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From: Robert_F_Stewart@ios.doi.gov
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To: NRCREP Resource
Subject: Uranium Recovery GEIS - DOI Comments
Attachments: Uranium Recovery GEIS - DOI Comments.pdf

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The Department of the Interior's comments on the subject document are attached.

If you require paper-copy or word-processor version, please so advise.

(See attached file: Uranium Recovery GEIS - DOI Comments.pdf)

Robert F. Stewart
Regional Environmental Officer
Office of Environmental Policy and Compliance U.S. Department of the Interior P.O. Box 25007 (D-108)
Denver, CO 80225-0007
Voice: (303) 445-2500
Fax: (303) 445-6320
Cell: (303) 478-3373
Email: robert_f_stewart@ios.doi.gov

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Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

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Chief, Rulemaking, Directives and Editing Branch
U.S. Nuclear Regulatory Commission
Mail Stop T6-D59
Washington, D.C. 20555

Dear Sir or Madam:

The Department of the Interior has reviewed the subject draft Generic Environmental Impact Statement (GEIS) and is providing comments regarding: (1) concerns addressing the long-term effect of uranium recovery facilities on wildlife habitats; (2) the documents address of threatened and endangered species, and migratory birds; (3) potential for impacts of contaminants on migratory birds; and (4) general comments on the water related data analysis presented in the EIS. We offer recommendations for inclusion in the following round of site specific environmental analysis. Additionally, we recommend that you clarify the intent and analysis on some issues.

These comments are made pursuant to numerous environmental statutes, including the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703 and the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq., and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j. The information that we have requested and our recommended measures should be included in any future license applications prepared for this project. We may have additional information requests when site specific environmental analysis is prepared.

Generally, our goals during the application process are to insure that project effects to environmental resources are avoided to the extent possible, minimized with the development and implementation of specific project features and operations where practicable, and mitigated as necessary to address any unavoidable project effects. Potential effects may include: creating contaminated habitats that attract migratory birds, timing of construction to preclude nesting behavior, and both long and short-term effects on the environment caused by project construction and operation. We recommend you document how these potential effects will be avoided or show that they are not issues with construction and operation of *in-situ* leach uranium recovery facilities.

Because the GEIS is a programmatic document, our comments do not reflect concerns that would be presented on a local scale. In this regard, we request clarification, propose recommendations on analysis, and offer recommendations that would minimize impacts on wildlife. In addition to the primary comments in the highlighted sections, specific comments on the document are provided for either clarification or improvement of accuracy.

Impacts of Long-term Operation vs Construction

The GEIS states that the potential environmental impacts to the terrestrial habitat and its biological components would be small to moderate during the construction phase and small during the operational phase. We believe that the potential environmental impacts of operation are just as significant, if not more so, than during the construction phase. The operational phase will last much longer and would have greater probability of accidental releases associated with the actual In-Situ Leach (ISL) process. We recommend that a more detailed discussion of the typical life-span of an ISL facility be presented with a breakdown by phase. In addition, the document should acknowledge the possibility of water quality impacts due to accidental spills during the operational phase.

The environmental impact could range from small to large in significance, depending on the severity of the spill and the resources present at the site. Actions of a shorter duration of weeks or months, such as those occurring during the construction phase, may have fewer long-term impacts on the environment and may be more amenable to scheduling than actions lasting years, as might occur during the operational phase.

Migratory Birds

The MBTA and BGEPA protect many species of migratory birds, including eagles and other raptors. The MBTA, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs, except as permitted by regulations, and does not require intent to be proven. BGEPA prohibits taking any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing. Project activities that could lead to take of a migratory bird including an eagle, their young, eggs, or nests should be coordinated with the Department before any actions are taken. Removal or destruction of such nests or causing abandonment of a nest could constitute violation of one or both of the above statutes. An example of such an activity would be the creation of new roads and powerlines in the vicinity of a nest. Removal of any active migratory bird nest or nest tree is prohibited. For golden eagles, taking of an inactive nest will only be permitted for activities involving resource extraction or human health and safety. Mitigation, as determined by the Department, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on or near the project area, we recommend that you time project activities to avoid breeding season for he species present.

Environmental Contaminants

Operations related to *in-situ* waste water management can impact migratory birds. *In-situ* mining wastewater is typically disposed of through deep-well injection or discharge into large evaporation ponds. In 1998, the Service conducted a study of a grassland irrigated with wastewater from an in-situ uranium mine and found that selenium was mobilized into the food chain and bioaccumulated by grasshoppers and songbirds (Ramirez and Rogers 2002). Disposal of the in-situ wastewater through irrigation is not recommended by the Service due to the potential for selenium bioaccumulation in the food chain and adverse effects to migratory birds. Land application may result in the contamination of groundwater and eventually seep out and reach surface waters. Additionally, the selenium-contaminated groundwater could seep into low areas or basins in upland sites and creates wetlands which would attract migratory birds and other wildlife.

We are also concerned with the potential for elevated selenium in evaporation ponds receiving in-situ wastewater. Waterborne selenium concentrations greater than 2 ug/L are considered hazardous to the health and long-term survival of fish and wildlife (Lemly 1996). Additionally, water with greater than 20 ug/L is considered hazardous to aquatic birds (Skorupa and Ohlendorf 1991). Chronic effects of selenium include immune suppression to birds (Fairbrother et al. 1994) which can make affected birds more susceptible to disease and predation. Selenium toxicity will also cause embryonic deformities and mortality (See et al. 1992, Skorupa and Ohlendorf 1991, Ohlendorf 2002).

High selenium concentrations can occur in wastewater from in-situ mining of uranium ore as uranium-bearing formations are usually associated with seleniferous strata. Uranium deposits in the southern Powder River Basin in Converse County, Wyoming can contain up to 4,500 µg/g (ppm) of selenium (Boon (1989). The leaching solution use in uranium mining dissolves selenium present in the formation. The disposal of this wastewater can expose migratory birds to selenium which is known to cause impaired reproduction and mortality in sensitive species of birds such as waterfowl.

If submerged aquatic vegetation and/or aquatic invertebrates are present in evaporation ponds with high waterborne selenium concentrations, aquatic migratory birds can be exposed to high concentrations of selenium through by feeding on these items. The potential for selenium and other contaminants to impact migratory birds should be assessed if the proposed facility will use ponds to store or dispose of the wastewater or if the wastewater will be disposed of in such a manner as to potentially expose migratory birds or other wildlife to contaminants.

Accidental releases/spills of uranium in-situ production water can result in the ponding or pooling of this production water which could be ingested by wildlife, thus exposing them to uranium, radionuclides, and selenium. Spills or releases of production water could also reach surface waters which could impact aquatic organisms inhabiting the affected waters. We recommend you implement the following measures to reduce the impacts of contaminants on migratory birds

1. The NRC should require installation of leak detection systems in all injection wells and production wells to enable operators to immediately respond to releases of injection or production water onto the environment.

2. Land application of in-situ wastewater through irrigation or other disposal methods should not be allowed if this disposal option presents a risk for selenium bioaccumulation in the food chain and adverse effects to migratory birds, and a risk for soil, surface water and ground water contamination.

SECTION 6(f) COMMENTS

The National Park Service has reviewed this project in relation to any possible conflicts with the Land and Water Conservation Fund and the Urban Park and Recreation Recovery programs. We have found the following L&WCF projects that could be impacted:

NEW MEXICO: There are numerous L&WCF projects in McKinley and Cibola Counties in New Mexico that appear to be either in the project site or close proximity. We recommend you consult directly with Mr. Maurice Mondary, the official who administers the L&WCF program in the State of New Mexico. Mr. Mondary can be contacted at 505-827-3558 or Mr. Maurice A. Mondary, Federal Grant and Trails Administrator, New Mexico State parks Division, PO Box 1147, Santa Fe, NM 87504.

SOUTH DAKOTA: There are numerous L&WCF projects in Fall River, Custer Pennington and Lawrence counties in South Dakota that appear to be either in the project site or close proximity. We recommend you consult directly with Mr. Randy Kittle, the official who administers the L&WCF program in the Sate of South Dakota. Mr. Kittle can be reached at 605-773-5490 or Mr. Randy Kittle, Grants Coordinator, South Dakota Division of Parks and Recreation, Department of Game, Fish and Parks, 523 East Capitol, Foss Building, Pierre, SD 57501-3182.

Data Analysis of Water Resource Data

The GEIS is unclear concerning how the conclusions for potential earthquake impacts from deep well injection were reached for each of the sites discussed. Each section listed below states that, "This change in pressure theoretically could impact the transmissivity (e.g., resistance to flow) of faults in permitted areas. However, this change in pressure is not expected to be significant enough to reactivate the local faults and it is expected to be extremely unlikely that any earthquakes would be generated." We recommend that the GEIS provide additional references on how this conclusion was reached. We recommend you review relevant information found at http://pubs.er.usgs.gov/usgspubs/b/b1951 and http://www.earthquake.usgs.gov/learning/faq.php?categoryID=11&faqID=1.

Wyoming West Uranium Milling Region:
Section 4.2.3.2, Operation Impacts to Geology and Soils, page 4.2-10, lines 22-28
Section 4.2.3.3, Aquifer Restoration Impacts to Geology and Soils, page 4.2-12, lines 17-25

Wyoming East Uranium Milling Region:
Section 4.3.3.2, Operation Impacts to Geology and Soils, page 4.3-5, lines 21-28
Section 4.3.3.3, Aquifer Restoration Impacts to Geology and Soils, page 4.3-7, lines 26-34

Nebraska-South Dakota-Wyoming Uranium Milling Region:
Section 4.4.3.2, Operation Impacts to Geology and Soils, page 4.4-5, lines 25-31
Section 4.4.3.3, Aquifer Restoration Impacts to Geology and Soils, page 4.4-7, lines 25-33

Northwestern New Mexico Uranium Milling Region:
Section 4.5.3.2, Operation Impacts to Geology and Soils, page 4.5-5, lines 26-33
Section 4.5.3.3, Aquifer Restoration to Impacts to Geology and Soils, page 4.5-7, lines 27-35

In addition, the discussion in Section 4.2.4.2.2.2 which discusses the operational impacts to production on surrounding aquifers, is ambiguous. Because the hypothetical case provided is such an extreme worst-case scenario, it would greatly benefit the decision maker to understand if either: (a) a more likely drawdown scenario is provided; or (b) a discussion showing that even this extreme case leads to only minor impacts. The present assessment indicates that 128 feet of drawdown occurs at 330 feet from the pumping well. A drawdown of this magnitude could be a significant impact to a nearby rural domestic well, depending on the regional extent of the draw-downs. An alternative presentation could be to show the extent of the area in which drawdown greater than 5 feet occurs, i.e., the limit of potentially minor drawdown.

Page-Specific Comments:

Page xliii, paragraphs 6 and 7. In the discussions related to impacts from construction and operation, the Draft GEIS notes that, with regard to threatened and endangered species, "most species readapt quickly." We suggest that this phrase be deleted from both paragraphs. By virtue of being threatened or endangered, it is likely indicative that these species do **not** readapt quickly to disturbances. We also believe that the potential environmental impacts to threatened and endangered species are just as significant, if not more, during the operational phase as during the construction phase. As noted in the previous comment, the operational phase would likely be of longer duration and would be the phase most vulnerable to impacts from accidental releases associated with the actual ISL process.

Page 3.2-13, lines 1-2. The streamflow gaging station on the Sweetwater River near Alcova, WY (USGS station number 06639000) has not been operated year-round since 1983. Therefore, it is not clear how the average streamflow was estimated for the assessment. For more information about the USGS's streamflow gaging program and data for Wyoming, please contact Kirk Miller, Surface-Water Specialist, USGS Wyoming Water Science Center, at (307) 775-9168 or kmiller@usgs.gov.

Page 3.2-13, lines 18-20, and page 3.2-15, line 6. Annual mean streamflow for Little Wind River near Riverton, WY (USGS station number 06235500) for the period 1941-2007 was 557 cubic feet per second (cfs), as summarized on the top of page 3 of the pdf file available at http://wdr.water.usgs.gov/wy2007/pdfs/06235500.2007.pdf. It is unclear how the reported figure of 215 cfs was derived. If it was extracted from WaterWatch as the references suggest, it may represent the average flow for the day the website was accessed, not the average flow for the year or period of record. Similarly, annual mean streamflow for the Wind River below Boysen

Reservoir, WY, for the period 1951-2007 was 1,360 cfs as summarized on the top of page 3 of the pdf file available at http://wdr.water.usgs.gov/wy2007/pdfs/06259000.2007.pdf. Similar concerns may apply to all the USGS streamflow data cited in this section and the data should be verified.

3.2-88, lines 42-44 and page 3.3-65, lines 11-13. The link for the Whitehead (1996) report is incorrect. The correct link is: http://pubs.usgs.gov/ha/ha730/ch_i/index.html.

Page 3.3-12, line 49 and page 3.3-15 lines 10 and 16-17. The streamflow data cited in this section should be verified as described in the comment above. The units also should be verified as some streamflows are reported as cfs whereas others are reported in cubic feet per minute.

Page 3.3-16, lines 23-25. Flow is unlikely to be simultaneously downward in the same location, as recharge from precipitation; and upward, as seepage into shallower aquifers. The statement on line 23 should be modified to include the phrase "Recharge to the aquifer is by precipitation *in outcrop areas*..." as is stated by Whitehead (1996). Numerous statements of scientific fact are made in this section without attribution. The source of the information should be stated.

Pages 3.4.32-3.4.38. Figures 3.4-12 through 3.4-18 depict critical habitat for certain game species in the Nebraska-South Dakota-Wyoming Milling Region. All of the habitats depicted by these figures occur only in Wyoming. We suggest that habitat for some of these species (mule deer and white-tailed deer in particular) also likely exists in South Dakota and/or Nebraska. This information should be obtained from the Nebraska Game and Parks Commission and the South Dakota Department of Game, Fish and Parks.

Page 3.4-17, lines 46-48. Average annual streamflow for the White River near the NE-SD State Line (USGS station number 06445685) is 39.8 cfs as summarized on the top of page 3 of the pdf file available at http://wdr.water.usgs.gov/wy2007/pdfs/06445685.2007.pdf. Similarly, average annual streamflow for Hat Creek near Edgemont, SD (USGS station number 06400000), is 16.2 cfs as stated at http://wdr.water.usgs.gov/wy2007/pdfs/06400000.2007.pdf. All citations to USGS streamflow data should be verified.

Page 3.4-44. The State list of threatened and endangered species for South Dakota includes the swift fox. Line 28 references section 3.2.5.3 for a discussion of the swift fox; however, that section does not contain a discussion of the fox.

Pages 3.5-18 to 3.5-19. Numerous statements of scientific fact are made in this section without references. We recommend that you list references supporting these statements.

Page 3.5-87, lines 9-10. The link provided for Robson and Banta (1995) is incorrect. The correct link is http://pubs.usgs.gov/ha/ha730/ch_c/index.html.

Page 4.2-20, lines 7-15. Comparing production bleed to irrigation water usage is a useful example for putting the potential impacts of leaching in context. However, irrigation pumpage has some return flow that recharges the aquifer, whereas the production bleed cannot be allowed to return to the aquifer, as it would defeat the purpose of causing slight inflow to the production field. Hence, this analysis slightly understates the impacts of operation.

Page 4.2-22, lines 11-16. The equation(s) used to calculate the vertical movement and the source of the assumption of a hydraulic gradient of 0.1 should be provided, as the calculation is quite sensitive to the gradient. It appears that a basic form of the Darcy equation was used to perform this calculation by multiplying conductivity by the gradient to determine velocity. Use of the Darcy equation is appropriate for calculating bulk discharge but may have been inappropriately applied in this case. Individual contaminant particles traveling through rock/aquifer material must move faster than the rate calculated by Darcy because part of the space is taken up by rock (Focazio and others, 2002, p 4-5; Freeze and Cherry, 1979, p 70-71). Therefore, the Darcy velocity must be divided by the porosity of the rock material, resulting in a velocity that could be 2-5 times, or more, greater than the Darcy velocity, to calculate the average linear velocity.

McWhorter and Sunada (1977) are incorrectly cited as Whorter and Sunada (1977).

NOTE: The preceding three comments pertaining to Section 4.2 also apply to the parallel sections for the three other uranium milling areas, i.e. Sections 4.3, 4.4, and 4.5

Page 4.4-21, lines 16-18. The Draft GEIS notes that potential operational impacts to ecological resources would be small (versus small to moderate to large during the construction phase) due to less land disturbance. As noted previously, we believe that the potential impacts to ecological resources are just as significant, if not more, during the operational phase as during the construction phase. The operational phase would likely be of longer duration, and any animals that were displaced due to habitat loss or increased disruption would likely continue to be displaced. Potential impacts from causes other than physical disturbance, such as impacts from accidental releases associated with the actual ISL process, should be noted.

Page 4.3-13, lines 1-2. No discussion of drawdown sensitivity is provided in the section indicated, and should be included in the final EIS.

Page 4.3-15, lines 32-33. No discussion of aquifer tests is provided in the section indicated.
Page 5-3, lines 11-15. The Draft GEIS notes that Table 5.2-1 includes tabulations of the cumulative history and short-term future of uranium recovery sites, including research and development sites, conventional uranium milling sites, and ISL facilities. Based upon the counties listed in the table, it appears that only facilities within the milling regions addressed by the Draft GEIS were addressed. Since traditional uranium milling sites are included in the table, it might provide additional perspective if sites within these states under the jurisdiction of the Nuclear Regulatory Commission but outside of the specified milling regions were also listed or their approximate numbers noted in the final EIS.

Page 10-38, Table 10-3. This table notes that impacts to terrestrial ecology would be small to moderate during the construction phase and small during the operational phase. For the reasons stated in several previous comments, we believe that impacts to terrestrial ecology would be just as significant, if not more, during the operational phase as during the construction phase.

Page 10-40, Table 10-3. This table notes that impacts to threatened and endangered species would be small to moderate to large during the construction phase and small to moderate during the operational phase. For the reasons stated in several previous comments, we believe that impacts to threatened and endangered species would be just as significant, if not more, during the operational phase as during the construction phase.

Page C-1. Appendix C contains only one page, and appears to be missing one or more additional pages.

Appendix E. This appendix includes analyses of hazardous chemicals used in the ISL process. We suggest a similar appendix that addresses the naturally occurring constituents commonly encountered during milling that could pose a risk to people, water quality, soil, fish, and wildlife (e.g., arsenic, selenium, radium, and uranium).

We appreciate the opportunity to provide comments on this proposed project and are available to work with the project applicant to further evaluate the project and provide direction on information needed and the environmental evaluations requested. If you have any questions or need further information for fish and wildlife resources, please contact Tim Modde, USFWS, Region 6 Environmental Coordinator, (303) 236-4253. For questions concerning our water resources comments, please contact Lloyd Woosley, Chief of the USGS Environmental Affairs Program, at (703) 350-8797 or at lwoosley@usgs.gov. Those relating to our Section 6(f) comments should be directed to Jane G. Beu, Outdoor Recreation Planner, in our Midwest Regional Office at 402-661-1544.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

References Cited:

Boon, D.Y. 1989. Potential selenium problems in Great Plains soils. In L.W. Jacobs, ed. Selenium in agriculture and the environment. American Society of Agronomy, Inc, and Soil Science Society of America. SSSA Special Pub. No. 23. Madison, WI. pp: 107-121.

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cc: J. Park,
TWFN T8-F5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555