NRDC
THE EARTH'S BEST DEFENSE

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Via Electronic Mail

Chief, Rulemaking, Directives and Editing Branch
U.S. Nuclear Regulatory Commission
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RE: Natural Resources Defense Council Comments on Uranium Recovery GEIS

Dear Sir/Madam:

The Natural Resources Defense Council (NRDC) writes today to comment on the Nuclear Regulatory Commission's (NRC) *Draft Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities* (hereinafter "Draft GEIS"). *See* 73 Fed. Reg. 43795 (July 28, 2008) *for Notice of Availability of Draft GEIS*. NRDC respectfully urges the NRC to withdraw the Draft GEIS as the agency's actions fail to meet the requirements of the National Environmental Policy Act (NEPA) 42 U.S.C. § 4321 et seq.

Summary of Comments

The Draft GEIS is a deficient presentation that fails a federal agency's basic duties to take a "hard look" at the significant environmental impacts associated with "in-situ leach" (ISL) uranium mining. This failure to take a thorough, searching look at the environmental impacts, and at the alternatives available to avoid or mitigate those impacts, rests at the heart of a federal agency's NEPA obligations.

The NRC has written a document with long listings of citations to existing EIS and environmental reports and a broad-brush treatment of potential problems with ISL uranium mining. Such an effort is inadequate to the task. The Council on Environmental Quality's guiding NEPA regulations are clear that an "EIS shall be analytic rather than encyclopedic." 40 C.F.R. § 1502.2. The document is long, and even so fails to provide meaningful information setting out environmental harms, the likelihood of those harms, mitigation options, reasonable alternatives, and the larger cumulative impact of yet more resource extraction in the areas covered by the Draft GEIS.

The NRC's failure to present meaningful data, a full analysis of cumulative impacts, and a set of reasonable alternatives strike at the core of a federal agency's NEPA obligations. Obliquely discussing the idea that there might be failures of groundwater restoration and presenting two essentially anecdotal tables – tables that clearly demonstrate restoration failure for key and dangerous groundwater contaminants – does not constitute a searching review of the environmental impacts. Simply listing a litany of Environmental Impact Statements (EIS) from other resource extraction technologies without meaningful explanation or analysis does not amount to a "hard look" at the potential cumulative impacts on scarce Western water resources. In short, the Draft GEIS is agency action that is arbitrary, capricious, and not in accordance with law. We strongly urge withdrawal of the Draft GEIS, analysis of the material submitted by the public (material that should have been presented by the agency in the first instance), and a re-tooling of the entire process along the lines suggested by NRDC in our scoping comments. We will return to this suggested "re-tooling" of the agency's approach at the close of our comments.

SPECIFIC COMMENTS AND QUESTIONS

(A) Comments on Executive Summary

All question and data requests apply to the revision of the GEIS.

Executive Summary at xxxiii: The proposed federal action is to prepare a GEIS that identifies and evaluates the potential environmental impacts associated with the construction, operation, aquifer restoration, and decommissioning of ISL milling facilities in portions of Wyoming, Nebraska, South Dakota, and New Mexico. Without additional specificity, the NRC also intends to make use of the GEIS during subsequent site-specific ISL licensing actions.

(1) Approach, page xxxiv: Please provide longitude and latitude coordinates that define polygons within which can be found the four geographic regions covered by this GEIS. Since the geologic and hydrologic flow characteristics everywhere within these regions are not the same, what are the ranges of each geologic characteristic and hydrologic flow parameter that together bound the environmental impact assessment of ISL operations covered by this GEIS?

(B) Comments on Chapter 1, Introduction

All question and data requests apply to the revision of the GEIS.

(1) Section 1.6.5.1, page 1-15: The US Fish and Wildlife Service (F&WS) is listed as a consulting agency. In accordance with Section 7(a)(2) of the Endangered Species Act, which requires that "each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is

determined by the Secretary . . . to be critical." 16 U.S.C. §1536(a)(2). To ensure compliance with this statutory mandate, federal agencies must consult with the appropriate fish and wildlife agency whenever their actions "may affect" an endangered or threatened species. See 50 C.F.R. § 402.14. This interagency consultation process assists federal agencies in complying with their duty to ensure against jeopardy to listed species or destruction or adverse modification of critical habitat.

(2) Was a prerequisite "Section 7" consultation conducted with F&WS in order to analyze potential impacts to listed threatened and endangered species? And if no formal consultation occurred, what was the basis for not conducting a formal Section 7 consultation? Furthermore, what was the nature of the consultation absent a formal consultation?

(3) Section 1.8.3, page 1-26: This section repeatedly uses rubbery phrases such as "to the extent applicable," "to the extent needed," "relevant aspects," and "essential aspects" in describing when the NRC staff's NEPA site-specific review would rely on the "conclusions reached in the GEIS" in place of a de-novo NEPA analysis of site-specific impacts. What are the specific environmental protection standards and technical criteria by which NRC staff will make for when determinations for reasonably foreseeable adverse impacts of uranium recovery at a specific-site fall within or outside the range and intensity of impacts previously analyzed in the GEIS? Without the benefit of such specific criteria and standards, how does NRC propose to protect this process from slipping into an arbitrary and capricious exercise of its regulatory "discretion?"

(4) In the past, the NRC has not been noted for it expertise in groundwater hydrology, geochemistry, western water requirements, aquifer restoration, or mining impacts. What are the minimum qualifications of the NRC staff who will be involved in making make such highly specialized and technical judgments without the benefit of detailed investigation and analysis of a prospective mining site's particular geology, hydrology, and environmental equities deserving of protection?

(5) Section 1.8.3, page 1-26, line 10: Why does the list of proposed actions on which the NRC will conduct "an independent, detailed evaluation of environmental impacts" fail to include the phrase "restore aquifers?" By contrast, *see* Section 1.1, page 1-2, line 9, and Section 1.2, page 1-4, line 3 for similar listings that include much of the same proposed actions for a detailed environmental evaluation and do include the phrase "aquifer restoration." What is the basis or purpose of deleting the phrase "restore aquifers" in this instance?

(6) Section 1.8.3, page 1-26, line 30: What is meant by the phrase a "reasonable range of alternatives" to an applicant's proposed action for uranium recovery? Does this concept embrace well-field designs not proposed by the applicant? Does is it include additional environmental safeguards, some of which may involve significant additional costs, not included in the applicant's uranium recovery plan? Does it include ISL technologies not proposed by the applicant? If so, what are these technologies, and how does one reconcile

the existence of these technology alternatives with the statement that ISL technology is "relatively standardized," as stated in Section 1.1 line 35?

(7) Section 1.8.3, page 1-26, lines 34-37: Here we find the statement that "to the extent needed," the NRC staff will "independently *confirm* and verify *essential aspects*" of the applicant's environmental analysis (emphasis added).

(a) How will NRC staff determine which aspects of an applicant's analysis are "essential," and therefore worthy of "independent" confirmation and verification, and what fraction of the NRC's effort will be devoted to gathering data sets designed to independently "challenge" or "test," rather than "confirm," an applicant's analysis?
(b) How is the "non-essential" information in an applicant's environmental analysis evaluated?
(c) How are "computer codes" used to verify essential aspects of the analysis?
(d) What "other verification techniques" potentially could be used, and what verification techniques have been used to date to evaluate the data submitted by ISL applicants? How is accuracy monitored specific to each potential verification technique, including the use of computer codes?

(8) Section 1.8.3, page 1-26, lines 42-47: Please describe the additional site-specific conditions, including, but not limited to geologic characteristics, hydrologic flow parameters, specific mining and milling techniques and characteristics, and aquifer restoration operations associated with a new license application, or a license to expand an existing operation, that would trigger the need to prepare a site specific EIS, rather than be covered by an Environmental Assessment (EA) or Finding of No Significant Impact (FONSI).

(9) Section 1.8.5, page 1-27, line 24: If the NRC can issue either a final EIS or a final EA/FONSI, without clear public criteria guiding when the agency should opt for one over the other, how does this proposed federal action support a "consistent approach to NRC's site-specific environmental review of license applications for ISL facilities" as stated in Section 1.3 line 17?

(C) Comments on Chapter 2, *In-Situ* Leach Uranium Recovery and Alternatives

All question and data requests apply to the revision of the GEIS.

(1) Section 2.1.2, page 2-2, lines 15-16: If "strata bound deposits can take different physical forms and are typically described as either roll-front deposits or tabular deposits" which have fundamentally different deposit geometries, how do the ISL technology used and well field designs employed vary between facilities extracting from roll-front deposits versus tabular deposits?

(2) Section 2.1.2, page 2-3, line 25 through page 2-4, line 2: What are the differences in drilling, underground infrastructure, and pumping technologies necessary to extract uranium from deposits at a depth of 100 meters as opposed to 560 meters? If there are

standard technologies associated with specific depth ranges please provide a table listing each depth range and the associated technologies used.

2.2 Pre-Construction.

(3) Section 2.2, pages 2-6, lines 3-10: Setting an appropriate and accurate picture of baseline conditions is an area of significant public and environmental concern and this description of the matter is wholly inadequate. Gathering “general location” information, with “more detailed information” to be collected *if* a license is granted is indicative of the problems with the NRC’s regulatory requirements. More specifically:

(a) How does the NRC verify the accuracy of the baseline data supplied by the applicant, including water-sampling data to establish baseline conditions prior to operations?

(b) If the application is for expanded operations at or near an existing licensed site, how does the NRC insure that the baseline date are not contaminated by conditions arising from the existing licensed operations?

(4) With respect to an application for a new ISL mining operation, or the expansion of an existing ISL mining operation, does the NRC believe this GEIS’s qualitative discussion of pre-construction activities absolves the NRC of the requirement to present and discuss quantitative baseline data in an EIS, or does the NRC believe this can be handled in an Environmental Assessment (EA) and a subsequent Finding of No Significant Impact (FONSI)? Please explain the basis for your response.

(5) If the NRC proposes that an EA may be adequate under some circumstances, please describe these circumstances, including delineating when an EA would be inadequate and when an EA would not be adequate. In this regard, for each of those circumstances where the NRC believes an EA may be adequate, please explain how the public would be able to comment on the accuracy or adequacy of the applicant’s baseline data supplied to the NRC?

(6) Section 2.2, page 2-6, lines 29-31: Is the NRC-accepted list of constituents to be sampled considered a minimum requirement for license applicants? If an applicant, state agency or another federal agency either proposes or sets out a list containing constituents not included in the NRC-accepted list, will the applicant be held accountable for restoring these constituents to the measured baseline levels? If so, would this not provide incentive for an applicant to gather as little or as innocuous baseline data as possible?

(7) Section 2.2, pages 2-6, 2-7, lines 34-5: Determining baseline water quality has been an issue of significant public concern and potential for dispute.

(a) How frequently are baseline samples collected over the “period of at least 1 year?

(b) What is considered a “distribution that is sufficient to characterize the different aquifers and surface water bodies?”

(c) If there is no specific distribution, what accounts for the variation between sites in determining the ability to sufficiently characterize aquifers and surface water bodies?

(d) Does baseline water quality data gathering include any degradation of the aquifer from other types of environmental impacts, such as past or currently operating resource extraction techniques?

(e) In what ways can baseline water quality be affected by past land uses, including exploratory drilling?

(8) Section 2.2, page 2-7, Table 2.2-1: This table describes the typical baseline water quality parameters gathered for ISL sites. Have ISL sites listed other parameters? If so, please provide examples.

2.3.1.1 Well Fields.

(9) Does the NRC agree that the well field pattern could significantly affect the environmental impact of ISL mining and aquifer recovery?

(10) With respect to an application for a new ISL mining operation, or the expansion of an existing ISL mining operation, does the NRC believe this Draft GEIS's qualitative discussion of the well field pattern absolves the NRC of the requirement to describe and discuss the well field pattern in an EIS, or does the NRC believe this can be handled in an EA with a subsequent FONSI? Please explain the basis for your response.

(11) If the NRC proposes that an EA may be adequate under some circumstances for well-fields, please describe these circumstances, including delineating when an EA would be inadequate and when an EA would not be adequate. In this regard, for each of those circumstances where the NRC believes an EA may be adequate, explain how the public would be able to comment on the accuracy or adequacy of the applicant's well-field data supplied to the NRC?

(12) Section 2.3.1.1, page 2-7, line 30: The discussion of well-fields should be amplified.

(a) Why are both five-spot and seven-spot patterns commonly used?

(b) Which is more efficient in production and are there differences in how the varying patterns work in different types of geology?

(c) Which is more efficient in restoration? Has one pattern had more incidences of excursions? When and for what reason would one pattern be used over the other?

(d)What role does the NRC play in deciding and regulating well field design? Please provide specific sites that have employed various five-spot, seven-spot and irregular well field patterns.

(13) Section 2.3.1.1, page 2-7, lines 31-34: What variations in technology employed, magnitude of surface impact, and magnitude of underground infrastructure arise due to the fact that "roll-front uranium deposits normally have irregular shapes" and "well

patterns in a given well field are also irregular?" Are any two well fields designed identically or is each well field plan unique? Please provide examples.

(14) Section 2.3.1.1, page 2-9, line 14: Are all manifolds engineered to the same specifications and with consistent use results? If not, what accounts for the variation? Are there significant differences in the operation of different manifolds? What is the performance history of each manifold design that has been used in commercial production?

(15) Section 2.3.1.1, page 2-9, lines 15-16: When are meters and control valves not computerized to control flow rates and pressure? Please provide lists of well fields that do not have computerized monitoring systems and those that do.

(16) Section 2.3.1.1, page 2-10, line 9: "Locations and boundaries for each well field are adjusted as more detailed data on the subsurface stratigraphy and uranium mineralization distribution are collected during well field construction." This is an area of enormous concern and it is one that has engendered significant controversy, such as with the *Hydro Resources, Inc*. uranium ISL license originally granted by the NRC in 1994.

(a) How do these post-license well field changes impact the license status?

(b) Please explain the rationale for how a license can be issued prior to sufficient information being gathered to finalize basic plans such as well field location and boundary?

(c) How is the industry required to present the characteristics of the aquifer and associated geology to the public and the regulator? Is there a significant difference in the level of information available to each of these parties?

(d) Is the required level of information sufficient to document high confidence that well-field excursions will not occur? If so, what specific types of information comprise the factual and technical basis for this confidence? If not, why not?

(17) Section 2.3.1.1, page 2-11, lines 3-4: Insufficient information is presented on drilling techniques.

(a) What other drilling techniques are used in addition to mud rotary drilling? For example, is air drilling used?

(b) Are types of drilling with significant water consumption or impact commonly used?

(c) What types and quantities of specialty drilling fluids are employed, and do any of these have characteristics harmful to the environment?

(d) In what instances are techniques other than rotary mud drilling used ,and for what reason?

(e) Are there substantive differences between wells that are drilled using different methods? At what depths are different drilling methods used?

(18) Section 2.3.1.1, page 2-11, lines 7-8: Additional information is needed on downhole geophysical tools. Specifically:

(a) What downhole geophysical tools are used?

(b) Are the same tools used on all wells? When are specific tools used and not used?

(c) Please provide a table with descriptions for each geophysical tool used, the circumstances under which it is used, what it measures, and under what circumstances it is not used.

(19) Section 2.3.1.1, page 2-11, lines 10-13: Please supply additional information of disposal of drilling fluids:

(a) In what localities are residual cuttings and drilling fluid mud pits backfilled and graded?

(b) In what localities are they emptied and cleaned?

(c) Is there a substantive difference in the impact on surface water between these two methods?

(d) Please provide a list of well fields that have been or are currently developed and indicate which mud pit remediation was used, and please provide an environmental evaluation of any differing qualitative results.

(20) Section 2.3.1.1, page 2-11, lines 17-19: More information is needed on grouts and casing materials:

(a) What grouts and casing materials are selected based on the following parameters: lixiviant chemical composition, depth of well, anticipated pressure, and pH of groundwater?

(b) Please provide a list of current grouts and casing materials in use, the conditions under which licensees have used these grouts and casing materials, and an explanation for why a specific grout and casing combination is best suited for the indicated condition.

(21) Section 2.3.1.1, page 2-11, lines 27-29: How is “properly graded” sand or gravel pack determined? Please provide a table indicating all instances of wells filled with sand, wells filled with gavel, and wells where the formation has been left to collapse around the screen and explain any substantive differences in production and reclamation performance.

(22) Section 2.3.1.1, page 2-11, lines 37-39: (a)What are the “variety of protective enclosures” used to protect well-heads from the elements?

(b) Under what circumstances is each type of protective enclosure used?

(c) What are the substantive differences between protective enclosures?

(d) Are there any instances of well heads exposed to the elements?

(e) What currently and previously operating facilities did not use protective enclosures and for what reason?

(23) Section 2.3.1.1, page 2-12, Figure 2.3.4: (a) What are the advantages and disadvantages of retrievable well screen liners?

(b) Why is this technology optional? Specifically, are there any substantive differences between wells that employ retrievable well screen liners and those that do not?

(c) What are the advantages and disadvantages of an under ream zone? Why is this technique optional?

(d) Are there any substantive differences between wells with an underream zone and those without?

(24) Section 2.3.1.1, page 2-13, lines 2-4: (a) Please provide a full description of the air lift method?

(b) What other pumping methods are used to develop a well?

(c) Under what circumstances is the air lift method appropriate for local conditions?

(d) Under what circumstances are specific other pumping methods appropriate for local conditions?

(25) Section 2.3.1.1, pages 2-13, Side Bar: (a) Why is a pressure drop of 10% not considered significant to identify a Mechanical Integrity Testing (MIT) failure?

(b) Why are MITs conducted every 5 years or less (presuming "less" could mean 4 years and 51 weeks)?

(c) Is it possible for a well casing to fail and go undetected between MITs?

(d) When a well fails a MIT what corrective steps are taken to fix the well?

(e) Is there a documented history of the success or failure rates for MIT at ISL mining sites? If so, please provide that history.

(26) Section 2.3.1.2, page 2-14, line 1: (a) Are the trenches unlined in all instances?

(b) Have there been any instances when a pipeline has leaked? Please provide a list of all pipeline leaks including date, facility, well field, type of pipe material, type of fluid released, amount of fluid released, an explanation for the cause of leak, and corrective actions taken.

(c) Are pipelines subject to MITs? If so, how often is an MIT conducted? If not, why are MITs not conducted?

(27) Section 2.3.2, pages 2-14, 15, lines 50-3: (a) What is considered “sufficient space?”

(b) Is the same amount of space required for all ISL facilities?

(c) If not, what is the cause for variation?

(d) How does evaporation rate, wave action, and amount of water managed impact the amount of space that is conserved?

(e) Are there instances when evaporation ponds have exceeded freeboard requirements?

(f) If so, when and where did this occur and what was the associated impact?

2.4.1.1 Lixiviant Chemistry

(28) Section 2.4.1.1, page 2-15, lines 26-47: Groundwater chemistry is of primary concern, especially for restoration of aquifers contaminated by uranium ISL practices.

(a) Specific history and documentation should be provided on the results of differing types of lixiviant chemistry, including whatever information is known on the restoration efforts and the ultimate results of that restoration for the aquifers where acid-based ISL mining systems were used [lines 34-36].

(b) The same documented history should be produced for ammonia-based systems and alkaline-based systems.

(29) Section 2.4.1.1, page 2-15, lines 45-47: (a) Why does the NRC assume that for the purposes of the Draft GEIS “alkaline lixiviants will be used in uranium recovery operations?” (b) How might this assumption conflict with use of this GEIS in projects with varying lixiviants?

(30) Section 2.4.1.1, page 2-16, Table 2.4-1: (a) What is the mean and standard deviation of typical lixiviant chemistry?

(b) How many lixiviant solutions where used to derive the ranges presented in Table 2.4-1?
(c) What is the specific lixiviant chemistry for each currently and previously operating ISL facility?

(d) What are the substantive differences in performance at each site? Can they be compared between sites? If so, what must be considered in order to make the comparison? If not, why are the different lixiviant chemistries not comparable?

(31) Section 2.4.1.1, page 2-16, Inset Box: NRC Staff makes the statement that “[a]lkaline-based ISL operations are considered to be easier to restore than acid mine sites” and cites two reports.

(a) Please provide full documentation and a comparative evaluation of the history of restoration of acid-based sites vs. alkaline-based ISL sites.

(b) Was any site fully restored to pre-mining conditions?

(c) Were certain parameters difficult to restore, or not restored at all in either type of mining?

(32) Section 2.4.1.2, page 2-17, lines 8-9: (a) Are there other common or uncommon metals that “enrich” the groundwater? (b) Are there percentages that vary across different types of groundwater chemistry or different types of geologies?

(33) Section 2.4.1.2, page 2-18, line 3-5: The GEIS fails to effectively account for the significant climatic differences in seasonal variation between the four framework regions.

(34) Section 2.4.1.3, page 2-18, lines 17-28: This list is not comprehensive and a “hard look” requires that it be comprehensive. Mine operators have cited restoration activities, nearby drilling, high water tables due to seasonal precipitation, among other explanations for a monitor well to be on excursion status. Please provide a list of all excursions reported to the NRC with the licensee’s rationale for the excursion and the regulatory response – and the basis for the response – to the excursions.

(35) Section 2.4.1.3, page 2-18, lines 30-31: (a) How often are periodic tests required? (b) If there is no set time period, please explain why and provide a table with the permitted periods for each operating monitor well.

(36) Section 2.4.1.3, page 2-18, lines 42-43: (a) Since vertical excursions indicate unanticipated groundwater communication between strata, what corrective actions are taken to remediate a vertical excursion? (b) Please list the instances of all vertical excursions, the licensee’s rationale, and the remediation action taken.

(37) Section 2.4.1.4, page 2-19, lines 8-10: What site-specific considerations and hydrogeologic characteristics are addressed to determine the location and spacing of monitor wells?

(38) Section 2.4.1.4, page 2-19, lines 21-36: (a) Under what circumstances would underlying aquifer monitoring wells not be required? Please provide both hypothetical and/or historic examples.

(b)What is the rationale for the specific spacing of overlying and underlying monitor wells?

(c) Why are they monitored every two weeks during operations?

(d) With modern (digital and remote?) technology, why are the wells not monitored continuously?

(39) Section 2.4.1.4, page 2-19, lines 38-45: Please provide a table of the excursion indicators, the steps used to notify the NRC in the event of an excursion, the sampling

frequency under various scenarios, and the response rates required by the NRC of the mine operators. How are these excursion reports required to be written and filed?

(40) Section 2.4.1.4, Page 2-19, side bar paragraph 2: (a) Why does the statistical method used depend upon the water quality?

(b) Why does the NRC not use the same statistical method in an effort to improve consistency in determining excursions?

(c) Has the NRC ever taken enforcement actions against a licensee for failures to properly monitor for excursions?

(d) If so, when and please provide all relevant details and documentation.

(41) Section 2.4.1.4, page 2-20, lines 2-4: (a)What considerations allow NRC staff to determine that an excursion cannot be recovered?

(b) How long must a licensee attempt to recover an excursion prior to NRC determination that the excursion cannot be recovered?

(c) Please provide a list of all instances of vertical and horizontal excursions, the length in time of the excursion status, and whether or not the licensee was required to stop injection of lixiviant into the well field.

(d) Please provide more specific guidelines used by the NRC to determine agency action in response to excursions.

(42) Section 2.4.2.1, page 2-20, lines 16-22: (a) What are the substantive differences between ion exchange circuits?

(b)Why do some plants have downflow vessels and some have both downflow and upflow vessels?

(c) How does facility design determine the size and a number of exchange vessels?

(d) What advantages do larger exchange vessels provide over smaller exchange vessels?

(e) What advantages do smaller exchange vessels provide over larger exchange vessels?

(f) What reasons do licensees give for using a lesser number of larger exchange vessels as opposed to a greater number of smaller exchange vessels to process an equivalent amount of pregnant lixiviant?

(43) Section 2.4.2.1, page 2-20, line 23: (a) Do all plants use the same resin beads?

(b) Are all resin beads chemically identical?

(c) Who are the primary producers of the resin beads used in currently operating ISL facilities?

d) Are resin beads environmentally benign? Please provide an explanation.

(44) Section 2.4.2.2, page 2-20, line 41: (a) Do facilities that can process resin have a substantively different impact on the surrounding environment? (b) Please provide a list of the facilities (central and satellite), indicate whether they have the ability to process resin, and identify any substantive differences in license or permit stipulations pertaining to the environmental impact of resin processing.

(45) Section 2.4.2.2, page 2-20, lines 45-46: Other than eliminating transportation from a remote location, are there any advantages or disadvantages to elute the resin directly in the ion exchange column? If so, please provide an explanation.

(46) Section 2.4.2.3, page 2-24, line 7: (a) Do all operating and proposed processing plants use vacuum yellowcake dryers? (b) Please provide a list of all currently operating and proposed new and restart processing plants and the yellowcake dryer technology used (or planned) at each site.

(47) Section 2.4.2.3, page 2-24, lines 21-22: (a) Do all processing plants have a baghouse dust collection system?

(b) Which processing plants do not have a baghouse dust collection system?

(c) Are all baghouse dust collection systems designed the same?

(d) If not, what are the substantive differences between baghouse dust collection systems and how effective is each known design at containing the dust particles?

(48) Section 2.4.3, page 2-25, lines 16-17: By having production wells extract slightly more water than is re-injected into the host aquifer, the mines sites maintain a net inward flow of water into the well field.

(a) Can this net inward flow be offset by groundwater extraction in other areas, including nearby production sites, cities, or water supplies?

(b) If so, please provide scenarios under which this may occur or has occurred in the past.

(49) Section 2.5, page 2-26, lines 11-13: The subject of aquifer restoration is a matter of enormous concern in the arid American West, and this section’s environmental analysis is inadequate and fails to take the “hard look” required by NEPA. The NRC Staff commences this section with the statement “[A]quifer restoration with the well field ensures that the water quality and groundwater use in surrounding sources of drinking water will not be adversely affected by the uranium recovery operation.” This is a confused, and we would submit, unsupportable statement. First of all, uranium recovery operations and aquifer restoration activities occur at distinctly different times, so the latter, occurring later, can hardly preclude the prospect of contamination from the former. Nor, we suspect, has the NRC seriously studied the effectiveness of groundwater remediation efforts associated with ISL mines. Indeed, there is considerable evidence that

NRC's regulatory oversight in this area has been particularly lax and ineffectual. So statements such as these only widen the agency's credibility gap with the public and local environmental officials.

As is detailed in original documentation collected from the Wyoming Department of Environmental Quality (WYDEQ) and the Texas Commission on Environmental Quality (TCEQ), there are numerous examples of uranium ISL mines that have failed to restore heavily contaminated aquifers. In an attempt to thoroughly understand the extent of remaining contamination at past and ongoing restoration sites, NRDC and others have commenced compiling and analyzing public groundwater data from uranium ISL mines in several states. We are in the initial stages of collecting this data and, time and resources permitting, we will supplement our comments as necessary to ensure the NRC is fully apprised of what we are able to learn about restoration at several locations. However, in order to submit these comments in a timely fashion, NRDC includes with these comments an initial and brief listing of excursion and spill reports, technical reports, license applications, surety estimates, maps, correspondence, and inspection documents. These documents, which are provided to the agency in electronic form, make up a small percentage of the historic information that the NRC and the public should have available on the impacts of uranium ISL mines and show the extent to which important information went unconsidered by the NRC in the drafting of this GEIS. See Appendix A, attached to this document.

As a singular example of the type of data the NRC should be analyzing in this GEIS – but has failed to do so – the Texas Commission on Environmental Quality (TCEQ) compiled a table of original restoration values, final restoration values, and last samples for all ISL facilities/production areas in the state. Of the 42 wellfields that were restored, only five wellfields had an amended restoration value for uranium that was lower than the original value. All others—92% of the sites—had amended their uranium restoration values to be greater than what was originally mandated. (See Appendix A, John Santos TXRestorationHistory9-05.xls.)

We expect that the NRC can and indeed must supplement this information with more detailed information of past and ongoing restoration efforts at ISL sites, with any associated changes in applicable groundwater restoration requirements for the license holder noted. For example, if certain aquifers where ISL mining had taken place could not be restored for certain heavy metals, how often were alternative concentration limits for those parameters adopted?

(50) Section 2.5, page 2-26, lines 13-18: Please provide a full listing and associated documentation of each and every Safe Drinking Water Act aquifer exemption provided to ISL uranium mines. Please also provide the authorizing agency for the aquifer exemption and the original date of the exemption.

(51) Section 2.5, page 2-26, lines 20-27: The following questions are designed to obtain statistics needed to assess the adequacy of aquifer restoration efforts. Please modify the

draft GEIS to provide the following data with respect to each uranium ISL well field operation in the United States:

a) the name and location of the uranium ISL well field operation;

b) the year when well field production operations began;

c) the year when well field production operations were completed, or plan to be completed;

d) the year when aquifer restoration operations began, or plan to begin;

e) the year when aquifer restorations operations were completed, or plan to be completed;

f) whether the production aquifer has to be returned to “pre-operational conditions;”

g) whether the NRC has required that the production aquifer be returned to the maximum contaminant levels provided in Table 5C of 10 CFR 40 Appendix A;

h) whether the NRC has required that the production aquifer be returned to Alternative Concentration Limits (ACL) approved by the NRC;

i) the number and date of each lixiviant excursion;

j) the number of ISL wells that were placed in excursion status; and

k) the current status or resolution of each excursion.

(52) Section 2.5, page 2-26, lines 22-23: To ensure that the NRC provides a meaningful comparative analysis of ISL impacts, please ensure the revised draft provide responses to the following questions:

(a) Why does the GEIS not include general aquifer restoration criteria?

(b) Do any currently or previously operating well fields have the same restoration criteria as another currently or previously operating well field?

(c) Has every previously operating well field been restored under unique aquifer restoration criteria?

(d) What well fields have been restored to the original baseline water quality criteria for all parameters?

(e) What well fields have not been restored to the original baseline water quality?

(f) Were license conditions ever altered in response to failures to meet aquifer restoration criteria?

(g) Were license conditions and the associated *time frame* for restoration of these well fields ever altered?

(53) Section 2.5, page 2-26, line 26: When, and at which ISL processing facilities, and why has aquifer restoration not commenced as the uranium recovery operations end?

(54) Section 2.5, page 2-26, lines 29-32: (a) Please provide a list of all currently and previously operating ISL facilities and indicate what combination of the following restoration methods were used: groundwater transfer, groundwater sweep, reverse osmosis with permeate injection, groundwater recirculation, stabilization monitoring, and any additional steps used to date. (b) Explain any substantive differences in effectiveness of completed restoration operations that implemented different combinations of restoration methods.

(55) Section 2.5.2, page 2-27, lines 35-40: (a) Given the significant range in size of well fields (measured in million L) is there any correlation between number of pore volumes used for ground water sweep and the size of the well field?

(b) Using documented commercial-sized restoration operations, what is the magnitude and direction of the slope of any correlation between the size of the well field and total number of pore volumes.

(c) If there is a significant correlation (with 95% confidence), please explain if the relationship is best fit by a linear, exponential, quadratic, or other functional form.

(56) Section 2.5.2, page 2-27, Inset Box: (a) Please provide the permitted or licensed estimated number of pore volumes needed for each restoration step as documented in surety estimates as well as the actual number of pore volumes used. (b) Please also provide extensions for additional pore volumes, the stated need for such additional pore volumes, and any associated license amendments.

(57) Section 2.5.3, page 2-28, lines 9-11: (a) Are all reverse osmosis systems used in ISL facilities designed the same? (b) Have there been substantive differences in performance across systems, and if so, what has been the basis for the substantive differences in performance?

(58) Section 2.5.3, page 2-29, lines 1-4: Please provide a list comparing the number of pore volumes estimated in surety estimates and the actual number of pore volumes used during reverse osmosis, permeate injection, and recirculation at all restored and currently operating facilities.

(59) Section 2.5.3, page 2-29, lines 12-17: (a) Do all current and previously operating facilities use brine concentrators?

(b) If not, please provide a list of all current, previously operating, and proposed facilities (license submitted), and indicate whether a brine concentrator is used.

(c) Can salts precipitated from a brine concentrator be used for other commercial purposes or must they be disposed of as hazardous solid waste?

(60) Section 2.5.4, page 2-29, lines 43-48: (a) Why is stabilization conducted on a quarterly basis?

(b) Is there any minimum or maximum amount of time that a well field can be classified as "in stabilization?"

(c) How many samples are required in order to establish a statistically significant trend in stability time series data?

(d) With what confidence does the NRC base statistical significance?

(e) Which of the following are used to compare baseline or pre-operational class-of-use to determine if aquifer restoration is considered complete: stability averages, stability trends, final stability readings, or a combination of the above?

(61) Section 2.6, page 2-30, line 48: (a) Are there any instances of wells abandoned and not plugged or abandoned and not plugged using accepted practices? (b) What are the potential hazards to the surface and subsurface waters if a well is abandoned and unplugged or not plugged using accepted practices?

(62) Section 2.6, page 2-31, Table 2.6-1: Figures in this table represent estimates specific to the Smith Ranch facility. (a) What is the range of byproduct radioactive waste and other solid waste produced per facility from all current and previously operating facilities? (b) What is the mean and standard deviation of byproduct radioactive waste and other solid waste produced per facility from all current and previously operating facilities?

(63) Section 2.6, page 2-31, lines 25-27: Please provide documentation of a disposal path for all historical, currently operating, and proposed radioactive waste from ISL facilities that would fall under the Atomic Energy Act 11e.(2) byproduct material designation.

(64) Section 2.7.2, page 2-35, lines 5-16: NRC Staff states that liquid wastes are generated during all phases of uranium recovery and then cites to estimated flow rates and constituents in liquid waste steams (sic) for the Highland ISL facility (NRC 1978). (a) Is the 1978 estimation (also cited in Table 2.7-3) the most recent information NRC has obtained on flow rates and constituents in liquid waste streams for a comprehensive presentation? (b) If not, please provide the more recent data and how it compares to the 1978 set of estimations.

(65) Section 2.7.2, page 2-37, lines 11-16: (a) Please provide information and associated documentation on all areas where treated water was applied to land and any follow-up monitoring results of uranium and radium levels. (b) Have decommissioning surveys been conducted on all areas where land application has taken place?

(66) Section 2.7.2, page 2-37, lines 28-31: (a) Please provide details on any National Pollutant Discharge Elimination System permits obtained by ISL facilities.

(b) Have there been any violations of NPDES permit conditions?

(c) If so, what were those violations and were there any associated penalties?

(67) Section 2.10, page 2-41, lines 18-34: With a history of failures in efforts to adequately restore contaminated aquifers at ISL uranium mining sites, the subject of financial surety is one of great concern to NRDC and a matter that merits a hard look from the NRC.

(a) Please provide a full (and comparative) accounting of each and every original financial surety required by NRC or relevant state agencies for ISL uranium mines, including the type of surety arrangement (e.g., bonds, cash deposits, certificates of deposit, parent company guarantees, etc.).

(b) What was the basis for the initial surety requirement?

(c) Were there license conditions requiring each of these surety arrangements?

(d) Were the surety estimates for funding the entirety of groundwater restoration and decommissioning the facility adequate in each instance? If not, why not?

(e) How often were updates required of each surety at each ISL mining site?

(f) If at any point a surety was not adequate to meet the costs of restoration and decommissioning, what entity provided funding for continuing restoration?

(68) Section 2.10, page 2-41, lines 34-37: NRDC is aware that the NRC Staff and the Environmental Protection Agency (EPA) have been working on a proposed rule for groundwater protection at ISL uranium mining sites, but we are surprised to see that the Draft GEIS describes a final rule on related issues as being possible in late 2008 or early 2009. We understand that there will be meetings abut such a rulemaking (to which NRDC has been invited) in December 2008. Unless the NRC entirely truncates the public comment period in a rulemaking of such importance and ignores any associated NEPA obligations (and we have no evidence of the NRC having met a single NEPA obligation with this as yet to be proposed rulemaking), we find it impossible to imagine how the NRC could arrive at a final rule by early 2009. Please explain the planned schedule for any rulemaking(s) related to uranium recovery, and the relationship of this GEIS, if any, to NEPA coverage of proposed or potential rulemakings related to uranium recovery.

(69) Section 2.10, page 2-42, lines 1-21: The NRC Staff describes that the licensee must "provide estimated costs for all decommissioning, reclamation, and groundwater restoration work remaining to be performed at the site." It is NRDC's understanding that this requirement is the direct progeny of the Commission's ruling in <u>In re Hydro Resources</u>, CLI-00-8, 51 NRC 227, at 241 (2000). In that decision, the Commission required the licensee to submit a Restoration Action Plan (RAP) detailing the basis for addressing these costs.

(a) Have the NRC and State licensing agencies required RAPs for only the HRI license? Or have the NRC and States required RAPs from other currently operating sites? If not, why not?

(b) If the NRC and States have required the submission of RAPs, please provide links for public access to the RAPs in their entirety.

(c) Please also provide a comparative analysis of those RAPs and whether their respective assessments have been adequate to meet originally estimated costs for decommissioning, reclamation, and groundwater restoration work.

(70) Section 2.11.2, pages 2-43, 2-44, lines 6-12: As an "example" of spills and leaks, the Draft GEIS cites a multi-year stretch of time at only one facility (2001-2005). The Draft GEIS notes a reported 24 spills of uranium recovery solutions and the WDEQ as having identified more than 80 spills during commercial operations. The size of spills ranged from a 50 to 100 gallon spill in 2004 to a nearly 200,000 gallon spill in 2007 (why this figure was provided outside of the time frame of the "example" is unclear to NRDC). The singular example and the associated information on the ranges of spills and leaks provided by the NRC is wholly inadequate. This is clearly an issue of great potential impact on the environment and a truncated notation of some spills fails the need for a hard look at a broadly representative sample of the industry's record in this area.

(a) First, to the extent possible, please provide a quantitative listing of the spills and leaks at each past and present ISL uranium mining facility.

(b) If there is a threshold number of gallons below which the NRC deems it unnecessary to provide information on a spill or leak, please provide that threshold and the environmental analysis that supports such a conclusion.

(c) Please provide the cause of each of the leaks and spills over a certain environmental threshold and some link to the analysis where the spill or leak's impact to the environment was fully analyzed by the NRC or some other licensing body.

(71) Section 2.11.2, page 2-44, lines 14-20: (a) Please provide the differing requirements on reporting times and a comparative evaluation of the associated environmental impacts with the differing reporting times. (b) How has the NRC analyzed spill documentation in an effort to mitigate future environmental harms and violations?

(72) Section 2.11.2, page 2-45, 2-46, lines 6-4: (a) Is the information on the 16 spills and leaks described on this section inclusive of all ISL uranium mines?

(b) Have there been other leaks at ISL facilities? If so, which facilities?

(c) If not, has the NRC investigated and analyzed why certain facilities have identified more leaks?

(d) Has there been any comparative analysis done as to why certain facilities have a substantially larger impact on the environment as a result of leaking hazardous chemicals?

(73) Section 2.11.2, page 2-46, lines 6-13: (a) Regarding the mechanical integrity of production and injection wells, please identify each instance where the "cleanup" described in the text on lines 12 and 13 has been necessary. (b) If cleanup was necessary in any such instances, please describe the circumstance and the ultimate resolution of addressing the spill or leak.

(74) Section 2.11.3, page 2-46, lines 27-33: The amount of consumptive groundwater use noted is significant and the draft GEIS fails to provide any meaningful context for the potential environmental impacts in the arid West. The draft cites one estimate of a mine that could use an amount approximating 391 million gallons over a 15 year operating period.

(a) Has the NRC conducted any estimates of the cumulative impact of water usage for extractive industries in the four areas identified in the Draft GEIS?

(b) If so, please insert this information in the GEIS.

(c) If not, NRDC registers its strongly held view that such an analysis of cumulative impacts on water resources in each of the affected areas is a critical part of any "programmatic" analysis that may be used to document the environmental acceptability of increased levels of uranium recovery operations in these areas, and urges that this information

(75) Section 2.11.4, page 2-46, 47, lines 47-9: Excursions are a matter of serious environmental concern and the presentation of information in this section is devoid of meaningful analysis. Please provide a comprehensive listing of both vertical and horizontal excursions at ISL uranium mining facilities.

(76) Section 2.11.4, page 2-47 and 2-48, lines 11-23: The information presented in these two paragraphs is inadequate and lacks any meaningful context. Please identify each and every excursion at all past and current ISL mining sites, including the following information:

(a) the wellfield;

(b) the date the excursion was identified;

(c) the likely reason for the excursion;

(d) how that excursion was addressed by the licensee; and

(e) the date of "recovery" of the excursion.

(77) Substantially more information is necessary to identify and fully evaluate the potential environmental impact of a substantial number of new ISL uranium mines. In lines 11-23, the NRC states that "most" were recovered within 1 year, but 4 horizontal excursions lasted up to at least 5 years. On line 34, the NRC states that one excursion took four years to restore. And on page 2-48, lines 2 and 3, the NRC notes that one well remained on excursion status for 8 years. What measures were taken to prevent this and what measures could be taken in the future? A comprehensive listing and associated "hard look" evaluation is appropriate and necessary here.

(78) Section 2.11.4, page 2-47, lines 41-47: (a) Are these all of the situations that can result in excursions, or the most common situations? (b) What are the historical lessons

learned from unplanned lixiviant releases and what efforts are in place to prevent common problems?

(79) **Section 2.11.5, Aquifer Restoration**

Section 2.11.5, page 2-48: Aquifer restoration is of paramount concern for NRDC and this section of the Draft GEIS is wholly inadequate and fails the requirements of NEPA. A full presentation of "Information From Historical Operation of ISL Uranium Milling Facilities" on the subject of aquifer restoration would present a comprehensive analysis of the restoration history of mines and their individual wellfields. After such a presentation, the NRC Staff would then analyze the extent to which each of those individual wellfields were restored to original water quality and then present a hard look analysis of any associated long-term environmental impacts. That hard look analysis would analyze, among many factors, the original estimation of baseline water quality, the original estimation of pore volumes, horizontal and vertical flare factors, the impact of excursions, and any unforeseen problems that emerged (like the inadequacy of financial surety set aside for decommissioning).

Section 2.11.5, pages 2-48 to 2-51: Table 2.11-4 lists ranges of baseline values and post-uranium recovery/pre-restoration values for 30 chemical and radiological parameters. As the accompanying text in the Draft GEIS makes clear, groundwater quality in the production zone at the cessation of leach mining is a toxic soup that illustrates the substantial task that faces ISL operators at the start of restoration, and to some extent explains why restoration to pre-mining baseline *averages* in the *production area* (i.e., ore zone) is geochemically difficult and invariably takes much longer than originally anticipated.

But the data in both Table 2.11-4 (from the Irigaray Mine) and Table 2.11-5 (from the Smith Ranch Q-Sand Pilot wellfield) reveal two important policy issues that the GEIS fails to address explicitly: first, the impacts and implications of averaging ore-zone water quality with non-zone ore water quality, and second, the inability of operators to return key toxic and radiological parameters to baseline means, even when the average baseline has been perturbed upward (i.e., toward poorer water quality) by the very practice of averaging. The NRC must address this issue in a thorough, "hard look" analysis.

Specifically, the low ends, or minimums, of the ranges of contaminant values in both tables show clearly that the groundwater quality, *even in close proximity to an ore zone*, is suitable for human consumption, or in Wyoming, for Class I domestic use. Minimum values for arsenic, cadmium, chromium, lead, radium-226, selenium, and uranium — parameters that are known to be highly toxic, even carcinogenic, to humans over long periods of ingestion — at the Irigaray Mine were *lower* than current USEPA primary drinking water standards (called maximum contaminant levels [MLCs]). At the Smith Ranch pilot wellfield, radium-226 was the only toxic constituent that had a minimum baseline slightly higher than the MCL (6 pCi/l v. 5 pCi/l).

The large variance between the minimum and maximum baseline values in both tables shows that some baseline wells were completed in or near ore zones, and others weren't. While average baseline values for Irigaray Mine Units 1-9 are not shown on Table 2-11.4, they were reported to NRC in an August 11, 2006 report by COGEMA (ML062400363), and those values show clearly what happens when ore-zone water quality is averaged with non-ore zone water quality. The table below, showing four selected constituents, illustrates our point.

Selected Water Quality Constituents, Irigaray Mine Units 1-9

Parameter (all mg/l, except as noted)	Baseline minimum	Baseline maximum	Baseline mean	Final restoration minimum	Final restoration maximum	Final restoration mean	USEPA MCL
Ra-226 (pCi/l)	0	247	39.6	23.5	521	130.7	5
Uranium	0.0003	18.6	0.52	0.08	6.03	1.83	.03
Lead	<0.002	0.05	0.02	<0.001	0.09	0.039	0.015
TDS	308	784	404	343	968	626	500*

*USEPA secondary MCL.

The large variance between minimum and maximum baseline values — covering several orders of magnitude — generates baseline mean values that, in most cases, disqualify the groundwater for human consumption. After restoration, *all* of the four constituents listed in the table failed to achieve mean baseline concentrations, which as noted, were increased upward by the averaging of extreme values, and *none* would be suitable for human consumption. An inspection of the complete suite of restoration results for Irigaray Mine Units 1-9 shows that 19 of 35 constituents (or 54%) were not returned to pre-mining *average* baseline.

A similar pattern can be seen in the Smith Ranch pilot data in Table 2.11-5. Large variances between minimum and maximum values covering 1 to 4 orders of magnitude generated large mean values. Even then, 60% of final restoration values (12 of 20 parameters) exceeded baseline means.

These data show the environmental impacts of averaging good quality groundwater with naturally poor quality water in the ore zones and make it evident that the NRC's policy of allowing averaging permits ISL licensees to pollute groundwater that could otherwise serve as a source of drinking water. This represents an irrevocable commitment of natural resources that the GEIS does not address. And the resource in question, groundwater, is particularly valuable for sustaining life and economic activity in arid Western states covered by the GEIS.

Baseline Water Quality Data and Restoration Values, Irigaray Mine Units 1-9
From: COGEMA, Inc., Restoration Report, August 11, 2006 (ML062400363)

Mine Unit	Parameter	Baseline Minimum	Baseline Maximum	Baseline Mean	Stability Round 4 Minimum	Stability Round 4 Maximum	Stability Round 4 Mean
	Calcium (mg/L)	1.6	27.1	7.8	11.6	65	28.8
	Magnesium (mg/L)	0.02	9	0.9	2.8	13	7
	Sodium (mg/L)	95	248	125	107	275	185.6
	Potassium (mg/L)	0.92	17.5	2.4	1.1	4.9	2.9
	Carbonate (mg/L)	0	96	13.2	< 1.0	< 1.0	0.8
	Bicarbonate (mg/L)	5	144	88.3	5.1	631	409
	Sulfate (mg/L)	136	504	188.1	62.8	237	132
	Chloride (mg/L)	5.3	15.1	11.3	0.1	117	39.4
	Ammonium (mg/L)	0.05	1.88	0.3	0.05	36.1	8.5
	Nitrite (mg/L)	<0.1	1	< 0.4	<0.1	<0.1	<0.1
	Nitrate (mg/L)	0.2	1	0.9	<0.1	0.12	0.1
	Fluoride (mg/L)	0.11	0.68	0.29	0.1	0.22	0.12
	Silica (mg/L)	3.2	17.2	8.3	2.5	7.3	4.99
	TDS (mg/L)	308	784	404	343	968	626
	Conductivity (umho/cm)	535	1343	658	604	1970	1094
	Alkalinity (CaCO3) (mg/L)	67.8	232	104	127	518	345
	pH	6.6	11	9	7.07	8.4	7.76
1 - 9	Aluminum (mg/L)	0.05	4.25	0.16	<0.1	0.14	0.102
	Arsenic (mg/L)	< 0.001	0.105	0.007	< 0.001	0.029	0.005
	Barium (mg/L)	< 0.01	0.12	0.06	0.03	0.2	0.095
	Boron (mg/L)	< 0.01	0.225	0.11	<0.05	0.1	0.088
	Cadmium (mg/L)	< 0.002	0.013	0.005	< 0.002	0.005	0.004
	Chromium (mg/L)	< 0.002	0.063	0.02	< 0.005	0.05	0.039
	Copper (mg/L)	< 0.002	0.04	0.011	< 0.01	0.02	0.01
	Iron (mg/L)	0.019	11.8	0.477	< 0.03	0.5	0.113
	Lead (mg/L)	< 0.002	0.05	0.02	< 0.001	0.09	0.039
	Manganese (mg/L)	< 0.005	0.19	0.014	0.06	0.95	0.215
	Mercury (mg/L)	< 0.0002	0.001	0.0004	< 0.0002	< 0.001	< 0.001
	Molybdenum (mg/L)	< 0.02	0.1	0.06	< 0.01	<0.1	0.069
	Nickel (mg/L)	< 0.01	0.2	0.1	< 0.05	< 0.05	< 0.05
	Selenium (mg/L)	< 0.001	0.416	0.013	< 0.001	0.086	0.019
	Vanadium (mg/L)	< 0.05	0.55	0.07	< 0.05	<0.1	0.088
	Zinc (mg/L)	0.009	0.07	0.016	<0.01	< 0.01	< 0.01
	Uranium (mg/L)	0.0003	18.6	0.52	0.08	6.03	1.83
	Radium (pCi/L)	0	247.7	39.6	23.5	521	130.7

(80) Section 2.11.5, page 2-51, lines 4-6: (a) Please list the "site-specific hydrological and geochemical characteristics" that complicate aquifer restoration. (b) With respect to an application for a new ISL mining operation, or the expansion of an existing ISL mining operation, does the NRC believe this GEIS's qualitative discussion of aquifer restoration absolves the NRC of the requirement to describe and discuss restoration in an EIS, or does the NRC believe this can be handled in an EA? Please explain the basis for your response.

(81) Sections 2.12 and 2.13, page 2-51, 2-52: The discussion of alternatives considered, included, and excluded is, as we anticipated in our 2007 comments, woefully inadequate. There is a lengthy and tragic history associated with uranium recovery, and the Draft GEIS identifies no broad national purpose, and no overarching need for a dimly defined proposed action is stated, or weighed against alternative means of accomplishing the agency's purpose and need for action. Since the purpose and need for agency action is so ill-defined, it is by no means clear whether a GEIS is even appropriate or warranted. If the agency's purpose and need for action is "to increase the future supply of uranium to meet increased demand for nuclear fuel," this GEIS requires an analysis of alternatives for increasing this supply that could avoid the environmental impacts of uranium recovery in the identified areas, by examining, for example, the feasibility of increasing imports to cover the increment of supply that would otherwise have come from increased ISL mining in those areas, and the possibility of substituting increased energy efficiency for an increased supply of nuclear generated electricity.

On the other hand, if the agency's purpose and need is essentially procedural – to streamline its consideration and approval of license applications for uranium recovery – then the agency is in the peculiar position of using NEPA to revise its own rules without a proposal for rulemaking being presented. And the agency has made no showing that its current rules are inadequate or overly burdensome to industry (indeed, to the contrary), or that streamlining them would provide a higher level of environmental analysis for decision makers and better environmental protection to the public.

In any event, both the draft GEIS's definition of the NRC's purpose and need for action, and the resulting consideration of reasonable alternatives, are incoherent, inadequate, and unacceptable.

In sum, in order to proceed with a searching and thorough NEPA process, the NRC must, in full consultation with other involved federal agencies, go back to the drawing board and craft a statement of "Purpose and Need for Agency Action" that relates whatever uranium recovery program it eventually defines to broad national objectives that are within the NRC's purview, including for example, such goals as "improving remediation of land and water impacts from the recovery of source or byproduct materials," or "ensuring the long-term isolation from the human and natural environment of harmful radionuclides and chemical toxins produced in the nuclear fuel cycle." As we've noted, we do not believe that the uranium recovery industry (at least how it has been operated in the past) will be effective in addressing any of these goals, but this prospect is present, at least in theory. We do note, however, that other concrete policy and program alternatives exist that address practical solutions to each of the challenges presented by these objectives, and therefore merit detailed consideration in any NEPA scoping document.

(82) Rather than a Draft GEIS that will truncate and weaken the environmental review of each specific site proposed for uranium recovery operations, there is another path available for a serious examination of alternatives. As we noted in our 2007 scoping comments, the agency must:

> (a) analyze the broader national purpose and need that would be met by a national program for increased domestic uranium recovery; and the reasonable alternatives thereto;
> (b) perform an inter-agency assessment of alternatives for managing the impacts of a national uranium recovery program jointly with the other federal agencies that have related statutory responsibilities;
> (c) address and identify the extensive environmental damage from past uranium mining and milling practices, and how these will be prevented in the future
> (d) identify current and applicable regulatory standards as they relate to management of the specific and serious environmental impacts from a national program of future uranium mining activities; and
> (e) identify – with the aid of the other cooperating agencies – gaps or lack of coverage in statutory or regulatory authority to address and mitigate the environmental impacts of uranium recovery.

(D) Comments on Chapter 3, Description of the Affected Environment

All question and data requests apply to the revision of the GEIS.

(1) Section 3.1.1, Page 3.1-1: Please describe the methods NRC used to define the four uranium milling regions.

(2) Section 3.1.1, Pages 3.1-2, Figure 3.1-1: Please explain the NRC's rational for not including potential uranium ISL deposits, such as Uranium Energy Corp's Burnt Wagon deposit (42°43'45.84"N, 106°55'19.92"W) within the range of a uranium milling region. How far into the future did the NRC consider when determining potential mine sites?

(3) Section 3.1.1, Pages 3.1-3, Figure 3.1-2: Please explain the NRC's rational for not including potential uranium ISL deposits, such as Target Exploration's Buck Point and Bootheel deposits (42° 7'24.18"N, 105°53'50.12"W) within the range of a uranium milling region.

(4) Section 3.1.1, Pages 3.1-4, Figure 3.1-3: Please explain the NRC's rational for not including Bayswater Uranium Corp's planned Alzada uranium ISL mine (45° 2'25.86"N, 104°45'46.55"W) within the range of a uranium milling region. Bayswater wrote a Letter of Intent (LOI) to submit a facility application to the NRC in March of 2008. Please also explain the NRC's rational for not expanding the South Dakota-Nebraska uranium

milling region to include Crow Butte Resources Inc's planned Marsland Satellite Facility (42°30'7.66"N, 103°15'13.97"W).

(5) Section 3.1.1, Pages 3.1-5, Figure 3.1-4: Please explain the NRC's rational for not including potential uranium ISL deposits, such as Rodinia Minerals Inc's Workman site (33°50'52.21"N, 110°57'23.19"W) within the range of a uranium milling region. The Workman site is located within the Tonto National Forest and encompasses nine locations that span roughly 14 miles. Please also explain the rational for not including Max Resource Corp's potential uranium ISL deposit C de Baca (34°15'0.00"N, 107°15'0.00"W) within the range of a uranium milling region.

(6) Section 3.2.4.3.3, pages 3.2-20 and 3.2-21. The information provided is indicative of the failure to take a hard look at the impacts of ISL mining. These pages present a set of general observations that Mine Unit 1 and Mine Unit 2 have different confining layers. Please provide more information on the relevance of different type of confining layers or varying depths and widths of each layer. If confining layers are substantially reduced or thin in certain areas, what else does that tell the decision-maker and the public about the likelihood of vertical excursions of uranium and other contaminants? What has experience from previous ISL mines shown?

(7) Section 3.2.4.3.3, page 3.2-21, lines 10-38: This is an inadequate analysis and provides no information that constitutes a hard look at the environmental impacts of substantial and new uranium ISL mining. The Draft GEIS notes that some sections of the aquifer (presumably) exceed EPA's drinking water standards? Some parts don't. There is no analysis of potential future uses, demands on the aquifers, or current uses of the aquifer that either present water quantity or quality challenges for the state. There is also no analysis that blends the general observations in this section with hard information or data gathered from past and existing ISL uranium mines.

(E) Comments on Chapter 4, Environmental Impacts of Construction, Operation, Aquifer Restoration, and Decommissioning Activities

All question and data requests apply to the revision of the GEIS.

The title and section headings of the chapter seem to imply that this is where the agency will quantify the precise "environmental impacts of construction, operation, aquifer restoration, and decommissioning activities" of ISL uranium mining. Unfortunately, the Draft GEIS fails to do any such thing. As our requests for significantly more quantitative data and analysis on Chapter 2 illustrates, Chapter 4's classification of impacts lacks any foundation for what little the Chapter provides the reader in the way of meaningful conclusions. The agency should use a much more rigorous set of data about what has actually transpired at ISL uranium mining sites and what such impacts may mean for the environment before it makes its conclusions found in Chapter 4. The NRC should withdraw this document and start its analysis over with more a more detailed data set along the lines of what is requested in our comments on Chapter 2. Anything less is arbitrary and capricious.

Also, we are disappointed to that the NRC simply cut and pasted significant sections of identical text into each of the four geographical regions identified in the Draft GEIS. Such cookie cutter analysis fails to meet NEPA standards. Compare, for instance, the discussion of Groundwater Impacts, Section 4.2.4.2 and Groundwater Impacts 4.3.4.2, specifically at 4.2-19 and 4.3-11. The descriptions are precisely the same, except for different proper nouns. And even where there are some slight differences in the text, the analysis that might make such slight differences meaningful is entirely absent. Compare again, pages 4.2-10 to 4.3-5, where the Operational Impacts to Geology and Soils in the two Wyoming Regions are discussed. Essentially identical text is used, but with addition of some description of the ranges (but not a comprehensive listing) of the spills and excursions from Smith Ranch. There is no analysis about what those spills have meant to the long-term impacts of the geology and soils, the cost of cleanup, whether or not it's ongoing, and whether or not they're going to require cleanup in the future.

Specific Comments on Chapter 4

4.2.1 Land Use Impacts

(1) Is the GEIS discussion meant to cover future mining operations in the two uranium mining districts (Gas Hills and Crooks Gap) only, or is it meant to cover other areas within the Wyoming West Uranium Mining Region?

(2) Please provide coordinates (longitude and latitude) of points that define the two polygons that delineate the Gas Hills and Crooks Gap mining districts.

(3) Please provide coordinates (longitude and latitude) of points that define a polygon within which the GEIS discussion of ISL mining and/or milling in this region applies.

(4) Section 4.2.1, page 4.2-1, lines 13-18: There is no discussion of land use impacts in a meaningful fashion, merely a listing of those impacts and no discussion of mitigation. See general comments on Chapter 4 above.

(5) Section 4.2.1, page 4.2-2, line 7: Please provide coordinates (longitude and latitude) that define the polygons that delineate each: (1) National Park, (2) State Park, (3) National Forest, (4) BLM land, (5) Grassland, and (6) Native American land, (7) historic, cultural or archeological resource area/site, and (8) endangered species habitat within the regions covered by the GEIS discussions under the "Wyoming West Uranium Milling Region."

(6) Section 4.2.1.1, page 4.2-2, lines 44-50: How does expansive well spacing at uranium ISL mines affect the ability for oil and gas and coal bed methane sites to co-exist within the ISL site's permitted area? How is the site-specific well spacing at different ISL sites taken into account in the determination that "impacts to current or future mineral rights for resources other than uranium on an ISL facility permit area are expected to be small"?

(7) Section 4.2.3.2, page 4.2-11, lines 42: Has land application been done in other areas? To what effect?

(8) Section 4.2.4.1.3, page 4.2-17, lines 6-14: Please provide examples, historical context, explanation or analysis as to how permit requirements and subsequent decommissioning has worked mitigated environmental impacts thus far.

(F) Comments on Chapter 5, Cumulative Impacts

All question and data requests apply to the revision of the GEIS.

(1) The Draft GEIS rightly notes the importance (and the legal requirement) that agencies take into account the cumulative impacts of several actions affecting the environment that take place over time. *See* Section 5.1, lines 5-10. Then, despite noting the unquestioned environmental "uncertainties" surrounding decisions to proceed with ISL uranium mining, the rest of the chapter is essentially a list. Instead of a thorough, searching review of the environmental impacts of the many mineral extractive techniques and other activities practiced in the four areas covered by the Draft GEIS, the NRC Staff has produced a several page listing of EISs related to the 4 sub-regions. *See, e.g.*, pages 5-4 to 5-11. Simply listing a set of EIS documents and hoping that this action will suffice as a meaningful analysis of the myriad environmental impacts posed by the listed projects is inadequate. Has the NRC Staff analyzed any of these documents and the associated environmental impacts in conjunction with past, current and proposed ISL uranium mining? In Table 5.3-1, the NRC Staff presents a list of acronyms that are meant to describe the environmental impacts of "other actions concurrent with uranium recovery in the Wyoming West Uranium Milling Region." Again, in no way does this essentially meaningless list, devoid of any analysis, description, or illustration of the environmental harms (and any available alternative or mitigating strategy), meet the "hard look" requirements of NEPA. At the very least, the NRC Staff needs to (1) provide links to the documents in order to make them easily available to the public; (2) perform some level of analysis beyond the a rudimentary listing of acronyms; and (3) present the information in a publicly available forum that allows interested members of the public to understand the cumulative impacts of the activities (perhaps in a GIS format and on the internet).

(2) Compounding the problem is that a number of these documents cited in the GEIS are either not relevant, or were found to be insufficient in characterizing the federal resources in question. One pertinent example as cited in this roll is the inclusion of "Bureau of Land Management's (BLM) Proposed Revisions to Grazing Regulations for the Public Lands EIS." The federal courts' conclusion of this document upon further examination "found that BLM's regulatory revisions violate(d) NEPA, FLPMA and the ESA" see Western Watersheds Project v. Kraayenbrink, et al., No. CV-05-297-E-BLW, 2007 U.S. Dist. ID.

Failing to comprehensively detail the role of public lands in the context of this GEIS is further complicated by the fact that BLM and the United States Forest Service (USFS) are obligated to protect, preserve, and properly manage agency resources as articulated in

Sec. 102(a) (8) of the Federal Land Policy and Management Act (FLPMA) and in Sec. 1602 (5)(c) of the National Forest Management Act (NFMA) respectively.

(3) In regard to BLM surface lands and subsurface spilt estate lands, any decisions toward the leasing and development of uranium resources on federal public lands managed by the BLM must also comply with relevant aspects of FLPMA (43 U.S.C. §§ 1701-1785).[1] Congress enacted FLPMA "to provide guidance and a comprehensive statement of congressional policies concerning the management of the public lands . . . ." (Rocky Mtn. Oil & Gas Ass'n v. Watt, 696 F.2d 734, 737 (10th Cir. 1982)). FLPMA also directs BLM to manage public lands for multiple uses and sustained yield (43 U.S.C. § 1732(a)). The Secretary is required to "use and observe the principles of multiple use and sustained yield" in developing and revising land use plans. "Multiple use" is defined as managing the lands so that the various resources ("recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values") "are utilized in the combination that will best meet the present and future needs" of the public; "sustained yield" is defined as managing to maintain regular renewable resource outputs in perpetuity [see Pub. Lands Council v. Babbitt, 529 U.S. 728, 738 (2000) (discussing standards); Pennaco Energy, Inc. v. U.S. Dept. of Interior, 377 F.3d 1147, 1151 (10th Cir. 2004) (discussing standards)].

Congress also directed BLM to conduct inventories of the public lands and to incorporate those inventories into management decisions [43 U.S.C. §§ 1711(a) (inventories), 1712 (resource management planning)]. BLM is thus required to "take any action necessary to prevent unnecessary or undue degradation of the lands" [Id. at § 1732(b)]. Resource Management Plans (RMPs), in turn, must "provide for compliance with applicable State and Federal air, water noise, or other pollution standards or implementation plans . . . ." [Id. at § 1712(c).]. Implementing regulations specifically require that BLM ensure compliance with federal and state air quality standards [*See* 43 C.F.R. §§ 2920.7(b), 3162.5-1]. Significantly more explanation from the NRC of how it will work with BLM with respect to ISL uranium mining is in order.

(4) These provisions noted above are applicable to all resource uses and decisions affecting BLM lands [43 U.S.C. § 1732(b)] and should serve as the bedrock for all analyses in the GEIS and activities undertaken pursuant to the relevant RMPs. The GEIS does not examine the pace and intensity of development but instead leaves it to industry to set. Coupled with no identification of cumulative impacts or measures the BLM and industry will take to mitigate such impacts, the EIS is unable to identify the impacts to federal lands resulting from development. The GEIS also fails to identify the specific federal lands, the qualities of those lands, and the relevant regulatory and administrative restrictions in place in order to protect these lands from undo development and harm that

[1] We choose to emphasize in these comments, when addressing the role of federal lands, FLMPA concerns over other relevant federal organic acts concerning federal lands given the probability that most of the subsurface federal lands, regardless of what agency is charged with the management on the surface, fall under BLM's jurisdiction for split estate. This is an assumption on our part, an assumption that we have to make given that the EIS generally fails to quantify and characterize the likely spilt estate nature of the lands in question.

might come from potential projects like ISL uranium mining. The impacts are thus conceptual and so too is the mitigation.

Because the GEIS only cites a 'roll' of USFS and BLM documents, the GEIS does little to describe the potential cumulative effects. Given that the proposed actions in the GEIS incorporate such large-scale measures and involve such an extensive geographic area, it is evident that the NRC has not been able to adequately ascertain the extent of the impacts to these federal agency lands as required by NEPA.

Conclusion

In contrast to the complicated statutory and regulatory patchwork for uranium recovery operations, NEPA is clear in its well-established mandates. NEPA characterizes environmental impacts broadly to include not only ecological effects, such as physical, chemical, radiological and biological effects, but also aesthetic, historic, cultural, economic, and social effects. 40 C.F.R. § 1508.8. NEPA requires an agency to consider both the direct effects caused by an action and any indirect effects that are reasonably foreseeable. Effects include direct effects caused by the action and occurring at the same time and place and indirect effects caused by the action, but later in time or farther removed in distance, but still reasonably foreseeable. 40 C.F.R. § 1508.8

NEPA directs that NRC take a "hard look" at the environmental impacts of its proposed action, or series of related actions comprising a "program" of action, and compare them to a full range of reasonable alternatives for meeting the agency's purpose and need for agency action that may avoid or mitigate environmental harms or risks posed by its preferred alternative. "What constitutes a 'hard look' cannot be outlined with rule-like precision, but it at least encompasses a thorough investigation into the environmental impacts of an agency's action and a candid acknowledgement of the risks that those impacts entail." Nat'l Audubon Soc. v. Dept of the Navy, 422 F.3d 174, 185 (4th Cir. 2005).

As evidenced by the preceding comments and questions, NRC failed to take a "hard look" at the serious environmental and public health harms caused by ISL uranium mining. Given the environmental record of uranium mining to date, there is no basis for concluding that this Draft GEIS – in lieu of a full blown EIS for each individual site as well as an entirely new and more protective set of regulatory requirements – will be legally sufficient for the vital task of fully identifying and characterizing the prospectively harmful impacts on public health and the environment posed by uranium recovery operations at specific sites. We feared that a truncated process such as this Draft GEIS would fail to consider all reasonable alternatives for avoiding, preventing, minimizing, and mitigating these impacts. Our fears have come true.

As we noted in our November 2007 comments on the Notice of Intent to Prepare the Uranium Recovery GEIS, the NRC had failed to define, or even prospectively identify, the specific licensing actions or sequence of connected licensing actions that would constitute a "major federal action" triggering the need for NEPA review. The Draft GEIS has also failed in that regard. Simply positing that a number of license applications potentially will be filed, and then attempting in advance to streamline an environmental review process (in an inadequate fashion with inadequate analysis) to facilitate processing of these anticipated applications, does not constitute a legitimate proposal for major federal action. Streamlining the environmental review process before alternatives have even been presented is inappropriate, and even more so when the environmental review that does take place – this Draft GEIS – is so deficient. Indeed, we can still discern no proposed major federal action other than a systemic weakening of the environmental review process that must accompany each and every license application for uranium recovery. If this is indeed the agency's intent, such action amounts to an alteration of the agency's licensing rules that must be accompanied by a rulemaking proposal that addresses the entirety of ISL uranium mining and a broader NEPA review of the environmental impacts.

And again, harking back to our 2007 Notice of Intent comments, we suggest the agency return to the drawing board to commence: (a) performing a full analysis of the purpose and need for a national program for uranium recovery; (b) performing an inter-agency assessment of alternatives for any national uranium recovery program with the other federal agencies that have related statutory responsibilities; (c) addressing and identifying the extensive environmental damage from past uranium mining and milling practices; (d) identifying current and applicable regulatory standards as they relate to management of the specific and serious environmental impacts from a national program of future uranium mining activities and as such (e) identifying any gaps or lack of coverage in statutory or regulatory authority to address and mitigate the environmental impacts of uranium recovery. From what we see in this Draft GEIS, none of this has taken place.

As we stated at the outset of these comments, we respectfully urge the NRC to withdraw this Draft GEIS as the document fails to meet the requirements of NEPA, 42 U.S.C. § 4321 et seq. The harms inflicted by the uranium industry on communities and on the environment over the previous half-century are significant, and this initial analysis of a new age of uranium recovery would take the country down a similarly expensive and environmentally damaging road. We appreciate the opportunity to comment and if you have any questions, please do not hesitate to contact us.

Sincerely,

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