uranium waste tailings as well as other radioactive wastes generated by past milling operations. Currently, all concentrations of ground-water hazardous constituents, with the exception of uranium and selenium, meet the established ground-water background values for the sites as measured at the site Point of Compliance (POC) wells. The L-Bar milling process was a sulfuric acid leach process, which resulted in an acidic leachate from the tailings and a low pH ground water plume immediately under the tailings pile. Modeling data provided by the licensee indicate that the resultant low pH plume will be naturally attenuated between the POC and POE.

## 5.0 ALTERNATIVES

The action that NRC is considering is approval of an amendment request to a source material license issued pursuant to 10 CFR Part 40. The alternatives available to NRC are:

- Approve the license amendment request;
- Require changes to the CAP; or
- Deny the request.

Based on its review of the request, NRC staff has concluded that there are no significant environmental impacts associated with the proposed action. Therefore, alternatives with equal or greater impacts need not be evaluated.

The licensee provided an evaluation that considers other practicable corrective actions, as required for ACL proposals by Criterion 5B(6) of 10 CFR Part 40, Appendix A. The licensee's evaluation of various options, including continuation of the CAP, construction of additional horizontal drains, and installation of vertical drainage walls, resulted in a conclusion that the net reduction of constituent concentration would not be significant. NRC staff review verified the licensee's findings of no significant improvement possible with increased corrective actions.

The third alternative to the proposed action would be to deny the requested action and require the licensee to continue operation of the existing CAP or implement some alternative. Based on its review, the NRC staff has determined alternatives will result in no net reduction of contaminant levels at any time at the POE.

## 6.0 SUMMARY AND CONCLUSIONS

Based on an evaluation of the radiological impacts of the L-Bar amendment request, NRC has determined that the proper action is to issue a FONSI in the Federal Register. The following statements support the FONSI and summarize the NRC staff's conclusions resulting from its EA.

1. Currently, all concentrations with the exception of uranium and selenium in a few POC wells, will meet the established ground-water background values for the site at the POC wells.

2. Due to the attenuation capability of the formations through which the acidic ground-water plume will move, the residual amounts of uranium and selenium will be reduced to background levels that will not pose any greater health risk than that assigned to the maximum concentration limits for ground-water protection.

3. The POEs are located along the site boundary of the restricted area that will be maintained for long-term care by the long-term care custodian (most likely the Department of Energy) following termination of the L-Bar license.

4. Ground water use from the First Tres Hermanos Sandstone and Mancos Shale is unlikely because of the low volume available in these units, and the already poor background water quality. Ground water used in the area is taken from deeper aquifers with better quality water and higher, sustainable well yields.

5. Additional corrective actions will have little effect on dewatering of the tailings or removal of contaminants and, therefore, will have little impact on the ground-water quality.

Because the staff has determined that there will be no significant impacts associated with approval of the amendment request, there can be no disproportionately high and adverse effects or impacts on minority and low-income populations. Except in special cases, these impacts need not be addressed for EAs in which a FONSI is made. Special cases may include regulatory actions that have substantial public interest, decommissioning cases involving onsite

disposal in accordance with 10 CFR 20.2002, decommissioning/decontamination cases which allow residual radioactivity in excess of release criteria, or cases where environmental justice issues have been previously raised. Consequently, further evaluation of environmental justice and concerns, as outlined in NRC's Office of Nuclear Material Safety and Safeguards Policy and Procedures Letter 1-50, Rev. 1, is not warranted.

## 7.0 CONSULTATION AND SOURCE INFORMATION

In completing this action, NRC staff held telephone discussions with representatives of the New Mexico Environmental Division (NMED).

References:

1. Letter (with enclosures) from J. Trummel, Sohio, to J. Holonich, NRC, Subject : Sohio Western Mining Company; L-Bar; Alternate Concentration Limits (ACL) Application, dated August 28, 1998.

2. Letter (with enclosure) from J. Trummel, Sohio, to C. Abrams, NRC, Subject: L-Bar ACL Application, license SUA-1472, Docket 40-8904, dated October 26, 1998.

3. Letter (with enclosure) from J. Trummel,Sohio, to C. Abrams, NRC, Subject: L-Bar ACL Application, license SUA-1472, Docket 40-8904, dated November 25, 1998.