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Felix M. Kilar, Jr.
DIRECTOR,
Material Licensees
Direct Line 202.739.8126
Fax 202.533.0157
E-mail: fmk@nei.org

April 24, 2002

Chief, Rules and Directives Branch
Mail Stop T6-D59
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

REFERENCE: **Comments on Nuclear Regulatory Commission (NRC)
Draft NUREG-1569 "Standard Review Plan for In Situ
Leach Uranium Extraction License Applications" [67 Fed.
Reg. p.5347 – February 5, 2002]**

Dear Sir or Madame:

The Nuclear Energy Institute (NEI)¹ on behalf of its industry members has reviewed Revision 1 of draft NUREG-1569 entitled "*Standard Review Plan for In Situ Leach Uranium Extraction License Applications*" which was issued in January 2002 for public comment. This NUREG is a very useful compendium of regulatory requirements applicable to the *in-situ* mining of uranium. The current revision of NUREG-1569 represents a considerable improvement to the initial October 1997 draft and we commend the NRC for addressing many of the concerns with the first draft that industry brought to the Commission's attention. NEI believes, however, that the NUREG can be further improved and the attachment to this letter presents approximately 600 suggested substantive and editorial improvements. The balance of this letter highlights several of NEI's outstanding higher-level concerns with NUREG-1569, while the attachment presents specific changes to individual chapters and sections of the document.

¹ NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all nuclear companies licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

Memphile = ADM-013

E-REDS = ADM-03
Add = J. Lusher (JHL)

Risk-Informed Regulation

The authors of NUREG-1569 have attempted to incorporate the NRC's new "risk-informed, performance-based" regulatory philosophy into this guidance. While we strongly support this approach, whereby licensing actions and regulatory oversight are conducted to reflect the true risks posed to human health and safety and the environment, there is yet no regulatory basis in 10 CFR 40 to support the NUREG's expectations and risk-based approach. A Standard Review Plan (SRP) should never be used to promulgate regulatory policy. In the absence of supporting regulations – such as those recently implemented for Part 70 fuel fabricators – the NRC cannot expect a license applicant to conduct the accident analyses, consequence evaluations, probability determinations and identify and rank by risk significance all facility safety systems, as is now stated in the NUREG. The risk-informing guidance (§3.2) is far too cursory, uses many undefined terms, assumes the existence of a 'facility change mechanism' similar to that used by Part 50 & 70 licensees and retains many highly prescriptive Acceptance Criteria. Until the 10 CFR 40 regulations are risk-informed to reflect industry's track record and practices, the guidance in NUREG-1569 must be revised accordingly. Citation of draft NUREG/CR-6733 (risk-informed, performance-based regulation of ISL operations) may be appropriate, once the 10 CFR 40 regulations are risk-informed and NUREG-1569 revised.

NUREG Structure

NUREG-1569 contains guidance both for obtaining a uranium recovery license and for conducting an Environmental Assessment. The guidance for each is often confused and intertwined with one another and should be clearly separated. The NUREG would be far less confusing were it to include a separate chapter on "Environmental Protection" that would include the applicant's environmental report and provide the information needed to prepare an EA. The structure of NUREG-1569 should conform to other agency NUREG documents and include a section entitled "Regulatory Requirements" in the "Acceptance Criteria" section of each NUREG chapter. The Acceptance Criteria state the regulatory bases for assessing an applicant's commitments. NUREG-1569 cites some technical bases for the Acceptance Criteria, but regulatory bases are lacking other than some very general statements included in the Evaluation Findings section of each SRP chapter. On many occasions there lacks agreement between the topics to be reviewed in a NUREG chapter and corresponding Acceptance Criteria. The 'Areas of Review' may identify a topic to be addressed by the applicant, but no applicable 'Acceptance Criteria' for that area of review are provided. Such disconnects should be thoroughly reviewed and amended.

Discussion of decommissioning surety (bonding) requirements appears in several NUREG chapters and is confusing. NEI recommends that all guidance pertaining

to fulfillment of the 10 CFR 40.36 decommissioning requirements be consolidated into a single chapter (e.g. an expanded §6.5).

Overlapping Jurisdiction

The NUREG now directs NRC reviewers to coordinate license application reviews with appropriate federal and state agencies. While commendable, this guidance is weak and fails to address one of the most burdensome aspects of facility licensing and operation – dual regulation by federal and state regulatory agencies. The NUREG fails to show how the NRC, as the lead federal licensing agency, should interact with the EPA, BIA, BLM and especially non-Agreement States to coordinate reviews and to ensure a minimum of conflicts in each agency's information demands. The NRC should, for example, accept the well abandonment procedures and environmental bonding requirements of Wyoming and Nebraska and revise its groundwater monitoring requirements to mirror those of states. On many occasions the NUREG seeks information on non-radiological aspects of an ISL operation. While such information may be needed to prepare the environmental report, the NUREG should not direct the staff to exceed the NRC's mandate to address impacts on human health and safety and the environment. The NUREG should reference the 1988 Memorandum of Understanding between OSHA and the NRC in assigning regulatory responsibility to the management and oversight of hazardous materials at NRC-licensed facilities and incorporate these principles into the guidance.

More complete explanations of two topics would greatly increase the usefulness of NUREG-1569, particularly to members of the public: (i) a discussion of how the NRC can accept and use information from licensees in non-Agreement States in areas such as groundwater monitoring, wellfield development and aquifer restoration, and (ii) a discussion of how the EPA (or State) UIC regulations impact the aquifer restoration design program.

Information Expectations

Many Acceptance Criteria remain prescriptive and seek information far in excess of what is required. Is there really any continuing need to seek ecological information from within a 50-mile radius of the facility? Operating history of ISL mines has demonstrated that potentially affected populations in no way extend 50-miles from the facility. Is there, therefore, any real need for information over such a wide swath? The information requests in several of the NUREG chapters still remain excessive and are inappropriate for an ISL operation. There also remain several instances in the NUREG of language and baseline design criteria (especially from Reg. Guide 4.14) more appropriate to a mill tailings impoundment than to the comparatively small surface impoundments that are typical of ISL operations. These inappropriate references should be clarified or deleted from the NUREG.

Human and environmental risks posed by the latter can not be compared to those of the former, and should, consequently, be modified. The Acceptance Criteria often seek the applicant to "demonstrate" compliance with a goal or regulation (e.g. efficacy of a remediation strategy, clean-up of groundwater) or to provide at the time of license application detailed operating procedures. An applicant can never be expected to "demonstrate" achievement or compliance with every regulation at the time of license application. Rather than seek such "demonstrations," the guidance should seek commitments from the applicant to meet the regulation or goal. Similarly, the applicant need not present detailed "procedures" at the time of license application, but should only be expected to commit to an approach or strategy that will be used. NRC guidance documents often direct the reviewer to seek "reasonable assurance" that a regulatory objective can be met by the applicant. Greater use of the "reasonable assurance" assessment by the review staff should be included in NUREG-1569 in place of "demonstrations."

The NUREG seeks disclosure of an applicant's "primary corporate internal costs" (e.g. §7.6, §9.3) including "...*internal costs, capital costs of land acquisition and improvement, capital costs of facility construction, other operating and maintenance costs...*". Such information affects the competitive position of the licensee and is proprietary and irrelevant to fulfillment of the NRC's mandate to protect human health and safety and the environment. Only the forecast costs for plant decommissioning and site reclamation need be publicly revealed for the sole purpose of computing decommissioning surety (bonding) estimates. "Primary corporate internal costs" are not required for the NEPA cost-benefit analysis.

Research & Development Operations

The NUREG continues to direct the reviewer to examine the results of R&D recovery or restoration tests in judging a license application. Such R&D tests were common in the 1970s as the *in-situ* leach technology was under development, but they are no longer widely used. Lixiviant chemistries are well known, aquifer restoration chemistries and techniques have been frequently demonstrated with success and the effects of geologic and hydrologic features on wellfield operation are understood. Thus, the NUREG should not create misleading expectations for reviewers to expect submissions of site-specific R&D data in support of a license application. The NUREG could, however, provide useful guidance for unique situations for which a pilot R&D operation might be warranted.

Editorial Issues

The attachment to this letter addresses many editorial and typographical errors that have been identified in Revision 1. Many of these errors can be grouped into one of the following areas:

- consistency in terminology – failure to use technical terms consistently throughout the SRP. Chapter 9 should be renamed “*Cost-Benefit Analysis*,” for this is the common term used throughout American industry. (Use of the term “*Benefit-Cost Analysis*” may seek to add uniqueness to an NRC document, but this is unnecessary)
- definition of terms – many terms are undefined (e.g. ‘control system relative to safety’, ‘evolutionary amendment’, ‘facility change’, ‘accident analysis’, ‘accident procedures’)
- acronyms – the guidance would be far more lucid were common, agency-wide used acronyms such as SRP (“*Standard Review Plan*”), ALARA (“*As Low As Reasonably Achievable*”), RWP (“*Radiation Work Permit*”) etc. used. There is no need to define an acronym more than once.
- word hyphenation – there is inconsistent use of hyphenated words (e.g. ‘groundwater’ versus ‘ground-water’)
- inconsistency amongst chapters – certain SRP chapters are well written (e.g. 8 & 10), while others require major editing (e.g. 5 & 6). A thorough technical editing of the NUREG is recommended to achieve uniformity in presentation.
- a surprising number of references to NRC Regulatory Guides and to 10 CFR 20 & 40 regulations are incorrect (wrong Reg. Guide, wrong version, wrong citation).

NEI is pleased to offer the enclosed comments on Revision 1 of NUREG-1569. This guidance document would have been very useful to the NRC staff and the mining industry during the 1970-1980 heyday of domestic uranium exploration and mine development. Although this important NUREG may see only very limited use in the foreseeable future due to the contraction of domestic uranium recovery industry, we do encourage the NRC to proceed with the revisions proposed by industry. Should risk-informing of 10 CFR 40 proceed, corresponding changes to the NUREG-1569 guidance should be made. For example, revision of the Commission’s decision that aquifer restoration waters are not 11e.(2) by-product material, and revisions to the §5.6 security requirements resulting from the Commission’s on-going assessment of uranium recovery licensee security provisions should be promptly incorporated into NUREG-1569.

NEI should be pleased to answer any questions that you may have with this submission. We look forward to seeing how these industry concerns are to be

Chief, Rules and Directives Branch
April 24, 2002
Page 6

addressed in NUREG-1569 and should be pleased to answer any questions that you may have. Please feel free to contact me or Dr. Clifton W. Farrell (Tel: 202-739-8098; E-mail: cwf@nei.org) at your convenience.

Sincerely,

A handwritten signature in black ink that reads "Clifton W. Farrell" followed by a stylized flourish or initials.

Felix M. Killar, Jr.

Attachment

SPECIFIC COMMENTS ON DRAFT NUREG-1569 "STANDARD REVIEW PLAN FOR IN SITU LEACH URANIUM EXTRACTION LICENSE APPLICATIONS"

Interpretive Note: suggested text for inclusion is underlined. Text that is recommended for deletion is ~~struck through~~.

EXECUTIVE SUMMARY

- ¶1, Line 1, Page xix: some text is missing at the top of this page. (The sentence starting on the bottom line of page xvii does not continue on page xix.)
- ¶4 ('Detailed Review Objectives'), Line 7, Page xxv: the solicitation of economic 'evidence' is not appropriate, except for cost data needed to establish decommissioning (surety) funding levels. The NRC should not be interested in the economic viability of the operation.

CHAPTER 1: PROPOSED ACTIVITIES

Section 1.1: Areas of Review

- §1.1, ¶1, Line 7, Page 1-1: missing punctuation. Revise to read: "...~~radiation safety protection, estimated schedules for...~~"
- §1.1, ¶1, Line 9, Page 1-1: a more complete statement may be: "...~~plans for ground-water quality~~ monitoring and restoration..."

Section 1.3: Acceptance Criteria

- §1.3, Item (1)(f), Page 1-2: asking the applicant to commit to annual U_3O_8 production levels for the foreseeable future is unreasonable. Production may be highly variable based on economic or contractual factors. Knowledge of the plant's nameplate (or design) capacity should be sufficient for NRC reviewers. Revise to read: "...~~(f) operating plans and design throughput, and annual U_3O_8 production...~~"
- §1.3, Item (1)(k), Page 1-2: the presupposition is that facility changes will be required. This may not always be the case. Revise to read: "...~~a summary of proposed changes, if any, a record of amendments since the last license issuance, and documentation of inspection results and other NRC files...~~"
- §1.3, Item 2, Line 1, Page 1-2: the presupposition that an R&D pilot operation will have been conducted is incorrect. R&D pilots were conducted in the 1970s, but there exists such a large body of operational and decommissioning/reclamation data for ISL facilities that such R&D operations are rarely performed.

Section 1.4: Evaluation Findings

- §1.4, ¶2, Line 4, Page 1-5: revise in accordance with previous comments: “...*(vi) operating plans and design throughput, ~~and annual U3O8 production;~~ (vii) schedules...*”
- §1.4, ¶2, Line 9, Page 1-5: revise in accordance with previous comments: “...*summary or proposed changes, if any, a record of amendments...*”
- §1.4, ¶2, Line 11, Page 1-5: revise in accordance with previous comments: “... *have included results from any applicable or relevant research and development operations and development...*”

CHAPTER 2: SITE CHARACTERIZATION

Section 2.1: *Site Location and Layout*

- §2.1.3, ¶2, Page 2-2: typographical error. Revise to read: “... *in the case ~~each~~ of renewals...*”

Section 2.2: *Uses of Adjacent Lands and Waters*

- §2.2.1, ¶1, Page 2-4: typographical error in first line. Correct to read: “...*within an 80-km [50-mi] radius of the site...*”
- §2.2.2, ¶1 and §2.2.3, Section (1), Page 2-4: There is confusion in the use of the terms “consequence” and “risk” in these two sections. “Risk” incorporates “consequence” as well as the likelihood of the event happening. While the inspection of uranium recovery operations should focus on process risks, the uranium recovery regulations are still based on assessment and mitigation of consequences. Thus, §2.2.3 Section (1) should be revised to read: “...*that the likely environmental consequences risks imposed by in-situ operations...*”
- §2.2.3, Section (1)(d), Page 2-5: for clarity, suggest adding an adjective to read: “...*for existing ground water wells...*”

Section 2.3: *Population Distribution*

- §2.3.2, ¶1, Line 4, Page 2-7: this item requires agricultural production data to be evaluated, but the SRP provides no guidance as to how the evaluation should be conducted. We believe the intention is for the applicant to tabulate the data. Suggest revising the sentence to read : “...*agricultural production data should be ~~evaluated~~ tabulated for vegetables, meat...*”

Section 2.4: *Historic, Scenic and Cultural Resources*

- §2.4: the review criteria for identifying and preventing (or mitigating) adverse impacts on cultural resources in this SRP must be consistent with the regulations of other federal agencies and state authorities. Such consistency will reduce unnecessary regulatory duplication. The SRP’s

Acceptance Criteria should be made consistent with state and other federal agency requirements.

- §2.4.1, ¶1, Line 1, Page 2-9: the term “*area of potential effect*” is undefined and requires clarification. Recommend for consistency throughout the SRP that this, and similarly vague terms later in the SRP, be replaced by “*licensed area*”. Revise to read “...and scenic resources, if any, within the licensed area ~~the area of potential effect~~...”
- §2.4.2, ¶1, Line 4, Page 2-10: correct language to read “...an evaluation of the likely ~~consequences of any impacts of the~~...”
- §2.4.2, ¶1, Line 5, Page 2-10: clarify the punctuation and text to read: “...features included in, or eligible for inclusion in, the National Register...” (See the correct expression in §2.4.3, Section (1))
- §2.4.2, ¶1, Line 9, Page 2-10: for consistency in the language (see second comment above), revise this sentence to read “...of the likely impacts consequences of any effects on the aesthetic...”
- §2.4.2, ¶1, Line 12, Page 2-10: improve the English expression as follows: “...the likely impact of the ~~presence of new roads~~...”
- §2.4.2, ¶2, Line 1, Page 2-10: improve the English expression as follows: “...state historic preservation officer ~~in accordance with the as required~~...”
- §2.4.3, Section (1), Line 1, Page 2-10: correct punctuation as follows: “...properties included in, or eligible for inclusion in, the National...”
- §2.4.3, Section (3), Line 5, Page 2-11: Similar corrections as made in §2.4.2. Simplify language to read: “...have been consulted on for the likely ~~consequences of any impact(s) on Native American~~...”
- §2.4.3, Section (4), Line 3, Page 2-11: As stated, a copy (clone?) of the state historic preservation officer would be required in a license application! Correct the language to read: “...This evidence includes a copy of comments of the state historic preservation officer and tribal authority, if appropriate, ~~comments concerning~~...”
- §2.4.3, Section (5), Line 1, Page 2-11: grammatical error – “between” pertains to 2 objects and “among” pertains to three or more objects. Correct to read: “...a memorandum of agreement among ~~between~~ the state...”
- §2.4.3, Section (6), Line 2, Page 2-11: Similar correction as noted above: “...with sites in, or eligible for inclusion in, the National Register...”
- §2.4.4, ¶2, Line 1, Page 2-12: the guidance should define the area over which the cultural investigation was performed. Revise to read: “...historic, scenic, and cultural resources within the licensed area...”

Section 2.5: Meteorology

- §2.5.1, ¶5, Line 1, Page 2-13: the statement that license applicants must examine “existing levels of air pollution” is unnecessarily broad and

exceeds the requirements of 10 CFR 40, Appendix A, Criterion 7. Background air quality monitoring for airborne radionuclides is appropriate and required, but the applicant should not have to address non-radiological contaminants such as Hg, NO_x, SO_x, etc. If the applicant seeks to install on-site electrical generators, separate permitting would be required, but such permitting lies outside of the NRC's regulatory oversight and licensing mandate. Recommend revision of this sentence to read: "...*general climatology including existing levels of airborne radionuclides ~~air~~ pollution...*"

- §2.5.3, Section (4), ¶1, Line 1, Page 2-14: Similar comment for §2.5.1 concerning limits on NRC regulatory authority. Revise to read: "...*contains a description of existing levels of airborne radionuclides ~~air~~ pollution...*"
- §2.5.4: classification of counties within 50 miles of the ISL facility according to NAAQS standards is unnecessary, as the air impacts of an ISL facility are minimal and generally non-detectable outside of the facility's restricted area. The SRP seems to ignore the well-documented operational history of ISL operations in making this claim. Working through an NAAQS process for an ISL facility is a waste of resources and unnecessary. Delete this requirement.
- §2.5.4, ¶3 (Line 15) and ¶4 (Line 4), Page 2-15: Similar comment for §2.5.1 concerning limits on NRC regulatory authority. Revise to read: "...*contains a description of existing levels of airborne radionuclides ~~air~~ pollution...*" and "...*allow evaluation of the spread of airborne radionuclides contamination at the site...*"

Section 2.6: *Geology and Seismicity*

- §2.6.1, ¶3, Page 2-16: Staff should not be directed to spend time reviewing information on other mineral occurrences. The issue of overlapping mineral and petroleum development rights should be examined in a legal review of the proposed mining property ownership. In the event of overlapping mineral and petroleum development rights, the license applicant should offer commitments to coordinate all resource exploitation activities in a manner that will not endanger human health and safety or the environment.
- §2.6.1, ¶4, Page 2-16: Similar comment – staff should not examine paleontologic information. As the applicant will generally not know whether paleontologic deposits of unique scientific interest are present, a general license commitment consistent with state or federal historical preservation regulations could be inserted in a license. Delete this paragraph.

- §2.6.2, ¶1, Page 2-17: the "...applicability, correctness, [and] inclusivity..." of a geological stratum is an unknown term. Clarify the meaning.
- §2.6.2, ¶2, Page 2-17: the adjective "viable" seems inappropriate in describing a geological map. "Accurate" may be a better term. The third line of the paragraph directs the applicant to submit "...representative supporting core samples...". The NRC would likely prefer "...descriptions of representative supporting core samples...". Clarify the language.
- §2.6.2, ¶3, Page 2-17: the meaning of this paragraph is unclear. The applicant should not be expected to provide "alternate interpretations" of geological data, but rather the one that which represents his best judgment. The paragraph should be reworded to permit the NRC staff reviewer(s) to independently review the applicant's data to assess whether the applicant's interpretations are reasonable and sound. Reword the paragraph.
- §2.6.3, ¶(3), Page 2-18: use of the term "ore" is inappropriate, for this term has economic connotations which will affect many assumptions, such as the estimated reserves, the locations of wellfields, etc. Replace "ore" by "mineralized" or "*U₃O₈ mineralized*" so that the first sentence would read, for example, "...in the local stratigraphic section, all mineralized horizons...". Correct the second sentence to read "...mineralized zone(s)..."
- §2.6.3, ¶(4), Page 2-18: the SRP provides no guidance on what should constitute a "...geochemical description of the ~~ore~~ mineralized zone(s)..." This oversight should be corrected. Also, correct use of "ore"
- §2.6.3, ¶(5), Page 2-18: correct use of the term "ore".
- §2.6.3, ¶(7), Page 2-19: the second sentence is unnecessarily prescriptive. The applicant should assemble necessary data and report the sources of such data. Revise sentence to read: "*Historical seismicity based on data from universities and state and local agencies should be summarized...*"
- §2.6.3, ¶(8), Page 2-19: correct use of the term "ore".
- §2.6.3, ¶(11), Page 2-19: the text in this criterion is too broadly stated and would require assessment of the seismic stability of the facility itself. The cited Regulatory Guide 3.11 applies more to embankment systems for tailings impoundments and not to the baseline design criteria for buildings and facility operations. This criterion should be clarified to just apply to ISL facility surface ponds.
- §2.6.4, ¶1, Page 2-20: correct three uses of the term "ore"
- §2.6.4, ¶2, Page 2-20: in the Evaluation Findings, the staff apparently has used "...associated conceptual and numerical models..." in its assessment. No mention of this modeling is, however, made in the "Areas of Review" or "Acceptance Criteria." If numerical models are to be used, they should be described in §2.6.3. Recommend deletion of these terms.

- §2.6.4, ¶2, Page 2-20: in line 9, correct “form” to “from” so as to read: “...locations away from ~~form~~ faults...”
- §2.6.4, ¶2, Page 2-20: the phrase “...requires locations away from faults capable of causing impoundment failures...” should be clarified. Criterion 4(e) pertains to large tailings impoundments constructed at conventional Class I milling operations. While Class II uranium recovery operations will also have comparatively small surface impoundments, the regulatory requirement should be expressed to ensure that the design basis for any such process water impoundments be able to withstand seismic events typical of the region in which the *in-situ* operation is located.

Section 2.7: Hydrology

- §2.7.1, Section 3(c), Page 2-20: For clarity, revise to read: “...estimated hydraulic conductivities, thickness...” The SRP is unclear whether this Area of Review requires a description of mitigative measures for wellfield excursions. If a description of mitigative measures is required (e.g. locations of perimeter wells, pumping methods for drawing back an excursion) are expected, this expectation should be clearly stated.
- §2.7.1, Section 5, Page 2-21: The SRP seeks information on “...the historical extremes...for aquifers...” Is the SRP seeking historical locations of potentiometric surfaces for mineralized aquifers? Some clarification is required here. Generally information on historical extremes for mineralized aquifers – that will probably never have been used as a source for any water – will not be available.
- §2.7.1, ¶5, Page 2-21: Why just not identify the EPA? The SRP is unclear in its guidance to NRC staff reviewers as to when EPA information is acceptable. The intention in this paragraph – to minimize duplicative staff reviews -- is excellent; a little clarification would be helpful.
- §2.7.2, Section (1), Line 2, Page 2-21: Correct to read “...and the applicant’s assessment...”
- §2.7.2, Section (3), Lines 6 and 7, Page 2-22: Correct to read “...horizontal hydraulic conductivity, and the thickness, aerial extent, and vertical hydraulic conductivity of...”
- §2.7.2, Section (3), Lines 8 and 11, Page 2-22: The correct term should be “pumping test” as was (correctly) used previously in Section (3), Page 2-21. Correct to read “...Examine pumping ~~pump~~ tests, analyses...” and “...Examine pumping ~~pump~~ tests that are used...”
- §2.7.2, Section (3), Line 11, Page 2-22: As noted earlier, use of the term “ore” should be avoided (due to its economic implications). Revise to read: “...isolation between the ore production zone(s) and upper...”
- §2.7.2, Section (4), Line 7, Page 2-22: Clarify to read “...water quality, including class(es) of use...” The text in this Section (4) should be more

clearly stated. The background water quality information is not used so much to "...*evaluate potential effects of in situ leach extraction on the quality of local ground-water resources...*" but more specifically to establish the production aquifer(s) as EPA- Exempted Aquifers under the Underground Injection Control (UIC) regulatory program. As an EPA (or State)-exempted aquifer the water will never be used as a source of drinking water. Restoration efforts by the licensee are focused not on the exempted portion of the aquifer, but rather on adjacent non-exempted parts of the aquifer or on other adjacent drinking water sources.

- §2.7.2, Section (6), Line 2, Page 2-22: Clarify to read " *...future water use(s)...*"
- §2.7.3, ¶1, Page 2-22: As noted earlier, use of the term "ore" should be avoided. Revise to read: " *...uranium from the ~~ore~~ mineralized zone(s), ...*"
- §2.7.3, Section (1), Page 2-23: There appears to be inconsistent use of terminology referring to the area of the mine. In Section (1) the term "permit boundaries" is used, but later in Section (3) the term "license boundary" is used. Is a difference intended? If not, recommend consistent use of the term "license boundary" Correct to read: " *...drainages within the license boundary ~~permit boundaries~~ and surrounding areas...*"
- §2.7.3, Section (3), Lines 7 and 15, Page 2-23: As noted earlier, use of the term "ore" should be avoided. Revise to read: " *...represent the mineralized ~~ore~~ zone aquifer and...*" and " *...ground-water flow direction in the mineralized ~~ore~~ zone(s) and in the overlying...*"
- §2.7.3, Section (3), Line 2, Page 2-24: Delete the comma following "that".
- §2.7.3, Section (3), Lines 3, 4, 6, and 7, Page 2-24: Correct "pump test" to read "*pumping test*" as noted earlier.
- §2.7.3, ¶1, Section (4), Lines 2 and 4, Page 2-24: As noted earlier, use of the term "ore" should be avoided. Revise to read: " *...obtained within the ~~ore body~~ and at locations away from mineralized zone(s) ~~ore body~~ have been made...*" and " *...determined for the mineralized ~~ore zone~~ and surrounding aquifers...*"
- §2.7.3, ¶2, Section (4), Line 3, Page 2-24: Correct the English to read " *...not be increased as a result...*"
- §2.7.3, ¶2, Section (4), Line 6, Page 2-24: Delete the comma following "solution".
- §2.7.2, Section (4), Page 2-25: Table 2.7.3-1 contains some parameters that states do not now require or that are not included in current NRC licenses (e.g. ²²⁸Ra, Ag, Gross alpha, Gross beta). The guidance should seek concurrence with state programs or express the flexibility to accept state requirements as suitable for meeting NRC requirements.
- §2.7.3, Section (4), Line 1, Page 2-26: There appears to be an inconsistency in the sampling frequency specified in this Section and that

stated in §2.7.2(4). The latter seeks documentation of seasonal variations in water quality, but §2.7.3(4) recommends closely sequenced samples. Collection of pre-operational baseline water samples on such a short time interval is inconsistent with the regulations of the State of Wyoming's DEQ, which requires quarterly samples collected over a one-year period. The NRC should revise its water sampling guidance to be consistent with those of states and of the EPA to avoid costly and unnecessary duplicative sampling. The "Areas of Review" and "Acceptance Criteria" in the SRP should be consistent. Some clarification may be warranted here.

- §2.7.3, Section (4), Line 9, Page 2-26: The SRP seeks information on each aquifer zone, regardless of its stratigraphic position relative to the proposed mining zone(s). This appears unnecessary, for if the geologic and hydrologic analyses identify 10 shallow aquifers that are, for example, situated 500 meters above the active mining zones, the risk that such upper aquifers would be contaminated by production solutions is remote (assuming correctly completed wells). The SRP should seek information from only those aquifers facing potentially adverse environmental impacts. Revise this sentence.
- §2.7.3, Section (5), Line 2, Page 2-24: Similar comment to that immediately above. There should be no need for potentiometric head and hydraulic gradient data for every aquifer, but only for those to which a credible, potentially adverse environmental impact risk is posed. Revise this sentence.
- §2.7.4, ¶3, Line 3, Page 2-26: As noted earlier, use of the term "ore" should be avoided. Revise to read: "...*intervals, including the mineralized ore-zone aquifer(s) and...*"
- §2.7.4, ¶1, Line 1, Page 2-27: Delete the comma following "samples". Revise the balance of the sentence to read: "...*in and near the mineralized zone(s) ~~ore-body~~ that define the pre-operational...*"
- §2.7.5, Page 2-28 Correct the final citation to read: "NRC NUREG-1620, "Draft Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Under Title II of the Uranium Mill Tailings Radiation Control Act." Revision 1, Washington DC: NRC. ~~1999~~ 2002

Section 2.8: Ecology

- §2.8.1, ¶1, Line 1, Page 2-28: For consistency within the SRP, we recommend use of the term "*licensed area*" rather than "*site*". The SRP should advise the reviewer that ecological impacts from ISL facilities are minimal. The license applicant should commit to examining ecological impacts over those areas for which adverse ecological impacts could occur. Typically, impacts should be examined within no more than a 2-mile radius of the ISL operation.

- §2.8.1, ¶3, Line 1, Page 2-28: For consistency with ¶4 in §2.8.2 and for reduction in the prescriptiveness of the language, simplify the first sentence to read: "...~~For commercial-scale operations and for research and development operations...~~"
- §2.8.2, ¶1, Line 5, Page 2-28: replace "site" with "licensed area" (see above comment).
- §2.8.2, ¶1, Page 2-29: Definition of "*important species*" for a second time in this paragraph is not needed. ("*Important species*" was previously defined in §2.8.1, ¶1, Page 2-28)
- §2.8.2, ¶1, Line 9, Page 2-29: for clarity the following words might be added to the end of the last sentence: "...*the organism by the proposed facility and its operations...*"
- §2.8.2, ¶3, Page 2-29: There appear to be inconsistencies between §2.8.1 ¶3 and this paragraph. The latter expands the categories of plant operations to be examined from simply those that dry yellowcake to those that also dispose of waste or generate hazardous effluents. There should be close correspondence in the language between "Areas of Review" and "Review Procedures". Correct this sentence.
- §2.8.4, ¶3, Page 2-31: Grammatical error (use of nouns): correct to read: "...*historical abundance, and (iv) through-descriptions of...*"

Section 2.9: Background Radiological Characteristics

- §2.9: General comment: the SRP should provide guidance to the reviewer on how to establish background radiological levels for the all-too-often situation in which an ISL facility operates in an area that had previously been operated as a conventional mine or where surface excavations and exploration pits have exposed source material. The ISL licensee is liable for the cleanup of radioactive contamination resulting from the ISL operation, but must not be held liable for pre-operational radioactive levels from source material (due to the 10 CFR 40.13(b) exemption). The SRP should provide the license with the flexibility to define areas of high and low background radiation throughout the licensed area and to design the land reclamation program accordingly. These topics require greater elaboration in this §2.9.
- §2.9.2, ¶1, Lines 6-9, Page 2-32: the guidance seeks to have a pre-operational radiation monitoring program comply with the requirements of three regulatory guides. The recent additions, NUREG-5849 and NUREG-1575 (MARSSIM), are oriented towards the decommissioning of facilities and are inappropriate to the design and conduct of a pre-operational survey. Post-decommissioning surveys are generally far more intensive than pre-operational surveys. Compliance with these two new

regulatory guides should be deleted, or at least not expected. Compliance with the existing Reg. Guide 4.14 has proven quite acceptable.

- §2.9.3, Page 2-33: Table 2.9.3-1 should be revised and the claim that it is simply excised from the EPA document should be deleted. What is the EPA table number? Either make the table an exact copy of the EPA table, or delete from the footnotes the term "*and are not termed Maximum permissible Concentrations*" as well as the reference to "tailings ponds" in item 2(a).
- §2.9.3, Section (3), Page 2-32 to 2-33: The guidance presented in this section (3) seems to be misplaced. It should be relocated to §2.7.3 that addresses baseline ground water quality determinations. The guidance in this §2.9.3 should simply reference §2.7.3 and the need to include in the water quality tabulation the required radiochemical analyses.
- §2.9.3, Section (3), ¶2, Line 3, Page 2-32: As noted earlier, use of the term "ore body" should be avoided. Revise to read: "...*within and away from the ~~ore body~~ mineralized zone(s)* should be made..."
- §2.9.4, ¶3, Line 5, Page 2-33: typographical error. First word in sentence should be "preoperational".
- §2.9.4, ¶1, Line 4, Page 2-34: Similar comment as that made for §2.6.4. There is the implication that the staff have used "...*associated conceptual and numerical models...*" to analyze the radiological data. And yet no mention of such models is made in the Review Procedures of Acceptance Criteria sections of this chapter. Clarify this discrepancy.

Section 2.10: *Background Non-Radiological Characteristics*

- §2.10: General Comment: The need for this Section 2.10 is not apparent. All of the requested information has been reported in earlier sections of Chapter 2 (air quality data, water quality data, etc.). Mention of "*site-related effluents*" and their environmental impacts in §2.10.3 (1) should be deferred to Chapter 3 in which the licensed process is described in detail. Such process effluents do not constitute a "*background non-radiological characteristic*." Section 2.11 is the "grab-bag" section for any additional site information. We recommend that the need for this §2.10 be clarified, or (preferably), the entire section be deleted from Chapter 2.
- §2.10.1, ¶1, Page 2-34: The phrase "...*such indicators as heavy metals and other toxic substances in surface and ground waters...*" seems to be misplaced. This information will already have been reported in §2.7. These data should pertain to background contaminant levels and not to the licensed uranium recovery operations. The term 'indicator' seems confusing. Indicator of what?
- §2.10.1, ¶1, Line 4, Page 2-34: Delete the comma following "dusts".

- §2.10.3, Section (1), Page 2-35: This first item does not pertain to a “*background non-radiological characteristic*”, but is rather a result of the process operations, which are discussed in Chapter 3. Compliance with the NAAQS standards is unnecessary for ISL operations. Delete.
- §2.10.3, Section (3), Page 2-35: the soil and sediment sampling requirements seem excessive. Surely the licensee need only sample for those waste constituents (e.g. Ra, U, Th) whose build-up in the soils may pose an adverse health and/or environmental impact.
- §2.10.4, ¶2, Page 2-36: Similar comment as that made for §2.6.4. There is the implication that the staff have used “...*associated conceptual and numerical models*...” to analyze the non-radiological background data. And yet no mention of such models is made in the Review Procedures or Acceptance Criteria sections of this chapter. Clarify this discrepancy.

Section 2.11: *Other Environmental Features*

- §2.11.1, ¶1, Line 5, Page 2-36: for consistency in the SRP use the term “licensed area” rather than the terribly vague “site”. Revise to read: “...*establish the value of the licensed area and its vicinity*...”
- §2.11.3, Section (2), Page 2-37: for consistency with the language in §2.11.4 and to correct the use of the term “site”, revise the second line of this section (2) to read: “...*by objective data to the extent possible, and is relevant to the licensed area site under consideration*...” The applicant should, as a matter of principle, only use “objective” data.
- §2.11.4, ¶2, Page 2-37: correct first line to read: “...*characterization information for concerned with other environmental*...”
- §2.11.4, ¶4, Page 2-37: Similar comment as that made for §2.6.4. There is the implication that the staff have used “...*associated conceptual and numerical models*...” to analyze the “*other environmental data*.” And yet no mention of such models is made in the Review Procedures or Acceptance Criteria sections of this chapter. Clarify this discrepancy.

CHAPTER 3: DESCRIPTION OF PROPOSED FACILITY

Section 3.1: *In Situ Leaching Process and Equipment*

- §3.1.1, ¶1, Page 3-1: recommend use of language that offers no connotations of economic feasibility, for NRC licensing does not extend to financial issues. Revise language as follows to make it consistent with, for example, §3.1.3 (1): “...*A description of the mineralized zones ore bodies and the technical feasibility of processing the defined well field areas.*”
- §3.1.1, ¶2, Page 3-1: similar comment as above. Revise end of sentence to read: “...*production zones and adjacent non-mineralized aquifers*...”

- §3.1.2, ¶1, Line 7, Page 3-2: restricting the tests to “welds” seems overly limiting, especially if fiber glass casing is used. A simple deletion of the word “welds” would be an improvement. Is this a typographical error – “weld” should read “well”?
- §3.1.3, ¶1, Page 3-3: similar comment on the inappropriate use of terms having an economic connotation. Suggest revision of this item (1) as follows: “...~~the description of the ore body is sufficiently detailed to identify the mineralized zone(s), its their aerial distribution, and its their approximate thicknesses are complete...~~” Similarly, revise the final sentence in this ¶1 as follows: “...If more than one mineralized ore zone is to be leached, each ore zone should be defined separately. The estimated U₃O₈ ore grade of mineralization should be specified...”
- §3.1.3, ¶2(a), Page 3-4: PVC casing has been successfully used to depths exceeding 1,000 feet at ISL operations. The SRP should recognize this common industry practice and the license applicant should not be placed under the burden of defending any PVC casing use at depths greater than 500 feet. Well development methods in addition to air lifting and swabbing are in use by the industry and the SRP should acknowledge their validity. Revise this paragraph.
- §3.1.3, ¶2(b), Line 15, Page 3-4: what is the technical basis for the 10% in 1 hour and 5% in 30 minutes? These performance criteria exceed those currently imposed by States and by UIC Class III permits. Correct verb to read: “...geophysical tools is are not acceptable...”
- §3.1.3, ¶5(e), Page 3-5: based on the extensive operational history of ISL mining, the license applicant should be able to identify, rather than just “estimate,” what process effluents should be expected. Suggest revising this sentence to read: “...the description should identify include an estimate of gaseous...”
- §3.1.3, ¶5(f), Line 1, Page 3-5: “...of the impacts that...”
- §3.1.3, ¶5(f), Line 7, Page 3-5: to “demonstrate” the effectiveness of proposed mitigative measures in a license application is not possible. The applicant can describe proposed procedures to mitigate an excursion (e.g. trained personnel, monitoring and alarm systems, pumping equipment, procedures), but to definitively assure that these systems will all work when required is not possible. The applicant should commit to having mitigative measures in place and in a functioning state to address an unexpected lixiviant excursion. Revise the end of the second sentence to read: “...and describe demonstrate the ability the applicant’s mitigative measures to recover lixiviant excursions...” Similar comment for the last sentence: “...an acceptable impact analysis should describe demonstrate the following...”
- §3.1.3, ¶5(f)(i), Page 3-5: “...lixiviant from the production ore zones...”

- §3.1.3, ¶5(f)(ii), Page 3-5: should this be expanded to address loss of production fluids from surface piping?
- §3.1.3, ¶5(f)(iv), Page 3-6: this section is not clearly stated. Is the object to have the applicant discuss the efficacy of the proposed aquifer restoration program on groundwater chemistry and aquifer properties?
- §3.1.3, ¶11, Page 3-6: should this language be modified to address an on-site deep disposal well? (Although this disposal alternative may no longer be favored by regulatory agencies, to maintain the breadth of applicability of this NUREG, perhaps the text should be revised to allow for this disposal option.)
- §3.1.4, ¶3, Line 2, Page 3-7: revise language to remove economic connotations: "...acceptably described the mineralized horizons ore body(ies), demonstrated..."
- §3.1.4, ¶3, Line 3, Page 3-7: the language is confusing here. How can well integrity "assure facility stability"? Surely the stability (economic, seismic, engineering) of the mining operation does not solely depend on well integrity. Suggest clarification of this sentence language.
- §3.1.4, ¶3, Page 3-7: the last sentence of this paragraph should not be included. The scheduling and timing of wellfield development and exploitation is highly dependent on economic factors, such as the price of U₃O₈, contract delivery schedule, etc. While the applicant may propose a mine development schedule, the schedule itself should not be enshrined in the license, for any changes due to changing economic circumstances will entail license amendments. Such amendments are time-consuming and of no safety significance.

Section 3.2: Recovery Plant, Satellite Processing Facilities, Well Fields, and Chemical Storage Facilities – Equipment Used and Materials Processed

- §3.2.1, ¶1, Page 3-8: the second sentence introduces a very important concept – **control systems relevant to safety**. Such control systems may be analogous to the term "systems, structures and controls" for Part 50 licensees or the term "items relied on for safety" for Part 70 licensees. In view of the importance of this term to the revisions now underway to the NRC's inspection and enforcement programs, this term warrants considerably more discussion in this §3.2.1 or elsewhere in the NUREG. The term must be defined in this paragraph. Also, there seems to be considerable use of other similar terms ("*safety features*" (§3.2.3) and "*control systems*" (§3.2.2)). Consistency in terminology throughout the NUREG is essential.
- §3.2.1, ¶2, Page 3-8: This paragraph, along with others in this §3.2, does not accurately incorporate the principles of the October 1988 NRC-OSHA

Memorandum of Understanding on the regulation of hazardous materials. The principles of this MOU should be stated in the NUREG (even as a footnote), and the MOU should be referenced in §3.2.5. The last sentence in this ¶2 is not strictly correct, in that the NRC would have no regulatory jurisdiction over bulk storage of hazardous chemicals that could not adversely affect the uranium recovery operation (e.g. were they stored down slope, downwind of the recovery plant or in the back 40 acres). Recommend that this sentence and others be re-written in strict conformance with the MOU terms.

- §3.2.2, ¶1, Page 3-8: this sentence references "*control systems*", but such control systems have not yet been defined either in this NUREG or in 10 CFR 40. The NUREG should provide some guidance to both the review staff and the applicant as to how a "*control system*" should be defined? Are there different levels of importance of a "*control system*"? Do different control systems warrant different degrees of quality assurance or applicant oversight?
- §3.2.3, ¶4, Page 3-9: Should the term "*control systems*" be used here in preference to "*safety systems*"? Note that the "*design features*" of a safety system (or "*control system*") do not in themselves assure the availability of the system. Other factors such as maintenance and proper operator training are very important. Recommend that the last half of this sentence be revised to read: "...and measures design features for ensuring availability and reliability ..."
- §3.2.3, ¶5, Page 3-9: providing accurate estimates of the "*quantities and locations*" of hazardous materials that may be maintained on the licensed facility may be difficult. Such quantities may change on a daily basis. The applicant may better be expected to identify the buildings (although not the actual location in the building) in which maximum anticipated quantities of U₃O₈ or hazardous chemicals are located. Suggest revision of this sentence to be less prescriptive.
- §3.2.3, ¶7, Page 3-9: The term "*safety features*" is undefined. Same as "*control systems relevant to safety*" in §3.2.1?
- §3.2.4, ¶1, Page 3-10: The term "*materials processed in the in situ leach facility*" is used. Is there any other material than U₃O₈-bearing solutions that are "processed"? Perhaps this sentence should be revised to state that the reviewers have examined the proposed methods to process the U₃O₈ solutions?
- §3.2.4, ¶2, Page 3-10: Same comment as above regarding "*materials to be processed*"
- §3.2.4, ¶3 Page 3-10: Same comment as above regarding "*materials to be processed*"
- §3.2.5, Page 3-10: Add the 1988 NRC-OSHA MOU:

U.S. Nuclear Regulatory Commission/Occupational Safety and Health Administration, "Memorandum of Understanding between the Nuclear Regulatory Commission and the Occupational Safety and Health Administration, 'Worker Protection at NRC-Licensed Facilities,'" Federal Register No. 53, October 31, 1988

- §3.3.1, ¶1, Page 3-10: As noted earlier, the term "*control systems relevant to safety*" must be defined
- §3.3.1, ¶1, Line 6, Page 3-10: this sentence is correct, but the qualification on oversight of "*chemical storage facilities*" should be made to be consistent with the principles of the NRC-OSHA MOU.
- §3.3.1, ¶1, Lines 9 & 14, Page 3-11: same comment as above – chemical hazards and failures of tank valves fall only within NRC jurisdiction within the limits placed by the NRC-OSHA MOU. Some clarification is warranted in this text.
- §3.3.3, ¶3, Page 3-11: "*Critical components of the systems*" is an undefined term.. What constitutes a critical (as opposed to a normal) component of a "*control system relevant to safety*"? How are such components defined? The guidance must be further developed in this §3.
- §3.3.3, ¶4, Page 3-11: delete the comma after "pressures" as it is unneeded.
- §3.3.4, ¶3, Line 1, Page 3-12: for consistency in the language in this §3.3, the beginning of this sentence should read: "...*the instrumentation and control systems have ~~has~~ been acceptably...*"
- §3.3.4, ¶3, Line 6, Page 3-12: see previous comment on "*critical system*". Definition is required.

CHAPTER 4: EFFLUENT CONTROL SYSTEMS

Section 4.1: *Gaseous and Airborne Particulates*

- §4.1.1, ¶1, Line 3, Page 4-1: "*specifications*" may be a better word than "*analyses*" in this sentence. For a new, as yet unconstructed plant, the NRC would likely be more interested in reviewing the design and performance specifications of proposed equipment. For an existing plant, the staff would likely want to examine actual equipment performance.
- §4.1.1, ¶1, Line 4, Page 4-1: recommend that the term ALARA be defined in this §4.1.1. and used thereafter in this NUREG. This is standard procedure in other NRC documents. Revise the end of sentence 2 to read: "...*and releases to as low as is reasonably achievable (ALARA)...*"
- §4.1.3, ¶1, Line 3, Page 4-1: for consistency with the language elsewhere in this chapter (e.g. §4.1.4, ¶3) the third sentence should be modified to read: "...*locations of maximum anticipated concentration...*"

- §4.1.3, ¶3, Page 4-1: for consistency with the language elsewhere in this chapter (e.g. §4.1.4, ¶3) the first sentence should be reorganized to read: "...*The review emphasis should be on (i) radon gas mobilization from (i) recovery operations...*"
- §4.1.3, ¶4, Page 4-2: as noted earlier, an applicant can not definitively "demonstrate" that the effluent control system will work. The applicant can provide analyses that provide reasonable assurance that the proposed equipment or procedures will limit exposures, but a demonstration must await actual operating experience.
- §4.1.3, ¶5, Page 4-2: revise to read: "...*effluent releases are ALARA as low as is reasonably achievable...*"

Section 4.2: *Liquids and Solids*

- §4.2.1, ¶1, Line 1, Page 4-3: The first sentence as written is inappropriate and should be deleted. The NRC lacks regulatory authority over soils, NORM and other non-radioactive waste that may be produced during facility construction. There are several additional comments in this §4 that deal with non-radioactive wastes, all of which should be deleted, lest the reviewer erroneously conclude that the NRC should be approving such civil engineering undertakings.
- §4.2.1, ¶5, Page 4-3: delete this item (5) entirely (see previous comment)
- §4.2.2, ¶1, Page 4-3: there is a lack of consistency in terminology referring to "surface impoundments", "storage ponds" and "evaporation ponds" and how such entities are used by the ISL facility. Clarification of these terms is needed. Note that a leak detection system would not be required for storage ponds, as these impoundments generally store treated water for either surface discharge or land application.
- §4.2.2, ¶2, Line 7, Page 4-4: use of the word "*injection*" in this last sentence is too limiting. The sentence should also apply to surface application as well as injection.
- §4.2.2, ¶4, Page 4-4: the guidance may want to include a comment on the Commission's current position that wellfield restoration waters are classified as 11e.(2) byproduct material. However, the Commission has agreed to review this position so as to make the regulatory treatment or ISL restoration waters consistent with those of mine waters (which can be surface discharged in accordance with an NPDES permit).
- §4.2.2, ¶5, Page 4-4: delete item (5) in its entirety as this is not an NRC regulatory issue.
- §4.2.3, ¶1, Page 4-4: would this also apply to waters produced from pumping tests for development of new wellfields?
- §4.2.3, Section (1), ¶3, Line 4, Page 4-4: addition of the word "*receiving*" may be appropriate here: "...on the nature of the receiving environment..."

- §4.2.3, ¶1, Line 7, Page 4-5: for clarity, remove the term “risk” in this sentence. The exposures must conform to the doses stated in 10 CFR 20. Introduction of risk analysis to uranium recovery facilities has yet to be undertaken. Revise to read: “...*All projected doses ~~and risks~~ must conform to the ~~risk~~ levels permitted under 10 CFR Part 20...*”
- §4.2.3, ¶2, Page 4-5: the introductory sentence of this paragraph could be construed to expect the applicant to conduct actual toxicity tests when, in fact, this should generally not be expected. Additionally, the NRC should not be addressing non-radioactive constituents unless covered by the principles of the NRC-OSHA MOU. Revise to read: “...*The applicant must conduct analyses to assess the chemical toxicity of radioactive ~~and nonradioactive~~ constituents to evaluate...*”
- §4.2.3, Item 2, ¶3, Line 3, Page 4-5: while the meaning is probably clear, better English expression would have this sentence read: “...*detection sumps, ~~chemical~~ samples for chemical analysis are not...*”
- §4.2.3, ¶2, Line 6, Page 4-6: for an accident that has already occurred, better choice of word is: “...*and describes the corrective ~~mitigative~~ actions and the results...*”
- §4.2.3, ¶3, Line 3, Page 4-7: “*applicant test data*” would probably not be available for a new facility. Reliance on manufacturers’ performance data and specifications would be better wording here.
- §4.2.3, ¶3, Page 4-8: Is daily inspection required by regulation? If so, the regulation should be cited.
- §4.2.3, Item (6), ¶2, Line 7, Page 4-8: perhaps some clarification is appropriate to confirm that the estimate of the amount of contaminated material excludes the decommissioning phase of the project? The need for the licensee to have agreements in place for disposal of 11e.(2) by-product material was already addressed in SRP Section 3.1.3 (11). There should be no need to repeat the need for staff review of this agreement. Delete this §4.2.3 Section 6 or §3.1.3 (11).
- §4.2.3, Item 6, ¶1, Page 4-9: this paragraph has been written with the implicit assumption that deep well injection is not feasible. While no longer likely to be permitted in uranium-producing states, the SRP should still be written to address this possibility.
- §4.2.3, ¶7, Page 4-9: This entire item (7) should be deleted. This is not the responsibility of the NRC and should not be subject to NRC approval or licensing.
- §4.2.4, ¶1, Line 9, Page 4-11: the 7th sentence should be deleted in its entirety as the NRC has no regulatory authority over this issue. “...*The applicant will dispose of noncontaminated solid waste periodically at a licensed disposal site landfill, in accordance with state and local regulations...*”

- §4.2.4, ¶1, Page 4-11: In the 9th sentence, the guidance should better be expressed that the staff have considered preventive and mitigative measures to protect health and safety.
- §4.2.4, ¶1, Page 4-11: The last sentence should be clarified to read: "...that meet applicable 10 CFR 20 exposure limits and that are ALARA as low as reasonably achievable goals..."
- §4.2.4, ¶3, Line 1 Page 4-11: see previous comments on the use of "demonstrate." Recommend revising the sentence to read: "...surface-water impoundments will has been demonstrated to comply with..."
- §4.2.4, ¶2, Line 6, Page 4-12: clarify the sentence to read: "...following preventive and mitigative measures to reduce..."

CHAPTER 5: OPERATIONS

Section 5.1: Corporate Organization and Administrative Procedures

- §5.1.1, ¶1, Line 2, Page 5-1: use of the term "*administrative procedures*" should be corrected. The staff should not expect to receive detailed administrative procedures for review, but rather should examine the applicant's administrative program or proposed practices that will lead to development of detailed, licensee-specific procedures. See, for example, the title of Reg. Guide 8.2, which does not use the term procedures. The applicant can be expected to make license commitments to develop detailed administrative procedures, but these will generally not be available at the time of license application. Revise to read: "...proposed organization and administrative practices procedures, including..."
- §5.1.2, ¶1, Line 6, Page 5-1: for clarity, suggest deleting the last few words of the sentence as redundant. As part of the licensee's change process and reporting requirements, identification of changes in the corporate organization and administrative practices is already required. Revise to read: "... *nonroutine maintenance activities, and changes to any of these...*"
- §5.1.2, ¶1, Line 8, Page 5-1: specifying the exact name of this committee in the SRP is unnecessarily prescriptive. The licensee must have the prerogative to name this committee in accordance with the company's policies. Revise to read: "...applicant for establishing a Safety and Environmental Review Panel, or similarly named organization, including the proposed..."
- §5.1.3, Line 1, Page 5-1: see above comment in §5.1.1 re "procedure" terminology. Revise to read: "...organization and administrative practices procedures are acceptable..."

- §5.1.3, ¶4, Line 1, Page 5-2: see above comment in §5.1.1 re “procedure” terminology. Revise to read: “...*organization and administrative practices procedures conform...*”
- §5.1.44, ¶1, Line 2, Page 5-2: see above comment in §5.1.1 re “procedure” terminology. Revise to read: “...*organization and administrative practices procedures, the following...*”
- §5.1.4, ¶2, Line 1, Page 5-2: see above comment in §5.1.1 re “procedure” terminology. Revise to read: “...*organization and administrative practices procedures proposed for use...*”
- §5.1.4, ¶3, Line 7, Page 5-2: see above comments on the use of the term “demonstrate”. Revise to read: “...*maintenance of the facility is clearly established demonstrated. In the case...*”
- §5.1.4, ¶1, Line 2, Page 5-3: see above comment in §5.1.1 re “procedure” terminology. Revise to read: “...*organization and administrative practices procedures for the...*”
- §5.1.4, ¶1, Line 4, Page 5-3: see above comment re “procedure” terminology. Revise to read: “...*organization and administrative practices procedures are acceptable...*”

Section 5.2: Management Control Program

- §5.2.1, ¶1, Line 1, Page 5-3: according to the subtitle of this section and the recommended statements contained in §5.2.4, a review of “administrative procedures” (or more accurately, “administrative practices” is not part of this §5.2.1 review and references to “administrative practices/procedures should be deleted. Revise the first sentence to read: “...*review the management control program and administrative procedures proposed to ensure...*”
- §5.2.1, ¶1, Line 4, Page 5-3: the name of the review panel is overly prescriptive and should remain the prerogative of the licensee. The third sentence addresses the important concept of a license change mechanism. Unfortunately, §40.40 fails to specify any criteria that the licensee can use to decide when a license amendment is required. §5.2 has been written in a manner that adopts the change mechanism approaches applicable to Part 70 licensees (among others), but there is no regulatory basis for doing so in 10 CFR 40. Incorporation of a formal facility change mechanism is a desirable goal and the NUREG’s authors are to be commended for making a first attempt to do so. However, the acceptance criteria in §5.2.3.(4) require revision (to remove inconsistencies) and to clearly state that quantitative likelihood and consequence analyses are inappropriate for Part 40 licensees.
- §5.2.1, ¶1, Line 5, Page 5-3: introduction of the Radiation Work Permit (RWP) concept may be appropriate here.

- §5.2.1, ¶2, Line 3, Page 5-3: the meaning of the last sentence could be clarified with the following re-phrasing: "...*instances where occupational safety is safe concerns affected by radiological operations or accidents...*"
- §5.2.2, ¶1, Line 2, Page 5-4: see the comment for §5.2.1 regarding the area of review for this §5.2. revise to read: "...*management control program and administrative procedures are sufficient to assure that any likely proposed activities affecting...*"
- §5.2.2, ¶1, Line 6, Page 5-4: Inclusion of the term "occupational safety staff in this sentence is wrong. Occupational safety issues are addressed by the Mine Safety and Health Administration (MSHA) and are not regulated by the NRC. Revise the sentence to read: "...*process to be used by the radiation and occupational safety staff to modify standard operating...*"
- §5.2.2, ¶2, Line 3, Page 5-4: the term "evolutionary amendment" is undefined and unclear. Recommend just deleting this adjective for clarity.
- §5.2.2, ¶3, Line 2, Page 5-4: recommend clarification of this sentence to read: "...*any disturbances to be associated with such development will be conducted completed in compliance...*"
- §5.2.3, Line 1, Page 5-4: for consistency in terminology (we are examining a "program," not a "system") revise the introductory sentence to read: "...*The management control program system is acceptable if...*"
- §5.2.3, Line 1, Page 5-4: same comment for §5.2.1 and §5.2.2. Revise first sentence to read: "...*management control program and administrative procedures are sufficient...*"
- §5.2.3, Item 1, ¶2, Page 5-4: The first and last sentences of this paragraph appear to be contradictory. The first suggests that the licensee may not be required to report an event, whereas the last sentence seems to suggest that a license amendment will be added obliging the licensee to report such events. The confusion may simply relate to the magnitude of the event, but if this, in fact, the case, the SRP provides no guidance on what levels will trigger a reporting requirement. The term "ponds" must be clarified (see comment in §4.2.2). Recommend revising the first sentence to read (including correction of punctuation): "...*If the license is required to report Any spills, evaporation pond leaks, excursions of source...or any other incidents/events that must be reported to state or federal agencies will also be reported a report shall be made to the NRC...*"
- §5.2.3, Item 1, ¶2, Page 5-4: The term "...*that may have an impact on the environment...*" is far too vague for the SRP. Very clean water certainly can have "an impact on the environment" but it may not be as significant as a release of acid. More specificity is required in this paragraph.
- §5.2.3, Section (2), ¶2, Page 5-5: the phrase "on an annual basis" is misplaced, for the licensee should not be expected to "develop, approve and

review” annually its procedures. Only the review need be conducted on an annual basis. Revise to read: “...*approval, and review on an annual basis of all standard...and occupational safety staff, on an annual basis.*

Subsequent...”. Inclusion of the term “occupational safety staff” in this sentence is wrong. Occupational safety issues are addressed by MSHA and are not regulated by the NRC. Revise the sentence to read:

“...*operating procedures by the radiation and occupational safety staff ...*”

- §5.2.3, Section (2), ¶3, Page 5-5: see previous comment on prescriptive panel name. Revise.
- §5.2.3, Section (3), Line 2, Page 5-5: Inclusion of the term “occupational safety staff” in this sentence is wrong. Occupational safety issues are addressed by MSHA and are not regulated by the NRC. Revise the sentence to read: “...*maintenance activity by the radiation and occupational safety staff ...*”
- §5.2.3, Section (4), ¶1, Page 5-5: see previous comment on prescriptive panel name. Revise. Section (a) should be revised to state that the licensee may make certain changes without a license amendment. The Safety and Environmental Review Panel is not accountable to the NRC, but rather only the licensee is. Revise to read: “...*The licensee Safety and Environmental Review Panel may, without obtaining a license amendment...*” The criteria in section (a) are inconsistent with those in section (b) and must be revised. For example, the first condition under which a change can be made without NRC pre-approval, (i), is unacceptably broad – it states that any change to the facility [described in the license] is permissible. This is clearly incorrect and contradicts all of the conditions stated in section (b).

The intention of this §5.2.3 (4) is good and is consistent with the NRC’s new policy of incorporating a “Facility Change Mechanism” in revisions of the regulations applicable to different licensee classes (e.g. Part 50, 70, 76). However, the obvious inconsistencies within Section (4) must be remedied. To be fully defensible, changes in the 10 CFR 40 regulations are needed to clearly define the conditions under which a licensee may make a facility change without NRC approval (i.e. license amendment).

Subsection (4)(a)(iv) is very perplexing and the meaning is unclear. What is the intention of the author here? Two editorial corrections are noted: Line 2: “...or the basis of, or analysis leading...” and Line 5 “...*statement or of environmental assessment...*”

- §5.2.3, Section (b), Page 5-6: the NUREG makes a very commendable attempt to define conditions under which a license amendment is required in terms of risk significance. There is, unfortunately, no regulatory basis

(yet) for adopting this approach for Part 40 licensees, and the NUREG should clearly state this absence. The authors have attempted to adopt the NRC's new facility change mechanism methodology, including use of the "accident analysis," "consequence," and "likelihood of occurrence" concepts that have been incorporated, for example, into the new Subpart H of 10 CFR 70. The NUREG also attempts to have license applicants identify safety-significant controls (SSCs for Part 50 licensees, Items Relied on For Safety for Part 70 licensees). There is an implied request for quantitative performance data for accidents and safety system performance, but such quantitative data are totally inappropriate for Part 40 operations when considered in terms of their risks. The guidance requests, for example, minimal increases in consequence of likelihood without providing the reviewer with the guidance needed to evaluate what constitutes "minimal" and how this assessment can be made in the absence of quantitative information. While NEI is very supportive of adoption of this new risk-based regulatory approach, incorporation is a complex issue that should not be simply introduced into a NUREG.

Some specific comments on this section (b) follow:

- §5.2.3, Section (4)(b), ¶(i), Page 5-6: the more common terminology would be "frequency of occurrence" (compare to (ii), for example). This (i) implies that the licensee has performed some sort of Process Hazards Analysis (PHA) or formal accident analysis. This has not been described previously in the SRP.
- §5.2.3, Section (4)(b), ¶(ii), Page 5-6: for consistency within the SRP, and especially with §3.3, the correct terminology should be "control systems relevant to safety." Revise to read: "...a malfunction of a control system relevant structure, system, or component important to safety previously..."
- §5.2.3, Section (4)(b), ¶(iii), Page 5-6: this (iii) implies a formal accident consequence analysis that has not been previously discussed in the SRP.
- §5.2.3, Section (4)(b), ¶(iv), Page 5-6: same comment for section (ii) regarding consistency in terminology. Revise to read: "...a malfunction of a control system relevant structure, system, or component important to safety previously..."
- §5.2.3, Section (4)(b), ¶(vi), Page 5-6: same comment for section (ii) regarding consistency in terminology. Revise to read: "...a malfunction of a control system relevant structure, system, or component important to safety previously..."
- §5.2.3, Section (6), Line 5, Page 5-6: The subject to be reviewed in this section has already been addressed in SRP Section 2.4. Why is there a need to repeat the review and assessment? Use of the gerund is not good

style. Revise to read: "...*will cease any work that results resulting in the discovery...*" Recommend deletion of this section (6) via consolidation into §2.4.

- §5.2.4, ¶2, Page 5-7: see previous comment on the use of "demonstrate," and specifically the inability of a license applicant to "demonstrate" compliance with a procedure or regulation. Revise to read: "...*The applicant has committed demonstrated that non-routine work...radiation safety requirements and that has provided for the issuance of radiation work permits will be issued for activities...*"

Section 5.3: Management Audit, Inspection and Record Keeping Program

- §5.3 is structured into two sections with the latter dealing solely with record keeping. Unfortunately, the wording in §5.3.1 often addresses record-keeping issues, especially in §5.3.1.4. To maintain the intended separation of these two topics, the text in §5.3.1 must be reviewed to remove references to record-keeping issues. For example, in §5.3.1.4 the suggested language for inclusion in the TER states that the staff has reviewed all aspects of the licensee's proposed record keeping approach, when, in fact, this material will not yet have been reviewed until §5.3.2 (see detailed comments below).
- §5.3.1.2, ¶1, Lines 2 & 3, Page 5-7: the language seems confusing and can be simplified as follows: "...*notification programs are acceptable to ensure the implementation of the proposed management control program and will provide reasonable assurance to ensure that employee...*"
- §5.3.1.2, ¶1, Line 4, Page 5-7: the staff can not yet review records and reports, for these will not have been generated (assuming a new facility application). Revise to read: "...*This review will include examination of the reporting and record-keeping functions records and reports prepared by of the...*" As noted earlier, the prescriptive name of this panel should be revised.
- §5.3.1.3, Section (4), ¶1, Lines 1 & 4, Page 5-8: to remove the prescriptiveness, revise as follows: "*~~The Safety and Environmental Review panel~~ Rrecords will include...*" and line 4 to read "...*in Section 5.2.3. Changes pages...*"
- §5.3.1.3, Section (4), ¶2, Lines 1 & 4, Page 5-8: consistent with a licensee's ability to make commitments in a license application, and as the potential licensee may not yet have "made provisions", recommend revising the first sentence (line 1) to read: "...*The applicant commits ~~has made provisions~~ to furnish...*" and line (4) to read: *The applicant licensee commits ~~has made provisions~~ to annually submit change...* (We recommend use of the term "applicant" instead of "licensee" as a broader term that encompasses both new license applicants as well as existing licensees).

- §5.3.1.3, Section (5), ¶1, Line 1, Page 5-8: this Section (5) imposes new and unnecessary reporting requirements on licensees. In addition to the ALARA report, which is maintained at the site, and the SERP report, which is sent to the NRC, the staff expects submission of monitoring data, land use survey, corrective action report and semi-annual effluent reports. Why must these reports be submitted if they are maintained at the site and available at any time for review and inspection by the NRC staff? The SRP must justify the need for submission of such reports. This new expectation runs counter to current agency policy for many other classes of licensee who are directed to maintain data and reports at the facility rather than to send them to NRC offices where they more often than not collect dust. Other comments for this section: use of the subjunctive should be avoided in good English style. Revise to read: "...The applicant will submit an annual report ~~an annual report will be submitted to the NRC...~~" The final sentence in this section (5) seems redundant, as all of these issues shall be incorporated into the license as commitments. Delete.
- §5.3.1.4, ¶1, Page 5-9: there are several statements in this section about the applicant's record-keeping programs. These must be deleted as this aspect of the license application has not been reviewed in this §5.3.1, but will be done so in §5.3.2. These corrections are:
 - ¶1, Line 2: "...~~audit, and inspection, and record keeping programs, the following...~~"
 - ¶2, Line 1: "...~~audit, and inspection, and record keeping programs...~~"
 - ¶3, Line 1: "...~~audit, and inspection, and record keeping programs...~~" The entire second sentence should be deleted (same reason). The third sentence should have deleted the verb "demonstrate" and be revised to read: "...~~The applicant has acceptably demonstrated that it will record and report...~~" (or "...The applicant commits to record and report...")
 - ¶4, Line 8: the reference to 10 CFR 20, Subpart L is not relevant to the matter under discussion in §5.3.1. Delete this clause.
- §5.3.2.3, Section (2), for internal SRP consistency, revise the first sentence to read: "...~~The record keeping plan demonstrates that the licensee~~ commits to will maintain..."
- §5.3.2.3, Section (3)(d)(i), Line 3, Page 5-11: the NRC would probably be more interested in learning what corrective actions the licensee has effected rather than just the cleanup actions that were taken. Suggest revision to read: "...assessments of hazard, corrective and cleanup actions taken..."

- §5.3.2.3, Section (3)(d), Page 5-12: the last sentence on this section (d) is overly prescriptive and unnecessary. How the licensee retains and stores his records (separate versus combined files?) is irrelevant so long as the records can be produced on demand for NRC review and inspection.

Section 5.5: Radiation Safety Training

- §5.5.2, ¶1, Line 1, Page 5-14: as detailed procedures may not yet be written, the staff should examine applicant commitments to radiation safety training. Recommend revising the first sentence to read: "...*the applicant has outlined procedures for an employee...*" or "...*the applicant has commits to write procedures for an employee...*"
- §5.5.4, ¶2, Line 1, Page 5-15: the review procedures (§5.5.2) make no mention of reviewing the instructors for the radiation safety program. The radiation safety program should not just be limited to a subset of employees, but should be given to all. This sentence should be clarified to read: "...*training program for ~~personnel conducting the radiation safety program and~~ all personnel entering restricted area at the _____ in-situ...*"
- §5.5.4, ¶3, Lines 1 & 2, Page 5-15: recommend consistency with the (excellent) terminology used in §5.5.3 in this section as well. Revise to read: "...*personnel at the _____ in-situ leach site is consistent with* ~~*adheres to the guidance and acceptable approaches contained in NRC...*~~"

Section 5.6: Security

- §5.6.4, ¶1, Line 1, Page 5-17: the concern here is again with use of the term "demonstrate." Suggest revising the first sentence to read: "...*The applicant commits to implement acceptable passive and active constraints for entry to controlled and restricted areas of the licensed facility....*"

Section 5.7: Radiation Safety Controls and Monitoring

- There appears to be a lack of consistency in the terminology used throughout §5.7.1 as to what exactly is being reviewed. In contrast to the title of this section ("effluent controls"), §5.7.1.1. addresses "*systems and procedures*", §5.7.1.2 addresses "*safety controls and monitoring procedures*" and §5.7.1.4 addresses "*radiation safety controls and monitoring program[s]*." To avoid any confusion, we recommend that a term clearly identifiable with the heading of this section be used: "*effluent control and monitoring systems.*" Corrections are made below.
- §5.7.1.1, ¶1, Lines 1 & 2, Page 5-17: Revise to read: "...*review descriptions of the effluent control and monitoring systems and procedures (e.g. ventilation, confinement, filtration) proposed by the applicant designed to minimize...*" As noted earlier, we recommend against use of the term

“procedures” as such procedures may not have been written by the time the license application is submitted to the NRC.

- §5.7.1.2, ¶1, Line 1, Page 5-18: Revise to read: “...*whether the proposed effluent control and monitoring systems ~~safety controls and monitoring procedures~~ are sufficient to limit...*”
- §5.7.1.2, ¶2, Line 9, Page 5-18: Revise to read: “...*the proposed effluent control and monitoring systems ~~and procedures~~ (e.g. ventilation, confinement, filtration) ...*”
- §5.7.1.2, ¶2, Line 15, Page 5-18: punctuation error -- revise to read: “...*consistent with manufacturers’ frequencies...*”
- §5.7.1.3, ¶1, Line 1, Page 5-18: consistent with the first comment in this §5.7.1, revise to read: “...*The effluent control radiation safety controls and monitoring systems ~~programs~~ are is acceptable if they ~~it~~ meet the following criteria:...*”
- §5.7.1.4, ¶1, Line 1, Page 5-20: consistent with the first comment in this §5.7.1, revise to read: “...*acceptance of the effluent radiation safety controls and monitoring systems for effluents...*”
- §5.7.1.4, ¶2, Line 1, Page 5-20: consistent with the first comment in this §5.7.1, revise to read: “...*review of the effluent radiation safety controls and monitoring systems for effluents...*”
- §5.7.1.4, ¶3, Line 1, Page 5-20: consistent with the first comment in this §5.7.1, revise to read: “...*acceptable effluent radiation safety controls and monitoring systems for effluents...*”
- §5.7.1.4, ¶4, Line 2, Page 5-20: consistent with the first comment in this §5.7.1, revise to read: “...*review conducted of the effluent radiation safety controls and monitoring systems for effluents...*”
- §5.7.1.4, ¶4, Line 9, Page 5-20: consistent with the first comment in this §5.7.1, revise to read: “...*the effluent control equipment and monitoring systems ~~procedures~~ meet the requirements...*”
- §5.7.2.1, Line 6, Page 5-21: this sentence could be clarified as follows: “...*review the program for worker external personal exposure monitoring, with the criteria for including workers in the program, the sensitivity...*”
- §5.7.2.3, ¶1, Line 2, Page 5-22: this sentence could be clarified as follows: “...*Criteria for determining the external radiation monitor sampling locations, are consistent...*” Regulatory Guide 4.14 does not pertain to external radiation programs. Is there another appropriate reference?
- §5.7.2.3, ¶3, Lines 2-4, Page 5-22: this §5.7.2 just addresses occupational health and safety protection. As protection measures for the environment are addressed in a later section, recommend deleting references to the physical environment. Clarify to read: “...*to protect health and safety ~~and the environment~~. The application also demonstrates that the ranges of*”

sensitivity for the proposed external radiation monitors are consistent with those appropriate to expected from the facility operation...

- §5.7.2.3, ¶6, Line 1, Page 5-22: *"...the application presents radiation dose levels for corrective action..."*
- §5.7.2.4, ¶3, Line 1, Page 5-23: *"...The applicant has proposed an acceptable external radiation..."*
- §5.7.2.4, ¶3, Line 9, Page 5-22: *"...The applicant's monitoring program is acceptable..."*
- §5.7.3.1, ¶1, Line 4, Page 5-24: recommend one clarification at the end of this line: *"...criteria for determining airborne radiation monitoring sampling locations and sampling..."*
- §5.7.3.2, ¶1, Page 5-24: the first sentence of this paragraph has been copied word-for-word from §5.7.1.2. Why is this sentence needed in this §5.7.3.2? It pertains to an issue that has previously been reviewed. This sentence should be deleted.
- §5.7.3.3, ¶2, Line 2, Page 5-24: protection of human health and the environment is really not the primary issue of importance in the review required by this §5.7.3, but rather the collection of accurate data on concentrations of airborne radioactive species. Revise the last part of the first sentence to read: *"...and planned use to accurately measure concentrations of airborne radioactive species protect health and safety and the environment. The application also states demonstrates that the ranges of sensitivity are appropriate for those expected from the facility operation..."*
- §5.7.3.3, ¶3, Line 2, Page 5-24: the correct reference is Reg. Guide 8.25.
- §5.7.3.3, ¶6, Line 1, Page 5-25: replace "demonstrate" by a more appropriate term. Revise to read: *"...The applicant commits to make available demonstrates that respirators will routinely be used for routine use in operations..."*
- §5.7.3.4, ¶3, Lines 2-5, Page 5-25: a few minor editorial corrections, plus replacement of "demonstrate". Revise to read (line 2): *"...The applicant has provided an acceptable drawing(s) chart(s) that depict the facility layout and the locations of..."* and (line 4) *"...The applicant attests demonstrated that the range...will enable accurate determinations to be made of the concentrations of airborne radioactive species so as to support protection of protect the health..."*
- §5.7.3.4, ¶1, Line 3, Page 5-26: punctuation: *"...The applicant's respiratory..."*
- §5.7.4.1, ¶1, Lines 1 & 3, Page 5-26: the term "procedures" is inappropriate in this §5.7.4. §5.7.4.4. correctly uses the terms "calculation methods" and "techniques" and we recommend that the word "methods" or "methodologies" be used as an acceptable replacement. What is important

is the applicant's selection of an NRC- or industry-approved estimation methodology to forecast occupational radiation exposures rather than the mechanical procedure of how the raw data are crunched and calculated into estimated exposures. The following revisions are recommended: (line 1): "...The staff should review the methodologies ~~procedures~~ proposed by the applicant to estimate ~~determine the exposures to...~~" and (line 3): "review should include methods to determine ~~procedures for determining~~ exposures during..."

- §5.7.4.2, ¶1, Line 1, Page 5-27: same comment as above. Revise to read: "...The staff should evaluate whether the methodologies ~~procedures~~ proposed by the applicant to determine..."
- §5.7.4.3, ¶1, Line 1, Page 5-27: "...The methodologies procedures proposed..."
- §5.7.4.3, ¶2, Line 4, Page 5-27: punctuation issues: "...The most conservative, ~~being~~ solubility class (Y), ~~which~~ should be used in the..."
- §5.7.4.4, ¶3, Lines 2- 3, Page 5-28: the second sentence should be revised to read: "The applicant commits to use acceptable methods ~~has provided procedures allowing determination of to determine the intake of radioactive materials...~~"
- §5.7.4.4, ¶3, Lines 6 & 7, Page 5-28: same comment as above. Revise to read: "...The applicant commits to use acceptable methods to calculate ~~has acceptable procedures for calculating prenatal...~~"
- §5.7.4.4, ¶3, Line 14, Page 5-28: "...systems in all ~~providing~~ procedures for exposure calculations..."
- §5.7.5.1, ¶1, Line 1, Page 5-29: for clarification, the first sentence should be revised to read: "... the bioassay program proposed by the applicant and how the bioassay results will be used to confirm the results derived..."
- §5.7.5.2, ¶1, Line 1, Page 5-29: for clarification, the first sentence should be revised to read: "... the bioassay program proposed by the applicant is adequate to confirm results determined... Section 5.7.4) is adequate. The staff..."
- §5.7.5.2, ¶1, Line 8, Page 5-29: suggest the first few words should read: "...to detect and take corrective action against high intakes..."
- §5.7.5.3, ¶1, Line 3, Page 5-30: for clarification, the first sentence should be revised to read: "... the bioassay program proposed by the applicant is adequate to confirm results determined... Section 5.7.4) is adequate..."
- §5.7.5.3, ¶3 Line 1 Page 5-30: bioassays should not be required for all new employees, but rather only for those that have the potential to contact U₃O₈. A worker in the yellowcake drier should be tested, but not an office secretary. Testing should reflect potential risk.
- §5.7.5.4, ¶3, Line 1, Page 5-31: the bioassay program will not have been "established" at the time of license application submittal (except for an

existing licensee. Therefore, recommend the following language change:
"...The applicant commits to establish ~~has established~~ an acceptable bioassay..."

- §5.7.5.4, ¶3, Line 5, Page 5-31: similar comment as that immediately above: *"...The applicant commits to establish ~~has established~~ an acceptable bioassay..."*
- §5.7.6.1, ¶1, Line 1, Page 5-31: The beginning of this §5.7.6 is confusing in that the reviewer is led to believe – based on the title of this section -- that the review will address a Contamination Control Program. However, §5.7.6.1 immediately introduces an Occupational Radiation Survey Program. What is the relation of these 2 programs, the reviewer may ask? To clarify this apparent inconsistency, recommend that the first sentence be revised as follows: *"...The staff should review the contamination control program ~~occupational radiation survey program~~ proposed by the applicant to prevent employees from entering clean areas or from leaving the site while contaminated with radioactive materials. Levels of radioactive contamination will be monitored by means of a radiation survey program. Review areas include methods for surveying occupational radiation levels, proposed housekeeping..."*
- §5.7.6.1, ¶1, Line 4, Page 5-32: grammatical clarification in last line: *"...contamination below limits before authorizing ~~recommended~~ release of equipment..."*
- §5.7.6.2, ¶1, Page 5-32: this paragraph has been copied word-for-word from §5.7.1.2. Why is this sentence need in this §5.7.6.2? It pertains to an issue that has previously been reviewed and is not relevant to review of the Contamination Control Program details. Delete the paragraph.
- §5.7.6.2, ¶2, Line 1, Page 5-32: same comment above regarding program names: Revise as follows: *"...determine whether the contamination control program ~~occupational radiation survey program~~ proposed by the applicant to prevent contaminated employees from entering clean areas of from leaving the site in is conformance..."*
- §5.7.6.2, ¶2, Line 6, Page 5-32: *"...standard operating procedures and ~~or~~ discussed in the application..."*
- §5.7.6.2, ¶2, Line 10, Page 5-32: minor clarification at the end of the line: *"...release limits before release of the equipment for unrestricted use ..."*
- §5.7.6.3, ¶1, Page 5-32: same comment regarding nomenclature of programs. Revise to read: *"...Radiation surveys of workers will be conducted ~~The occupational radiation survey program~~ proposed to prevent contaminated employees from entering clean areas or from leaving the site in is conformance..."*
- §5.7.6.3, ¶2, Line 3, Page 5-32: *"...standard operating procedures and ~~or~~ are discussed in the application..."*

- §5.7.6.3, ¶4, Line 2, Page 5-33: clarify the intent of the review at hand. Revise sentence to read: "...availability and planned use is thoroughly discussed ~~protect human health and safety and the environment. The application also demonstrates that the ranges of sensitivity for monitoring equipment will be appropriate to are those expected...~~"
- §5.7.6.3, ¶6, Lines 4 & 5, Page 5-33: the last sentence should be revised to read: "...The applicant commits to use a reasonable efforts ~~will be made to minimize...~~"
- §5.7.6.3, ¶7, Line 2, Page 5-33: punctuation error: "...at all traps, and other..."
- §5.7.6.3, ¶8, Line 5, Page 5-33: reference to NUREG-1575 (MARSSIM) is inappropriate in this criterion (5), for MARSSIM applies only to land and buildings, but not to equipment or scrap. Thus, delete reference to NUREG-1575 and refer the reviewer to Table 5.7.6.3-1 in this SRP.
- §5.7.6.3, ¶9, Line 1, Page 5-33: punctuation error: "...equipment; or scrap..." and for clarification the end of the sentence should read, "...of the limits specified in Table 5.7.6.3-1..."
- §5.7.6.3, ¶9(a), 9(b) and 9(c), Line 1, Page 5-33 & 5-34: the first line of each of these sub-sections should better express the applicant's commitment to the particular action, as the analyses and materials referenced will not be available at the time of license submission as no materials have yet been contaminated and under consideration for unrestricted release. Recommend making the following changes in each of the sub-sections (a), (b) and (c):
 - ¶9(a): "...The applicant commits to provide ~~has provided~~ detailed information..."
 - ¶9(b): "...The applicant commits to provide ~~has provided~~ a detailed health and safety analysis..."
 - ¶9(c): "...The applicant commits to include ~~includes~~ materials created by special circumstances..."
- §5.7.6.4, ¶3, Line 4, Page 5-35: minor clarification to read: "...entering clean areas or from leaving the site..."
- §5.7.6.4, ¶3, Line 6, Page 5-35: similar comment for Sections 9(a), 9(b) and 9(c), in that these actions will not have yet transpired until the licensee has operated. Revise the language to read in terms of "commitments": "...Acceptable action levels will be ~~have been~~ set in accordance..."
- §5.7.6.4, ¶3, Lines 8 & 9, Page 5-35: similar comment to that immediately above: "...The applicant commits ~~has established~~ that all items removed from the restricted area will be ~~are~~ surveyed by the radiation safety staff and will meet applicable release limits..."
- §5.7.6.4, ¶3, Lines 11, 12 & 13, Page 5-35: similar comment to that immediately above: "...The applicant commits ~~has demonstrated~~ that the

range, sensitivity and calibration of monitoring equipment will be adequate to protect the health and safety ... And in Line 13, revise to read: *"...The licensee commits ~~has demonstrated~~ that contaminated surfaces will not be covered...below the limits specified in NUREG-1569 Table 5.7.6.3-1..."*

- §5.7.7.1, Page 5-35: a majority of this subchapter (" §5.7.7 *Environmental Monitoring Programs*") seems to be unnecessary and highly repetitions of the review that was conducted for §5.7.3 (airborne monitoring). The chapter is also repetitious of the pre-operational baseline data collection program outlined in SRP Chapter 2. There is no need to repeat the review of the applicant's airborne radiation monitoring program that was performed in §5.7.3. Why is such a repeat of this review needed? Buried in this sub-section seems to be a desire to review airborne concentrations of non-radioactive hazardous materials during operations of the facility, but the SRP should caution the reviewer to abide by the NRC-OOSHA Memorandum of Understanding as it pertains to non-radioactive hazardous materials. The SRP should also acknowledge the trivial impacts on local and regional air quality caused by existing ISL operations. Acceptance criterion §5.7.7.3(3) seems to confuse what environmental sampling must be performed in documenting the pre-operational baseline conditions (e.g. surface and sub-surface soils, sediment, vegetation) versus that which must be routinely during operations. (Note, in contrast, §5.7.8.1 which tries to distinguish amongst the pre-operational, operational and restoration environmental sampling requirements.) This §5.7.7 must be re-drafted to remove the redundancy in reviews and to clarify the scope and intent of the review. Clarification that the review outlined in §5.7.7 does not apply to liquid effluents might also be helpful, as the liquid effluents probably pose the greatest potential threat to the environment (refer the reviewer to §5.7.8).
- §5.7.7.1, ¶1, Line 1, Page 5-36: the term "*present and future*" is confusing and pre-supposes that the staff is reviewing a document pertaining to an existing licensee. Simply delete this phrase to improve clarity and applicability of the guidance: *"...The staff should review the ~~present and future~~ operational airborne effluent..."* The limiting term "airborne" should be deleted as the review scope (apparently) pertains to solid and liquid effluents.
- §5.7.7.2, ¶2, Line 2, Page 5-36: the reviewer must be cautioned that any review of hazardous materials must abide by the jurisdictional separations contained in the NRC-OSHA MOU. The statement that the licensee must *"...limit exposures and releases of radioactive and hazardous materials to as low as reasonably achievable in conformance with regulatory requirements identified in 10 CFR Part 20..."* is erroneous.

Part 20 does not address the handling of "hazardous materials."

References to Subparts D and F in 10 CFR 20 are also erroneous, for these subparts do not address releases of hazardous materials. This paragraph needs a thorough re-write with proper citations of 10 CFR 20.2007.

- §5.7.7.2, ¶2, Line 3, Page 5-37: the term "*maximum*" by itself seems inappropriate. A better term might be "*maximum concentrations expected from the licensed facility's operations*"
- §5.7.7.2, ¶3, Page 5-37: use of the verb "committed" is excellent in this paragraph. Similar usage is recommended by NEI throughout this SRP.
- §5.7.7.3, ¶3, Page 5-37: the SRP should make the same clarification that is made in §5.7.8 amongst pre-operational monitoring (covered in SRP Chapter 2), operational (Chapter 5) and post-operational (SRP Chapter 6) that is made in §5.7.8. The Reg. Guide 4.14 Section 3 reference is incorrect.
- §5.7.8.1, ¶1, Page 5-39: inclusion of a second (?) review of the baseline pre-operational data collection program, that was already reviewed in Chapter 2, seems unnecessary in this §5.7.8.1. The reviewer should consult the results of this pre-operational study, but should not be obliged to repeat the technical review that was conducted previously.
- §5.7.8.1, ¶4, Page 5-39: as noted earlier, use of the term "ore zone" is quite inappropriate as what constitutes "ore" will be constantly changing as mining proceeds. As has been done later in this section (§5.7.8.3(3), Page 5-45), the SRP should use the term "*production zone*". Revise this sentence to read: "...well field testing to verify horizontal continuity between the production ore zone and perimeter wells and vertical isolation between the production ore zone and vertical excursion monitoring wells..."
- §5.7.8.2, ¶1, Line 1, Page 5-40: spelling mistake: "...operational..."
- §5.7.8.2, ¶1, Lines 2 & 3, Page 5-40: the phrase following "hydrologic data" is superfluous and should be deleted for clarity as "*information that describes the flow of groundwater*" is really hydrologic information. Revise to read: "...Hydrologic data, ~~or information that describes the flow of groundwater,~~ are used..."
- §5.7.8.2, ¶1, Line 8, Page 5-40: see earlier comment regarding "ore". Revise to read: "...standard for restoring the production ore-zones and adjacent aquifers..."
- §5.7.8.2, ¶1, Line 10, Page 5-40: punctuation error. Revise to read: "...To this end, the reviewer should:..."
- §5.7.8.2, Section (2), Line 1, Page 5-40: the final two sentences in this section seem redundant and are better included in an inspection manual rather than in this SRP. Both sentences should be deleted as they refer to data that will be collected in the future. Remove the reference to "ore." Revise to read: "...Review the applicant's selection of (or procedure for

selecting) the set of....unplanned lixiviant migration (excursions) from the production ore zones. ~~The reviewer is not expected to review the collected operational monitoring data for individual well fields. This will be done during routine inspections of operations...~~

- §5.7.8.2, Section (4), Page 5-40: remove references to “ore” and revise to read: “...horizontal hydraulic connection between the production ore zone and the...separation between the production ore zone and the shallow...”
- §5.7.8.2, Section (5), Page 5-40: as the detailed “procedures” may not yet have been developed at the time of license application, simplify the language to read: “...evaluate whether the descriptions of procedures describing the operational excursion monitoring program includes sampling schedules...”
- §5.7.8.2, Section (6), Page 5-40: does this guidance also apply to surface spills of process liquids?
- §5.7.8.3, ¶1, Line 10, Page 5-41: to agree with the title of this section, the first sentence should be corrected to read: “...The ground-water and surface-water monitoring programs should ensure...”
- §5.7.8.3, ¶1, Line 6, Page 5-41: there is inconsistent use of the term “excursion indicator constituent” throughout this §5.7.8.3 that should be corrected. For example, in Line 6, the nebulous term “parameter” should be replaced by the “excursion indicator constituent” term, which seems to be most commonly used throughout this §5.7.8.3. Revise to read: “...and the concentrations of excursion indicator constituents parameters that will be used...”
- §5.7.8.3, ¶2, Page 5-41: the meaning of the first sentence is unclear and poorly expressed. Revise to read as follows: “...monitoring programs are acceptable if they will allow the prompt detection and timely restoration of lixiviant excursions they are sufficient to ensure that, during operations, ground water and surface water will be monitored such that early detection and timely restoration of excursions will be achieved...”
- §5.7.8.3, ¶1, Page 5-41: the entire sub-section (1) is highly repetitions of the guidance contained in §2.7 – especially in light of the last sentence in §5.7.8.1 which states that the review to be conducted in this §5.7.8 is solely to address production and operational phases of an in-situ operation. We recommend deleting the entire Section (1) (as written) and replace it with guidance that the reviewer should examine the results, but not the methodology, of the pre-operational, environmental monitoring program in order to identify appropriate excursion indicator constituents and to define associated UCLs. We also disagree with the statement in section (i) to restore the aquifer to pre-operational water quality. This is an impossible task for every constituent, is not practicable and is not

required by state programs or, more importantly, by the EPA's UIC program.

- §5.7.8.3, Section (2), ¶1, Line 6, Page 5-42: for clarity, recommend including some words to define the term UCL. Revise the first two sentences to read: "...Upper control limits are concentrations for excursion indicator constituents that intended to provide early warning that leaching solutions are moving away from the well fields and so that ground water outside the monitor well ring may be is not significantly threatened. Excursion indicator constituents should be This is accomplished by choosing parameters that are strong indicators..."
- §5.7.8.3, Section (2), ¶1, Line 2, Page 5-43: recommend reversing word order (to be consistent with the next sentence, for example: "...If possible, the chosen parameters chosen should be..."
- §5.7.8.3, Section (2), ¶1, Line 3, Page 5-43: recommend minor changes to ensure consistency of terminology: "...The upper control limit concentrations of the chosen excursion indicator constituents indicator parameters should be set high enough..."
- §5.7.8.3, Section (2), ¶1, Line 6, Page 5-43: "...quality degradation could occurs by the time..."
- §5.7.8.3, Section (2), ¶1, Lines 7, 8 & 9, Page 5-43: consistency in terminology: "...A minimum of three excursion indicator constituents exeursion indicators must be proposed... The choice of excursion indicator constituents exeursion indicators must be based on lixiviant chemistry content and ground-water geochemistry. Ideal excursion indicator constituents exeursion indicators are measurable parameters..."
- §5.7.8.3, Section (2), ¶1, Lines 11 & 14, Page 5-43: consistency in terminology. Replace "excursion indicator" by "excursion indicator parameter."
- §5.7.8.3, Section (2), ¶2, Line 3, Page 5-43: consistency in terminology and punctuation error: "...as excursion indicator constituents exeursion indicators is generally not appropriate, because they are..."
- §5.7.8.3, Section (2), ¶2, Line 7, Page 5-43: consistency in terminology and punctuation error: "...not considered a good excursion indicator constituent indicator, because..."
- §5.7.8.3, Section (2), ¶3, Lines 2 & 3, Page 5-43: clarify the language to read: "...Upper control limits concentrations must be set at a levels to easily signal an excursion. that indicates A an excursion is defined to occur has occurred whenever the upper control limits for two or more excursion indicator constituents exeursion indicators in a monitoring well are exceeded exceed the upper control limit..." The definition of an excursion in this Criterion (2) differs from the definition in Criterion (5). Consistency is required (see comment for §5.7.8.3 (5) below).

- §5.7.8.3, Section (2), ¶3, Line 3, Page 5-43: for consistency in terminology and to account for unusual ground water chemistries, revise this sentence to read: "...for the upper control limit for each excursion indicator constituent ~~excursion indicators must generally be less than the lower limit...~~"
- §5.7.8.3, Section (2), ¶3, Line 6, Page 5-43: consistency in terminology and punctuation error: "...its respective excursion indicator constituent ~~excursion indicator...~~"
- §5.7.8.3, Section (2), ¶1, Lines 1, 2 & 3, Page 5-44: consistency in terminology and punctuation: "...Upper control limits for a specific excursion indicator constituent ~~parameter should be determined on a statistical basis; to account for likely spatial and temporal concentration variations for the parameter concentrations within the mineralized ore zone. Statistical techniques, such as...~~ Few "temporal variations" can be expected due to most production horizons being deeply buried. Over what timeframe are the temporal variations to be assessed?
- §5.7.8.3, Section (3), ¶1, Line 1, Page 5-44: consistency in terminology ("ore"): "...Mineralized Ore zone perimeter..."
- §5.7.8.3, Section (3), ¶1, Line 3, Page 5-44: the assertion that monitor wells must generally surround the well fields is not always correct. There is little justification in placing monitor wells hydrologically up gradient from a well field for aquifers that have a well defined flow gradient. Replace the final few words to read: "...screened over the entire mineralized ore zone hydrogeologic unit..."
- §5.7.8.3, Section (3), ¶1, Line 18, Page 5-44: the velocity of the water through, as well as outside, of the well field is also important.
- §5.7.8.3, Section (3), ¶2, Lines 1 & 2, Page 5-44: the sentence structure "it is determined" or "it was concluded" is poor style and should be avoided whenever possible. Revise this sentence to read: "...~~In an analysis and discussion of the risks of undetected vertical excursions in NUREG/CR-6733 (NRC, 2001, Section 4.3.3) established it was concluded that significant...~~"
- §5.7.8.3, Section (3), ¶1, Lines 6, 13 & 17, Page 5-45: correct the term "ore zone" to read "mineralized zone" in these three instances.
- §5.7.8.3, Section (3), ¶2, Line 6, Page 5-45: consistency in terminology. Revise to read: "...the zone of mineral ore extraction within an aquifer..."
- §5.7.8.3, Section (4), ¶1, Line 2, Page 5-45: consistency in terminology. Revise to read: "...~~establish that the ore-zone production...~~"
- §5.7.8.3, Section (4), ¶1, Line 8, Page 5-45: the more commonly used term is "pumping test". Revise to read: "...typically consist of a pumping test that subjects..."

- §5.7.8.3, Section (4), ¶1, Line 14, Page 5-45: consistency in terminology. This sentence can be better expressed without any loss of meaning: “...*To investigate vertical confinement or hydraulic isolation between the mineralized ore zone and the overlying and underlying upper and lower aquifers, it is acceptable to perform pump tests that in addition to the ore zone, also monitor water levels in the overlying and underlying upper or lower aquifers may also be monitored during the pumping tests...*”
- §5.7.8.3, Section (5), ¶1, Line 2, Page 5-46: consistency in terminology: “...monitored for excursion indicators constituents, the...”
- §5.7.8.3, Section (5), ¶1, Line 5, Page 5-46: consistency in terminology: “...sampled for excursion indicators constituents at least every...”
- §5.7.8.3, Section (5), ¶2, Line 1, Page 5-46: consistency in terminology: “...if any excursion indicators constituents in any monitor well...”
- §5.7.8.3, Section (5), ¶2, Lines 1-3, Page 5-46: the definition of an excursion conflicts with that presented in Criterion (2) above:
 - Criterion 2 definition: “...excursion occurs when two or more excursion indicator constituents exceed their UCLs...”
 - Criterion 5 definition: “... if any two excursion indicator constituents in any monitor web exceed their respective UCLs, or if a single excursion indicator constituent exceeds its UCL by 20%...”

The Criterion 5 definition appears to be new and is not in use by existing uranium recovery licensees. What is the origin of this new definition? What constitutes a “well on excursion status” seems to have been redefined in this NUREG. Licensees who can demonstrate that all excursion indicator constituents’ concentrations – save one – can state that the well is no longer on excursion status (cf. the Criterion (2) definition).
- §5.7.8.3, Section (5), ¶3, Page 5-46: this paragraph is not well suited for inclusion in this §5.7.8.3, for it pertains to pre-operational issues. The substance of this paragraph should be relocated to SRP §2.7. Recommend deleting the entire paragraph from its current position.
- §5.7.8.3, Section (5), ¶4, Line 6, Page 5-46: for consistency with the terminology used in the last line of the second paragraph, revise this line to read: “...wells are still on excursion status when the report...”
- §5.7.8.3, Section (5), ¶1, Line 1, Page 5-47: consistency in terminology: “...horizontal excursions within the production ore zone aquifer...”
- §5.7.8.3, Section (5), ¶¶2, 3 & 4, Page 5-47: these three paragraphs address the issue of financial surety and how excursions should affect its size. Such discussions are inappropriate for this §5.7.8.3, but should be better relocated to SRP chapters addressing financial surety requirements. Surety and ground-water monitoring should be addressed separately. Recommend removing these three paragraphs from this

§5.7.8.3. The following corrections are suggested for these 3 paragraphs, wherever they are eventually relocated:

- ¶1, Line 3: sentence structure: "...surety for horizontal excursions, contamination with lixiviant of ~~it is assumed that the entire thickness of the aquifer between the well field and the monitor wells on excursion status is assumed has been contaminated with lixiviant. It is also assumed that the~~ The width of the excursion is assumed to be the distance between..."
- ¶2, Line 2: rather than the term "background", perhaps use of the term "pre-operational basis" might be more appropriate.
- §5.7.8.3, ¶5, Line 2, Page 5-47: suggest adding the word "when" at the end of the line to improve the flow of the sentence: "...upper control limits, or when no more that one excursion indicator constituent does not exceed..."
- §5.7.8.3, ¶5, Line 6, Page 5-47: delete the hanging clause at the base of this paragraph: "...corrective action measures can be discontinued. ~~to their upper control limits or lower...~~"
- §5.7.8.4, ¶3, Line 2, Page 5-48: the second sentence should be deleted entirely as it pertains to establishment of pre-operational ground- and surface-water quality. As was stated in §5.7.8.1, this section only addresses ground- and surface-water quality during operational phases of the leaching facility.
- §5.7.8.4, ¶3, Lines 4 & 5, Page 5-48: consistency in terminology: "...acceptable excursion indicator constituents ~~parameters~~ and an approach for establishing upper control limits concentrations. Appropriate criteria are proposed ~~used~~ to establish..."
- §5.7.8.4, ¶3, Line 9, Page 5-48: consistency in terminology: "...monitoring for excursion indicator constituents, monitoring frequency,..."
- §5.7.8.4, ¶3, Lines 12 & 13, Page 5-48: references to pre-operational data collection are inappropriate to this §5.7.8 and should be deleted. Pre-operational data collection is addressed in §2.7. Revise to read: "...downstream sampling locations; ~~appropriate pre-operational seasonal data collection,~~ and standard approaches for monitoring..."
- §5.7.8.4, ¶3, Line 14, Page 5-48: for clarity as to what type of corrective action plan is being discussed, recommend the following revision: "...The applicant has prepared an acceptable ground-water and surface-water corrective action plan, including..."
- §5.7.8.4, ¶4, Line 4, Page 5-48: possessive punctuation correction: "...requires the applicant's proposed..."
- §5.7.9.1, ¶1, Line 2, Page 5-49: there is a lack of consistency in how the word "ground water" is to be written. In some sections (e.g. §5.7.8) the

two words are hyphenated, but in this §5.7.9 (and others), there is no hyphenation. Consistency throughout the SRP is required.

- §5.7.9.2, ¶1, Page 5-50: the first sentence is (again) copied from earlier in the SRP and seems to have little relevance to the topic of this §5.7. While the contents of this sentence are valid, they do not warrant repeating in this section. Recommend deletion of the first sentence of this paragraph.
- §5.7.9.2, ¶1, Page 5-50: Criteria 7 and 7(A) in 10 CFR 40, Appendix A do not address QA. Correct this regulatory citation.
- §5.7.9.4, ¶2, Line 3, Page 5-51: the question will surely arise as to the true relevance of Reg. Guide 4.14 to ISL operations. Some clarity and explanation should be included in this SRP chapter.
- §5.7.9.4, ¶3, Line 7, Page 5-51: Criteria 7 and 7(A) in 10 CFR 40, Appendix A do not address QA. Correct this regulatory citation.

CHAPTER 6: GROUND-WATER QUALITY RESTORATION, SURFACE RECLAMATION AND FACILITY DECOMMISSIONING

Section 6.1: Plans and Schedules for Ground-Water Quality Restoration

- §6.1 ¶1, Page 6-1: general comments:
 - the introductory paragraph to this §6.1 could be much improved if some of the specific information contained in §6.3 – about the EPA, EPA delegated Agreement State programs, etc. – were included in place of the general statements about avoiding duplicative technical reviews. The material in §6.3 is informative and well written and should be presented in this §6.1.
 - the introduction states that the Acceptance Criteria are “*more rigorous*” than before. What is the justification for this departure from the “risk-informed” agency policy? This Chapter 6 should be written in a manner to clarify how the NRC can accept the results of a State UIC program and to accept a State’s assertion and determination that restoration of an aquifer has been achieved. Chapter 6 seems to (again) ignore the meaning of an “Exempted Aquifer.”
 - on several occasions the issue of “surety” is introduced. We would recommend that any guidance on surety issues be consolidated into a “Financial Assurance” chapter (similar to §6.5). Guidance on how surety levels are to be established (and adjusted) should be presented there only.
 - the SRP provides no guidance on the handling of restoration waters which the Commission has tentatively classified as 11e.(2) by-product waste. Reference should be made to the Commission SECY paper that states this interim interpretation; the Commission is,

however, revisiting this position to make groundwater restoration waters compatible with the classification of mine waters.

- §6.1, ¶2, Line 3, Page 6-1: reflecting the aforementioned comment on sureties, recommend revising this sentence as follows: "...adequacy of ground-water restoration plans. ~~and the sureties associated with them...~~"
- §6.1, ¶3, Line 1, Page 6-1: reflecting the aforementioned comment on sureties, recommend revising this sentence as follows: "...~~Methods and models used in the~~Technical assessment of the selected ground-water restoration methods, restoration time and pore volume displacements, ~~and sureties may entail use of range from~~ detailed, small-scale..."
- §6.1.1, ¶1, Page 6-1: the introductory sentence to this paragraph seems to be poorly expressed. What is the intended meaning? Recommend that this sentence be deleted, for the remaining sentence very adequately introduces the 'Areas of Review.' All of the eight 'Areas of Review' seem to be expressed with difficulty and after reading through the end of topic (8), the reader is a little vague as to what is really being reviewed. The components of the ground-water restoration planning are explained with great lucidity in the following §§6.1.2 and 6.1.3. Revise to read: "...~~Aspects of any ground-water modeling that are important based on the extent to which the applicant relies on them to meet the objectives of the ground-water restoration.~~ Particular attention..."
- §6.1.1, ¶1(a), Line 2, Page 6-1: what is meant by "physical phenomena"? Some examples would be helpful.
- §6.1.1, ¶1(b), Line 2, Page 6-1: would the meaning be better expressed as follows: "...Technical bases for evaluating the impacts of geology, hydrology, geochemistry, processes and physical phenomena on ~~related to~~ flow and transport pathways..."
- §6.1.1, ¶1(c), Page 6-2: simplify the text: "...Consistency and adequacy of model assumptions ~~incorporated into modeling...~~"
- §6.1.1, ¶1(d), Page 6-2: simplify the text: "...~~Determination of contaminant technical bases for the concentrations of contaminants in well field models of the site...~~"
- §6.1.1, ¶1(e), Page 6-2: simplify the text: "...Sufficiency of data and selection of parameters...." Clarification of what "parameters" refers to is required? Are these indicator species to judge restoration effectiveness?
- §6.1.1, ¶1(f), Page 6-2: punctuation correction: "...Technical bases for, and uncertainty associated with, model parameters ..."
- §6.1.1, ¶1(g), Page 6-2: simplify the text: "...Site numerical model results as compared..."
- §6.1.1, ¶2, Line 1, Page 6-2: punctuation improvement: "...concentrations, and lateral and vertical dispersion ~~extent~~ of those... .."

- §6.1.1, ¶3, Lines 1 & 2, Page 6-2: "...*techniques to be used to restore achieve ground-water quality restoration, including...*" Recommend simplifying the end of the final sentence as follows: "...*and geochemical properties of the aquifers to be restored receiving stratum...*"
- §6.1.1, ¶5, Line 2, Page 6-2: revise to read more clearly. Note that this §6.1 only addresses ground-water restoration and so the word "land" should be deleted. Revision: "...*waters, comparisons to compared with the pre-operational land and water quality characteristics, and any if there is prior experience...*"
- §6.1.1, ¶6, Line 1, Page 6-2: simplify the text: "...*Adverse impacts assessments of the proposed ground-water quality restoration operations with respect to their adverse effects on ground-waters...*"
- §6.1.1, ¶7, Line 1, Page 6-2: simplify the text: "...*abandoning production wells associated with the in-situ leaching operations...*"
- §6.1.2 ¶1, Page 6-2: general comment: an introductory statement might be helpful to state the restoration goals, proposed methodology, etc.
- §6.1.2, Section (1), ¶3, Line 1, Page 6-3: the term "parameter" needs some definition. Are these the "excursion indicator constituents" referred to in §5.7? Or are they the "indicator constituents" of §6.1.3(3)? Or are they the "water quality parameters" of §6.1.3(4)?
- §6.1.2, Section (1), ¶8, Line 3, Page 6-3: clarify the text to read: "...*other geochemical reaction, that reduce the concentrations of, or retard, that leads to reduction or retardation of contaminants. The modeling...*"
- §6.1.2, Section (1), ¶8, Line 4, Page 6-3: replace "ore extraction areas" by "production areas"
- §6.1.2, Section (1), ¶8, Line 6, Page 6-3: "...*variations of aquifer properties of aquifers and ground-water...*"
- §6.1.2, Section (1), ¶2, Line 1, Page 6-4: as noted earlier, guidance addressing surety requirements should be consolidated into a separate SRP chapter. What is the definition of "[a] highly uncertain [surety estimate]"? The size of the surety estimate should not be made on the assumption that the mined aquifer(s) will be returned to drinking water quality. Delete this paragraph.
- §6.1.3, ¶1, Line 8, Page 6-5: the first paragraph of this §6.1.3 is generally well written and explains clearly the NRC, EPA and State responsibilities in aquifer restoration. What is needed, however, is guidance on how the NRC reviewers should coordinate their licensing efforts with the EPA and State officials. In accordance with the agency's risk-informed regulatory policy, a statement should be made that allows the licensee to tailor its aquifer restoration program to local geologic and hydrologic conditions. If the licensee can demonstrate that there is little or no likelihood that the contaminated water in the exempted part of the aquifer will not move or

contaminate other non-exempted parts of the aquifer, then the licensee's aquifer restoration program may be scaled back accordingly. Remove economic references to "ore zones." Revise text to read: "...*extraction (the exploited mineralized ore zone in an aquifer)*..."

- §6.1.3, ¶1, Lines 12-14, Page 6-5: the text is written in a confusing manner. Simplify to read: "...*ground-water restoration requirements that may be. ~~In accordance with the state's ability to implement requirements that are more stringent than those in the delegated federal program. The implementation of~~Ground-water restoration requirements may vary from state to state..."*
- §6.1.3, ¶2, Lines 1 & 2, Page 6-5: there are several terms that should be deleted from this sentence as they are addressed later in SRP Chapter 6. Recall the statement in §6.1 that this section only addresses ground-water issues. Revise to read: "...*The plans and schedules for ground-water quality restoration, ~~surface reclamation, and plant decommissioning~~ are acceptable if they meet the following criteria:*..."
- §6.1.3, Section (1), ¶1, Lines 4 & 5, Page 6-5: there may an inconsistency between third sentence of this paragraph and Section (3) in §6.1.2. The latter states that documentation from prior experience (whether operational or R&D) should be presented, but the former states that such data need not be presented. Is this an inconsistency?
- §6.1.3, Section (1), ¶3, Line 1, Page 6-5: for clarity, we recommend inclusion of a few additional words to read: "...*data to justify selection of the models used to develop*..."
- §6.1.3, Section (1), ¶2, Line 3, Page 6-6: for clarity, we recommend inclusion of a few additional words to read: "...*ground-water restoration approach is appropriate*..."
- §6.1.3, Section (2), ¶2, Line 5, Page 6-7: remove the term "ore" and revise to read: "...*by the thickness of the mineralized ore zone being exploited*..."
- §6.1.3, Section (3), ¶1, Line 1, Page 6-7: the last few words in the first sentence are redundant and should be deleted. Revise to read: "...*and projected completion schedules, ~~based on well field ore depletion~~*..."
- §6.1.3, Section (3), ¶4, Line 4, Page 6-8: for consistency in terminology the following revision may be appropriate: "...*trends of monitored indicator constituent concentrations* ..."
- §6.1.3, Section (3), ¶5, Line 1, Page 6-8: remove the references to surety and revise the first sentence to read: "...*For purposes of ~~surety bonding,~~ ~~Restoration plans must include~~*..."
- §6.1.3, Section (4), ¶2, Line 1, Page 6-8: clarify the meaning of "constituent" in the second line. Is it a "monitored constituent" or "indicator constituent" as discussed on Page 6-8?

- §6.1.3, Section (4), ¶2, Line 3, Page 6-8: remove references to “ore zones”. Revise to read: “...*must be established for the mineralized ore zone and...*”
- §6.1.3, Section (4A), Line 2, Page 6-9: remove references to “ore zones”. Revise to read: “...*within the exploited production ore zone and...*”
- §6.1.3, Section (4a), Line 4, Page 6-9: use of the “it is reasonable...” grammatical construction is inappropriate. Revise this sentence to read: “...*ground-water geochemistry, it is not reasonable to assume restoration activities are unlikely to ~~can~~ return ground-water quality...*”
- §6.1.3, Section (4a), Line 8, Page 6-9: further clarification of the meaning of “identified water quality parameters” is required. What are these? Are these the “monitored constituents” or the “indicator constituents” on Page 6-8?
- §6.1.3, Section (4a), Line 11, Page 6-9: Same comment as above. Clarify to read: “...*concentrations of water quality indicator constituents parameters...*”
- §6.1.3, Section (4b), ¶1, Lines 1-6, Page 6-9: revise the first few lines to address several errors. Revise to read: “...*Secondary Restoration Standards: It is reasonable to expect that In situ leach operations may cause permanent changes in water quality within the exploited production ore zones, because the in situ extraction process relies on changing the chemistry in the production ore zones to remove the uranium. For this reason, it is acceptable for the The applicant may, therefore, to propose returning the water quality within the exploited ore-zone aquifer to its pre-operational...*”
- §6.1.3, Section (4b), ¶1, Line 8, Page 6-9: express this thought in terms of a licensee commitment. Revise to read: “...*restoration program and commit not to apply that secondary standards will not be applied so long as restoration...*”
- §6.1.3, Section (4b), ¶1, Line 11, Page 6-9: clarify the terminology in this sentence to read: “...*ground-water quality to primary restoration standards goals before falling back on secondary restoration standards...*”
- §6.1.3, Section (4b), ¶1, Line 14, Page 6-9: clarify the last sentence in the paragraph to read: “...*The applicant must commit to use reasonable efforts demonstrate that a good faith effort was given to reach primary restoration standards goals...*” Note that the SRP refers to “restoration standards” rather than “goals” and that an applicant can not “demonstrate” compliance with any restoration goals until wellfield restoration commences, generally several years after a license will be granted.
- §6.1.3, Section (4b), ¶2, Line 2, Page 6-9: the statement to use the lower of the EPA drinking water or secondary drinking water standards seems to ignore the fact that mined aquifers have been exempted by the EPA and shall never be considered for drinking water supplies. This assertion is

unnecessarily burdensome and incompatible with existing state regulations. There is no attempt to “free-release” these aquifers for public use. Correct the apparent contradiction between paragraphs 1 & 2 of this section 4(b).

- §6.1.3, Section (4c), ¶1, Line 2, Page 6-9: remove references to “ore zone”: “...*standard within the exploited production ore zone, an applicant...*”
- §6.1.3, Section (4c), Line 4, Page 6-10: correct the grammatical construction as follows: “...*Consequently, it is possible that ground water restoration...*”
- §6.1.3, Section (5), ¶2, Line 7, Page 6-10: there appear to be some missing words here. Correct to read: “...*Before final well field decommissioning is completed, all designated monitor wells...*”
- §6.1.3, Section (5), ¶2, Lines 9 & 10, Page 6-10: simplify the language to read: “... *meet approved restoration standards and ~~show~~ no strong trends in ground-water quality deterioration develop. as a result of in situ leach operations...*”
- §6.1.3, Section (6), ¶2, Line 2, Page 6-10: remove references to “ore zone”: “...*exploited production ore zone*”
- §6.1.3, Section (6), ¶2, Line 7-9, Page 6-10: this sentence is unnecessarily limiting. Revise to read: “...*EPA primary or ~~and~~ secondary drinking water standards for ground-water, ~~that can be used as an underground source of drinking water...~~*”
- §6.1.3, Section (7), ¶1, Lines 12 & 13, Page 6-11: correction of punctuation error and added clarification. Revise to read: “...*specified in the application, and copies should be kept on file by the applicant. Techniques proposed by the applicant that are not considered...*”
- §6.1.3, Section (8), ¶2, Line 4, Page 6-11: this sentence is too definitive. Revise to read: “...*consumption may will significantly increase...*” Use of “may” is appropriate, for water consumption will depend on the volume of the mineralized/leached aquifer that must be restored. This, in turn, is dependent upon whether or not the ground water contains radionuclides (Ra, U, Rn) in concentrations that exceed drinking water standards and whether the risks of not restoring the aquifer to drinking water standards could threaten vertically or laterally adjacent areas of the aquifer that do not meet drinking water standards. There are, therefore, too many variables to be considered before definitively stating that water consumption will “significantly increase.”
- §6.1.3, Section (9), ¶1, Lines 1-5, Page 6-11: correct the term “ore” and a punctuation error: “...*an exploited production ore zone to primary or secondary ground-water restoration standards, in lieu of the above criteria...*” Revise second sentence: “...*and the environment, and assure no unacceptable degradation to ~~the use of~~ adjacent ground-water resources...*”

- §6.1.3, Section (9), ¶1, Line 6,8 & 9, Page 6-11: correct the term “ore” as before with “production zones.
- §6.1.3, Section (9), ¶1, Lines 13-15, Page 6-11: this last sentence should be relocated to an SRP chapter dealing with financial matters. Delete this sentence.
- §6.1.4, ¶3, Lines 1 & 2, Page 6-12: replace the term “demonstrate” due to the inability of the license applicant to demonstrate anything related to aquifer restoration at the time of license application. “Commitments” are feasible, “demonstrations” have little meaning. Revise to read: “...*The applicant has committed to adopt acceptably demonstrated that well field ground-water restoration standards that are will be representative...*”
- §6.1.4, ¶3, Line 4, Page 6-12: clarify to read: “...*use the federal or state primary and...*”
- §6.1.4, ¶4, Line 4, Page 6-12: clarify the language to read: “...*provided an acceptable approach that includes a mix of ground-water sweep...*”
- §6.1.4, ¶4, Line 6, Page 6-12: see comment above regarding “demonstrate”. Revise to read: “...*the applicant has proposed demonstrated an acceptable...*”
- §6.1.4, ¶5, Line 1, Page 6-12: clarify terminology: “...*list of indicator constituents to be...*”
- §6.1.4, ¶5, Lines 5 & 6, Page 6-12: similar comment as above concerning “demonstrate”. Revise sentence to read: “...*the applicant has committed to a demonstrated that the primary restoration program that will return the water quality of the production ore zones and affected aquifers to pre-extraction (baseline) water quality. The applicant has also committed to that any secondary restoration standards, if required proposed by the applicant are acceptable or and to provide reasonable assurance that final water...*”
- §6.1.4, ¶5, Line 9, Page 6-12: punctuation error: “...*The applicant’s post-restoration...*”

Section 6.2: Plans and Schedules for Decommissioning Disturbed Lands

- §6.2: The title of this SRP section, “Plans and Schedules for Decommissioning Disturbed Lands and Affected Structures,” seems to be inaccurate. This SRP chapter provides no guidance concerning the decommissioning of structures (e.g. surveys, demolition approaches, disposal options); such guidance is presented in §6.3. Furthermore, the chapter does not address “schedules” for the decommissioning and reclamation work. If the licensee is under time constraints to complete the D&D work, no guidance is provided to the staff reviewer as to how the acceptance of the schedule should be judged. Finally, the guidance mentions in several places the need for the estimated costs for the

decommissioning to be updated and maintained current. And yet no guidance is provided as to how the staff should evaluate the reasonableness of any such cost estimates. As we have mentioned earlier, discussion of sureties and decommissioning cost estimates should all be confined to a separate SRP chapter. We recommend re-naming the title of this chapter to simply be "Decommissioning of Disturbed Lands." Specific comments on this chapter follow. For the sake of clarification, some explanation of the meaning in the SRP of the terms "reclamation" and "decommissioning" might be helpful; the "Areas of Review" and "Acceptance Criteria" sections primarily use "decommissioning", whereas the "Evaluation Findings" section primarily uses "reclamation." Are these terms to be used inter-changeably?

- §6.2.1, ¶1, Lines 1 & 2, Page 6-13: the first sentence should be revised as the applicant will not be able to provide the post-operational, pre-reclamation maps that are requested. The applicant can only provide pre-operational maps. Recommend that this sentence be deleted or revise it to read: "...~~The staff should review all maps and data provided in the application showing the pre-reclamation operation conditions of affected lands and immediately surrounding areas. Prior to the commencement of reclamation the licensee will provide the NRC with maps and data that document the post-operational condition of the licensed area including well fields, processing plant, impoundments, diversion ditches and any other lands that may potentially be contaminated with radioactive materials. The staff...~~"
- §6.2.1, ¶1, Line 3, Page 6-13: recommend that the word "procedures" be replaced by "approaches" or "plans" (such as is used throughout in §6.2.4), as the detailed procedures will not be known at the time of license application. The conceptual approaches to decommissioning will be proposed in the license application and the applicant will commit to their use and implementation (subject to possible refinement during the life of the ISL operation). But "procedures" should not be expected.
- §6.2.1, ¶2, Line 4, Page 6-13: punctuation error: "...structures, and soils..."
- §6.2.2, ¶1, Line 1, Page 6-13: similar comment as above. Replace "procedures" as follows: "...whether the described approaches ~~procedures~~ for reclaiming..."
- §6.2.2, ¶1, Line 2, Page 6-14: the term "verify" is inappropriate as the applicant will not be able to provide this level of assurance at the time of license application submittal. Recommend revising to read: "...are sufficient to satisfy the ~~verify that~~ requirements of 10 CFR Part 40, Appendix A, Criterion 6(6), and 10 CFR 40.42. have been met. ..."
- §6.2.2, ¶1, Lines 14 & 15, Page 6-14: the sentence on these lines poses an impossible task for the reviewer. How is the reviewer to "determine

whether any changes have been proposed for this program” when the application has just been received? We think the meaning could be the following: “...reclamation, and cleanup activities. ~~and should determine whether any changes have been proposed for this program.~~ Prior to the commencement of reclamation, the NRC should review the license commitments to reclamation and review any changes that the licensee has proposed. The program for radiation protection...”

- §6.2.3, ¶1, Line 1, Page 6-14: as “schedules” for reclamation are not reviewed in this SRP section, and as guidance for handling affected structures are addressed in SRP §6.4, revise the introductory sentence to read: “...*The plans ~~and schedules~~ for reclaiming disturbed land ~~and possibly affected structures~~ are acceptable if they meet...*”
- §6.2.3, Section (1), ¶1, Line 1, Page 6-14: the past tense should not be used for verbs that will address activities in the future. The criteria will not just be “considered”, they will be “used.” Revise to read: “...*appropriate cleanup criteria will be used ~~have been considered in conducting developing the pre-reclamation...~~*”
- §6.2.3, Section (2), ¶1, Line 2, Page 6-14: for clarification, we recommend adding a few words: “...*techniques similar to those used in the pre-operational...*”
- §6.2.3, Section (4), Page 6-15: this paragraph seems to be located erroneously in this §6.2. Guidance on the planning of the final radiation survey is presented in §6.4. Thus, this Section (4) should be deleted.
- §6.2.3, Section (7), ¶1, Line 1, Page 6-15: this sentence limits the contract to 11e.(2) by-product material, whereas in the “Areas of Review” the contract was to also apply to radioactively contaminated soils. The latter do not constitute 11e.(2) by-product material. Correct this inconsistency.
- §6.2.3, Section (7), ¶1, Line 5, Page 6-15: correct the sentence structure to make the words in the parentheses a complete sentence. Correct the spelling of “lixiviant.” Revise to read: “...*expiration or termination. Failure to comply...from further lixiviant ~~lixiviant~~ injection*)...”
- §6.2.3, Section (8), ¶1, Line 1, Page 6-15: for consistency with §6.2.4, recommend use of the word “reclamation” throughout this Section (8). The term “reclamation” is generally used for land in preference to “decommissioning.” Revise to read: “...*providing final (detailed) reclamation decommissioning plans for land...description of the areas to be reclaimed ~~decommissioned~~, a description of planned...*”
- §6.2.3, Section (8), ¶1, Line 7, Page 6-15: this §6.2 provides no guidance on the design or conduct of the final radiation survey, but rather this guidance is presented later in §6.4. Recommend deleting all references to this final survey from §6.2. Similarly, we recommend consolidating all guidance related to surety and evaluating the acceptability of

decommissioning/reclamation plan cost estimates to a separate SRP chapter. The title of this §6.2 attests to the inappropriateness of including financial evaluations of decommissioning funding. Revise to read:

“...environment against radiation hazards, a description of the planned final radiation survey, and an updated detailed cost estimate...”

- §6.2.3, Section (10), ¶1, Line 2, Page 6-15: for consistency with the first sentence in this Section (10) recommend replacing “plans” with “programs” as used in the first sentence. Revise to read: “... *The programs plans should indicate...*”
- §6.2.4, ¶4, Line 14, Page 6-16: the last sentence in this paragraph has been copied word-for-word from §6.1.4 (Page 6-13) and seems redundant to the matters of §6.2. The sentence talks about ground-water restoration instead of about land reclamation, which is the narrowly defined topic of this §6.2. This sentence should be totally deleted.
- §6.2.4, ¶2, Line 7, Page 6-17: as noted earlier, remove the word “demonstrates” from the SRP. Revise to read: “...*The plan demonstrates the proposed decommissioning activities will result...*”
- §6.2.4, ¶2, Line 9, Page 6-17: as noted earlier, issues regarding assessment of decommissioning funding requirements require specialized assessment and should be evaluated in a separate SRP chapter. Delete the final sentence entirely.
- §6.2.4, Page 6-17: General Comments:
 - use of the past tense in verbs is inappropriate as decommissioning-related activities will not have taken place at the time of license application submission. Recommend use of “commitments” and the future tense of verbs.
 - §6.3 repeats a review that was conducted in §6.2 – an agreement for the disposal of radioactively contaminated materials (including 11e.(2) by-product material). If the terms of a radioactive waste disposal agreement were deemed acceptable in the §6.2 review, why is there a need to re-review the acceptability of this waste disposal agreement? Recommend that all references to the waste disposal agreement be deleted from this §6.3.
 - some specific mention should be made of what standards are to be selected for free release or disposal of radioactively contaminated equipment and structures.

Section 6.3: Removal and Disposal of Structures, Waste Materials and Equipment

- §6.3.1, ¶1, Lines 1-5, Page 6-17: use of the term “procedures” is inappropriate as the licensee will not have developed detailed written procedures for facility decommissioning at the time of license application

submission. Recommend revising the text to read: "...*The staff should review the applicant's commitments and approaches procedures for removing and disposing of contaminated structures and equipment used in in situ leach operations as well as approaches procedures for managing toxic and radioactive waste materials. The reviewers should examine the applicant's commitments to also evaluate procedures that identify radiological hazards before initiating dismantlement of structures and equipment and for detection and cleanup of removable contamination from such structures and equipment. The staff should also review the applicant's procedures and plans...*"

- §6.3.1, ¶1, Lines 6-8, Page 6-17: the options for removal of the facility equipment can be simplified to read: "...*are addressed, and that they are either planned to be disposed of in a licensed facility, cleaned to allow release or will meet the contamination levels for unrestricted use, or are designated for re-use at another in situ leach facility. Should be examined...*"
- §6.3.1, ¶1, Lines 9 & 10, Page 6-17: as noted earlier, the subject matter introduced in the last sentence has previously been reviewed in §6.2.3(7). Recommend deleting this sentence.
- §6.3.2, ¶1, Line 1, Page 6-17: see earlier comment about the use of "procedures". Revise sentence to read: "...*The staff should determine whether the applicant's commitments and approaches for removing and disposing of structures and equipment during in situ leach operations and approaches all procedures for managing...*"
- §6.3.2, ¶1, Line 6, Page 6-18: this sentence can be deleted as the applicant's plans for off-site disposal of contaminated equipment have already been approved in the review in §6.2.3(7). Delete this last sentence.
- §6.3.3, Section 5, ¶1, Page 6-18: this Section (5) can be deleted as the applicant's plans for off-site disposal of contaminated equipment have already been approved in the review in §6.2.3(7). Delete this section.
- §6.3.3, Section 6, ¶1, Line 2, Page 6-18: spelling error. Correct to read "least" instead of "lease". The material in Section (6) is general in nature and would be useful to have repeated at the beginning of Chapter 6 as an overview of part of the decommissioning program.
- §6.3.4, ¶1, Page 6-19: General comment: the future tense of verbs should be used throughout as the applicant will not have undertaken many of the tasks at the time of license application. Specific comments follow.
- §6.3.4, ¶1, Line 1, Page 6-19: see earlier comment about use of the term "procedures." Revise to read: "...*results in the acceptance of the applicant's commitments and approaches procedures for removing and...*"

- §6.3.4, ¶2, Line 1, Page 6-19: see comment immediately above. Add in additional term for consistency throughout this §6.3. Revise to read: *“...review of the applicant’s commitments and approaches procedures for removing and disposing of structures, waste materials and equipment...”*
- §6.3.4, ¶3, Line 1, Page 6-19: use of the word “elimination” is inappropriate here, for there would be no need to “eliminate” the contamination if the contaminated equipment were to be transferred to another in situ operation, or if the equipment were to be disposed of in a 11e.(2) by-product tailings impoundment. Recommend use of the word “control” so as to read: *“...The applicant has established an acceptable program for the measurement and control ~~elimination~~ of residual contamination on structures and equipment...”*
- §6.3.4, ¶2, Line 6, Page 6-19: verb tense: *“...that cannot be measured, will be have been assumed by the applicant...”*
- §6.3.4, ¶2, Line 10, Page 6-19: correct verb tense and clarify the meaning of this sentence to read: *“...The applicant commits to conduct ~~has provided~~ a detailed health and safety analysis so that future that reflects that the ~~contamination and any use of the premises, equipment...~~”*
- §6.3.4, ¶2, Lines 15 & 16 , Page 6-19: the matter addressed in the last sentence has been previously examined and approved by the staff in the review commissioned in §6.2.3(7). There is no need to repeat this review. Delete the entire sentence.
- §6.3.4, ¶3, Lines 11-15, Page 6-19: the last sentence in this paragraph has been copied word-for-word from §6.1.4 (Page 6-13) and seems redundant to the matters of §6.3. The sentence talks about ground-water restoration instead of about equipment and structure decommissioning, which is the narrowly defined topic of this §6.3. This sentence should be totally deleted.

Section 6.4 Post-Reclamation and Post-Decommissioning Radiological Surveys

- §6.4, Page 6-20: General Comments:
 - the scope of the guidance in this §6.4 must be clarified. It should only pertain to the final site radiation survey that is required by 10 CFR 40.42(j)(2). However, the introduction to this section suggests that it also apply to ground-water quality monitoring as well as to surveys conducted on equipment and structures. The adequacy of such ground-water and equipment radiation survey programs was already established by reviews conducted in §§6.1 and 6.3 and further, §6.4.3 provided absolutely no guidance in evaluating a radiological survey related to ground-water or structure decommissioning. There should be no need to conduct reviews of

- these previously-reviewed programs. The first sentence in §6.4.1 requires re-writing to clarify the intent of this §6.4 guidance.
- several of the acceptance criteria are unnecessarily prescriptive and should be revised. "Acceptance criteria" should only specify what qualities or attributes of a program are acceptable. But how the applicant (or licensee) achieves compliance remains the prerogative of the licensee.
 - to clarify and limit the scope of the review, and to re-emphasize that the staff will not be able to review procedures, but just commitments, plans and approaches, revise the title of this section to read: "~~Procedures for Conducting Post-Reclamation and Post-Decommissioning Radiological Surveys~~"
 - to clarify that this guidance does not apply during the decommissioning activities, we recommend inserting "post" before the term "~~decommissioning~~". Simplification of this terminology to simply "~~post-decommissioning~~" might be a better alternative.
- §6.4.1, ¶1, Lines 2 & 3, Page 6-20: define the scope of the §6.4 guidance more precisely so as to read: "...The staff should review the applicant's commitments and approaches ~~procedures for conducting post-reclamation and post-decommissioning radiological surveys, including post-operational ground-water monitoring, and decontamination and removal of structures and equipment...~~"
 - §6.4.2, ¶1, Line 4, Page 6-20: the final radiation survey is generally a one-time activity. Inclusion of the term "frequencies" in this second sentence appears redundant and should be deleted. Revise to read: "...The staff should ensure that sampling frequencies and locations are acceptable..."
 - §6.4.3, ¶1, Line 1, Page 6-20: consistent with the earlier comment, revise to read: "...post-reclamation and post-decommissioning radiological..."
 - §6.4.3, Section (2), ¶1, Line 4, Page 6-21: correct the grammatical structure to read: "...radionuclide concentrations within a given site it is acceptable for a the licensee may to assign different background..."
 - §6.4.3, Section (3), ¶1, Line 4, Page 6-21: this acceptance criterion is unnecessarily prescriptive and dictates that the approach in Appendix F is the only acceptable way to proceed. Revise the sentence to read: "...Acceptable cleanup criteria for uranium in soil, such as those are as discussed in Appendix F of this standard review plan, are proposed by the applicant. This is the radium..."
 - §6.4.3, Section (4), ¶1, Line 4, Page 6-21: this acceptance criterion is unnecessarily prescriptive and dictates the only acceptable approach. Revise the sentence to read: "...elevated thorium levels, the applicant proposes an acceptable cleanup criterion for thorium-230. One acceptable criterion is that concentration ..."

- §6.4.3, Section (6), ¶1, Page 6-21: there is no need for this section (6), as the acceptable cleanup criteria for equipment and structures have already been evaluated and approved as part of the §6.3 review. Delete this section (6).
- §6.4.4, ¶1, Line 2, Page 6-21: consistent with the earlier comment, revise to read: "...*post-reclamation and post-decommissioning radiological*..."
- §6.4.4, ¶2, Lines 1 & 3, Page 6-21: consistent with the earlier comment, revise both instances to read: "...*post-reclamation and post-decommissioning radiological*..."
- §6.4.4, ¶2, Line 5, Page 6-22: use the future tense as noted earlier. Revise to read: "...*remain onsite will meet the criteria*..."
- §6.4.4, ¶3, Line 2, Page 6-22: consistent with the earlier comment, revise both instances to read: "...*post-reclamation and post-decommissioning radiological*..."
- §6.4.4, ¶3, Line 2, Page 6-22: remove the term "procedures" and revise to read: "...*the staff concludes that the commitments and approaches ~~procedures~~ are acceptable*..."
- §6.4.4, ¶3, Lines 12-15, Page 6-22: the last sentence in this paragraph has been copied word-for-word from §6.1.4 (Page 6-13) and seems redundant to the final radiation survey guidance presented in this §6.4. The sentence talks about ground-water restoration – matters that are not even addressed in this section. This sentence should be totally deleted.

Section 6.5: Financial Assurance

- §6.5, Page 6-22: We recommend use of the short, but explicitly clear, title used in 10 CFR 40.36 for the decommissioning fund issue. The proposed title omits, for example, the financial assurance that should be provided to conduct the final radiation survey. Revise to read: "*Financial Assurance Assessment for Ground-Water Restoration, Decommissioning, Reclamation, Waste Disposal and Associated Monitoring*"
- §6.5.1, ¶1, Line 4, Page 6-22: the last sentence states that a simple "narrative" may be sufficient to allow the staff to evaluate the adequacy of the applicant's decommissioning funding arrangements. We doubt that this would be sufficient, for the staff should review the conceptual decommissioning plan, cost assumptions, surety calculation methodology, etc. as part of the review. Recommend revision of this sentence to more clearly state the review expectations.
- §6.5.2, ¶1, Lines 1- 4, Page 6-23: the first two sentences are repetitive and really do not succinctly define the scope of the decommissioning funding review. Revise as follows: "...*The staff should review the proposed surety amount provided by the applicant to ensure that it is sufficient to fund all decommissioning activities documented in the license application and that*"

~~*the methods used to establish the surety amount are acceptable and the forecast costs reasonable. to verify that the activities incorporated in the cost estimate are consistent with the activities proposed in the application. In addition, the reviewer should verify that the activities proposed in the application are included in the financial assessments. Activities ...*~~

- §6.5.2, ¶1, Line 5, Page 6-23: for consistency with the introduction to this §6.5, recommend adding a few words to read: "...ground-water restoration, structure and equipment removal, and closure..."
- §6.5.2, ¶1, Line 8, Page 6-23: we recommend inclusion of some words to state that the licensee has the right to conduct and complete the decommissioning without the use of outside contractors. Generally soil is "reclaimed" rather than "decommissioned" and we would recommend use of the former term. Revise the sentence to read: "...and soil reclamation decommissioning, by the licensee or by a third party, if necessary..."
- §6.5.2, ¶2, Line 11, Page 6-23: ISL facilities are not subject to "long-term surveillance costs." Delete this requirement.
- §6.5.3, Page 6-23: General Comments:
 - the Acceptance Criteria never provide for reductions in surety funding and how such reductions would be effected. For example, licensees who complete ground-water restoration as well fields are exploited may be able to seek some reduction in the surety bonding. The Acceptance Criteria should address this eventuality instead of assuming the worst that bonding can only increase.
 - the Acceptance Criteria are often unnecessarily prescriptive and state how the criterion should be met, not just what the performance criterion is. Some re-phrasing should be made.
 - reference should be made in §6.5.5 to NUREG/BR-0241 (1997), for this guidance does contain pertinent information for decommissioning of structures.
- §6.5.3, Section (1), ¶1, Lines 1 & 2, Page 6-23: Revise to be less prescriptive. The section should not simply state the regulatory citation, but state that the criteria are satisfied. Revise to read: "...The bases for establishing a financial surety are in 10 CFR 40, Appendix A, Criterion are satisfied..."
- §6.5.3, Section (7), ¶1, Lines 2 & 3, Page 6-24: suggest adding the words "and its operations" at the end of the first sentence. Need to specify exactly what is meant by the "anniversary date." Is this the anniversary date on which the license was originally granted? Revise the end of the first sentence to read: "...as necessitated by changes in the facility and its operations. The annual update..."

- §6.5.3, Section (8), ¶1, Line 1, Page 6-24: but would the surety amount remain the same or possibly decrease in this case? Need to be more explicit as to the intention of this Acceptance Criterion.
- §6.5.3, Section (9), ¶1, Line 3, Page 6-24: In view of the first sentence, what happens if the surety amount should be decreased? This Acceptance Criterion does not seem to address this possibility. Recommend a slight change in wording to be clear: "...*This revised surety instrument will ~~be in~~ take effect within...*"
- §6.5.3, Section (12), Line 4, Page 6-25: the statement about "the NRC-related portion of the surety" is erroneous. The NRC is responsible for regulation of the entire ISL operation and oversight of the entire surety funds. The error in this section seems to be that the DOE would receive some surety funds for long-term surveillance and maintenance. This does not, of course, apply to ISL licensees.
- §6.5.3, Section (14), Line 4, Page 6-25: this criterion only applies to conventional uranium mills and not to ISL operations. After mining there is no 11e.(2) byproduct material to maintain and the mined-out ore bodies are excluded from definition as by-product material (10 CFR 40.4). Delete this entire criterion as inapplicable.
- §6.5.4, ¶2, Line 1, Page 6-25: recommend deletion of the term "procedures" as these can not likely be reviewed at the time of license application. Recommend deletion of three words to simplify this sentence, for it is just not the methods that are to be reviewed, but more importantly, the decommissioning funding size. Revise this sentence to read: "...*NRC has completed its review of the ~~procedures for conducting~~ cost estimates...*"
- §6.5.4, ¶3, Lines 1 & 2, Page 6-25: as noted above ("procedures"), revise this sentence to read: "...*and the detailed review ~~conducted~~ of the applicant's proposed financial surety amount ~~procedures~~, for conducting the financial assessment for ground-water restoration...*"
- §6.5.4, ¶3, Line 4, Page 6-25: as noted above ("procedures"), revise this sentence to read: "...*the staff concludes that the amount of the proposed financial surety and its methods of estimation are acceptable...*"
- §6.5.4, ¶1, Lines 4-7, Page 6-26: the last sentence in this paragraph has been copied word-for-word from §6.1.4 (Page 6-13) and seems redundant to the financial surety assessment presented in this §6.5. The sentence talks about ground-water restoration – matters that are not germane to assessment of the adequacy of the decommission funding assessment. This sentence should be totally deleted.

SECTION 7: ENVIRONMENTAL EFFECTS

Section 7.1: Site Preparation and Construction

- §7.1.2, ¶1, Line 2, Page 7-2: for consistency with §7.1.3(1) and §7.1.4, recommend addition of a few supplemental words in this sentence: *“...calculations, and accepted modeling studies, as appropriate...”*
- §7.1.3, ¶1, Line 2, Page 7-2: the impacts of the construction work may not be acceptable, but the applicant’s assessment of them must be so. Add clarifying words to read: *“... The applicant’s assessment of the environmental impacts of site preparation and construction is ~~are~~ acceptable if it ~~they~~ meets the following criteria:...”*
- §7.1.3, Section (5), ¶1, Page 7-3: minor change: *“...for all significant adverse impacts...”*
- §7.1.3, Section (6), ¶1, Page 7-3: the meaning of the term “original characteristics” is unclear and should be explained – original land use, original contours, original content of radioactive species, etc? Rewrite to agree with the statement in §7.1.4.
- §7.1.4, ¶1, Line 1, Page 7-3: this sentence should be re-written to state that the assessment of the impacts is acceptable, whether or not the actual plans are so. Revise to read: *“...in the acceptance of the environmental assessment of the site preparation...”*
- §7.1.4, ¶3, Line 4, Page 7-3: a small clarification: *“... Identification and assessment of the effects of all unavoidable and irreversible...”*
- §7.1.4, ¶3, Line 7, Page 7-3: further clarification: *“...mitigation measures for all significant adverse impacts...”*
- §7.1.4, ¶4, Line 3, Page 7-3: clarify to read: *“...concludes that the environmental impacts of the proposed site preparation and...”*

Section 7.2: Effects of Operations

- §7.2.2, ¶1, Lines 1, 4 & 5, Page 7-4: punctuation corrections:
 - Line 1: *“...address the environmental impacts of facility...”*
 - Line 4: *“...is based on, and supported by, theoretical...”*
 - Line 5: *“...for this, or for previous, operations...”*
- §7.2.4, ¶2, Line 1, Page 7-5: minor clarification: *“...its review of the environmental effects of operations...”*
- §7.2.4, ¶3, Line 2, Page 7-5: recommend clarification in the first item (i) to reflect the fact that the applicant can not have mitigated anything at the time of license application submittal. Revise to read: *“...applicant has provided acceptable (i) means to mitigate ~~mitigation of~~ such impacts, (ii) justification...”*

Section 7.3 Radiological Effects

- §7.3.1, ¶1, Line 5, Page 7-6: the term “compartments” may need some definition. Is the SRP referring to a process node or a process operation?

- §7.3.1.1.2, ¶1, Line 7, Page 7-7: improve grammatical structure to read: *“...from the air pathway dose, it is important that the staff should ensures that the...”*
- §7.3.1.1.2, ¶1, Line 13, Page 7-7: punctuation error: delete the comma following “results”
- §7.3.1.1.3, ¶1, Line 2, Page 7-7: to agree with “requirements”, change “specifies” to “specify” (plural form).
- §7.3.1.1.4, ¶1, Line 1, Page 7-8: actual exposures would not be known at the time of license application. Therefore, revise to read: *“...in the acceptance of the exposures estimates from water pathways...”*
- §7.3.1.2.1, ¶1, Line 1, Page 7-9: the release rates are not dependent on meteorological conditions, but rather on the actual facility operations and accidents. The spatial dispersion of the released material will be a function of meteorological conditions. Recommend clarification of this sentence to read: *“...The staff should review estimated release rates of airborne radioactivity from facility operations and the atmospheric dispersion of such radioactivity considering applicable meteorological data as reviewed in Section 2.0 of this standard review plan...”*
- §7.3.1.4.1, ¶1, Line 4, Page 7-13: the requirement to examine dose to members of the public at a distance of 50 miles from the facility seems rather extreme – even in an accident scenario. In fact, the statements in §7.3.1.4.4 (“Evaluation Findings”) make no reference to the 50-mile distance, but rather limit the evaluation to the site boundary. This apparent contradiction between the two sections of §7.3.1.4 should be resolved and the evaluation limited to the site boundary.
- §7.3.1.4.4, ¶3, Line 1, Page 7-15: correct the contradiction between this section and §7.3.1.4.1 regarding the actual locations at which the dosimetry was estimated. (see earlier comment).
- §7.3.1.5.2, ¶1, Page 7-15: general comment: the analysis should distinguish between pre-operational radionuclide data (which could be anomalously high) and data modeled after the onset of operations.
- §7.3.1.5.4, ¶3, Line 1, Page 7-16: as noted earlier, use of the verb “demonstrate” is inappropriate in the license application, for the applicant can never “demonstrate” compliance at the time of a license application. Recommend the following revision: *“...The applicant forecasts ~~has demonstrated~~ that the off-site radiological impacts will ~~would~~ be minimal...”*

Section 7.4 Non-Radiological Effects

- §7.4.1, ¶1, Line 1, Page 7-17: reference to “non-radioactive wastes” in an effluent is not clear terminology. They may be constituents of the effluent, but they may not always be wastes. The phrase “without the

discharge" in Line 2 is redundant and should be deleted. Recommend the following changes: "...concentrations of non-radioactive constituents ~~wastes~~ in effluents at the points of discharge as compared with natural ambient concentrations ~~without the discharge~~ and with applicable discharge standards..."

- §7.4.1, ¶2, Line 8, Page 7-17: recommend deletion of "other" in this sentence as it not needed: "...and disposal of ~~other~~ solids and liquid wastes..."
- §7.4.2, ¶1, Lines 1 & 2, Page 7-17: (see comment above). Is there a need to distinguish between "specific" and "non-specific" constituents? Meaning? Revise to read: "...the staff should determine whether the ~~specific~~ estimated concentrations of non-radioactive constituents ~~wastes~~ in effluents..."

Section 7.5 Effects of Accidents

- §7.5 General Comments. This section continues with introduction of the new NRC risk-informed, performance-based regulatory approach, but the guidance is far too general and of limited use to a reviewer. There is, as of now, no regulatory basis to require the applicant to perform accident analyses, consequence determination and risk assessment. Applicants can not be required to address accident "probability" (p.7-19) for the comparative risks of uranium recovery accident sequences are trivial compared to those evaluated by reactor licensees Why this very important topic is introduced in Chapter 7 remains unclear, and in the absence of far greater elaboration of the guidance, we would recommend that its continued presence in the SRP be carefully considered. Some generic issues that require clarification include, for example:
 - what is the definition of a "potential accident"? Should not only credible accidents be included? What consideration should be given to the identification and analysis of accident initiating events?
 - what is the scope of an "accident analysis"? What is the difference between an "independent accident analysis" versus an "accident analysis"? To properly risk-inform the process, criteria should be provided in the guidance to distinguish those accident sequences that could potentially have serious radiological effects, versus the majority which would be of no regulatory interest.
 - what are "accident procedures" (p.7-19)?
 - how are the reviewer and applicant to distinguish between "trivial to significant" accidents (p.7-19)" What accident ranking schemes are envisaged?
 - how is the characterization of the accident's "occurrence rate or probability" to be determined?

Specific comments on certain parts of this §7.5 follow.

- §7.5.1, ¶1, Line 3, Page 7-18: emergency procedures and training are not necessarily the reasons accident sequence consequences are “minor”.. Other factors such as the features of the uranium recovery operation, mitigative measures, safety systems and controls, etc. are far more important.
- §7.5.1, ¶1, Line 2, Page 7-19: this sentence seems to suggest that if an applicant’s plant uses a “standard” design analyzed by the NRC, further analyses of accident sequences is not required. This seems to contradict assertions in earlier chapters of the SRP that accident analyses will be expected.
- §7.5.1, ¶1, Line 3, Page 7-19: what are “*accident procedures*”?
- §7.5.1, ¶1, Line 8, Page 7-19: the expectation that the applicant perform non-radiological accident sequences must be qualified to be in compliance with the terms of the NRC-OSHA Memorandum of Understanding. Analyses, for example, of purely chemical accident sequences that could not impact the radiological operations of the facility, would not be required as such events do not fall under NRC jurisdiction. The expectation for analysis of transportation accidents is far too broad and not applicable to procurement of a Part 40 license (other than on-site transportation of loaded resins or other radioactive materials). Transportation of U₃O₈ off-site is a separate licensing event.
- §7.5.1, ¶1, Line 10, Page 7-19: why is the frequency of occurrence of the accident sequence of interest? The expectation of quantitative analysis of accident “probability” is unnecessary in light of the trivial radiological effects that could be expected from a uranium recovery operation. The implication that detailed, quantitative evaluation of accident occurrence (read “probabilistic risk assessment”) should extend to uranium recovery licensees is groundless and inappropriate. No guidance is provided on how to establish accident triviality or significance (Line 10).
- §7.5.2, ¶1, Line 5, Page 7-19: NEPA does not specifically require accident analyses of the type proposed in this §7.5. Non-radiological impacts from an ISL facility can be easily established through engineering judgment and the long operating track records of existing (and former) ISL operations.
- §7.5.2, ¶3, Page 7-19: as noted earlier, the expectation that the licensee must mitigate all accident consequences should be subject to the same risk-informed approach that the NUREG attempts to apply elsewhere. Limiting the expectations to the four areas in the following sentence is very important.
- §7.5.3, Page 7-20: this entire section must be qualified by the risk-informed approach to define what accident sequences need to be presented. Only those that pose a significant threat to human health and

safety or the environment should be expected (refer to the comments for §7.5.1).

- §7.5.3, Section (1), Line 1, Page 7-20: in the absence of a definition of “probable” and what constitutes a “credible” accident, recommend replacing this adjective as follows: “...*the applicant has provided analyses of potential probable accident sequences...*”
- §7.5.4, ¶1, Line 1, Page 7-20: clarify the text to read: “...*results in acceptance of the applicant’s descriptions of the effects of accidents...*”
- §7.5.4, ¶2, Line 1, Page 7-20: what constitutes “significant effects?” This term requires definition.

Section 7.6 Socio-Economic Costs

- §7.6.2.1, ¶1, Page 7-24: this paragraph is totally erroneous. There is no regulatory requirement for the applicant to disclose “*primary corporate internal costs.*” This is proprietary information that bears directly on the competitive position of the licensee. The only cost information that need be revealed pertains to the decommissioning and restoration costs and estimation of the surety amount required for the operation. No other cost information is needed to perform a cost-benefit analysis. Delete the entire paragraph.
- §7.6.2.1, ¶4, Line 6, Page 7-24: “alternative” is the noun and “alternate” is the corresponding adjective. Revise to read: “...*(v) removal of land from present or contemplated alternate alternative uses;*...”

SECTION 8: ALTERNATIVES TO PROPOSED ACTION

Section 8.1: Areas of Review

- §8.1, ¶1, Line 4, Page 8-1: “...*the staff should consider the to no-action alternative...*”
- §8.1, ¶1, Line 5, Page 8-1: “...*Alternate alternative designs do not...*” (see earlier comment)
- §8.1, ¶2, Line 2, Page 8-1: delete superfluous text: “...*operational performance objectives developed by NRC staff in addition to...*”

Section 8.2: Review Procedures

- §8.2, ¶1, Line 2, Page 8-1: the reviewers should understand that the selection must be confined to recovery processes that are economic!

Section 8.3: Acceptance Criteria

- §8.3, ¶1, Page 8-2: in topics (b), (c), (d) and (e) change “alternative” to “alternate” as discussed earlier for §7.6.2.1

SECTION 9: COST-BENEFIT ANALYSIS

Section 9.1: Areas of Review

- §9.1: Why not entitle this chapter "*Cost-Benefit Analysis*" for this is the term used throughout American industry. Use of the inverted term "*Benefit-Cost Analysis*" may attempt to add uniqueness to an NRC document, but this is really unnecessary. Strive for uniformity.
- §9.1, ¶2, Line 1, Page 9-1: recommend changing the verb so as to read: "...*The review should examine include criteria for assessing...*"
- §9.1, ¶3, Lines 7-9, Page 9-1: what is the object of this sentence? How can one honestly attempt to state that a potential mine represents x% of the in-situ uranium resources within a district or state – especially when the in-situ resources can never be accurately known? Statements that a deposits in-situ (or should this be recoverable?) uranium resources constitutes 0.1±100% is meaningless. Recommend deleting this sentence.
- §9.3, Item (3), Page 9-2: a license applicant has no obligation to provide information on "...*internal costs, including capital costs of land acquisition and improvement, capital costs of facility construction, other operating and maintenance costs...*" This information is proprietary and has no bearing on a cost-benefit analysis. Only estimates of plant decommissioning and site reclamation costs need be provided (see §6.5) as part of the decommissioning surety estimates. NEPA requires the applicant to examine societal costs of the project, but the NRC has no authority to request business costs or other economic data. Such data do not assist the NRC in fulfilling its mandate to protect humans and the environment from the adverse effects of radiation. Inclusion of the term "*future improvements*" is very nebulous and some clarification is required. To expect an applicant to forecast 20 or 30 years of potential "future improvements" – including their costs -- seems unreasonable. Recommend deleting this term: "...*and site reclamation costs, ~~and the costs of future improvements in the proposed facility...~~*"
- §9.3, Item (8), Page 9-4: the costs referred to in this Item 8 do not include plant internal costs (see prior comment).
- §9.3, Item (10), Page 9-4: items (a), (d) and (e) do not really pertain to ISL operations. Item (f) seems questionable in the information it requests. Is the plant's electrical or CO₂ consumption, for example, an irretrievable commitment of resources? We question whether examination of an ISL facility's use of consumables is terribly relevant to a cost-benefit analysis?
- §9.4, ¶1, Lines 8 & 9, Page 9-5: references to examination of proprietary financial data must be deleted (see earlier comment). References to unknown "future improvements" should also be removed. Revise to read: "...*The applicant has acceptably summarized costs including (i) ~~internal,~~*

~~(ii) capital, (iii) other operating and maintenance, (iv) plant decommissioning and site reclamation, and (v) future improvements."~~

- §9.4, ¶1, Line 23, Page 9-5: the last sentence may need some clarification to state that the applicant's own proprietary financial analyses are not part of the societal cost-benefit analysis. The applicant's prior financial analyses that lead to the decision to apply for a license can not be publicly disclosed for competitive reasons. Such analyses are of no interest to the NRC in fulfilling the latter's legislative mandate.
- §9.4, ¶2, Lines 9 & 10, Page 9-5: this sentence is far too broad and must be clarified. As written (and referred to earlier in §9.3 (10)) the applicant would need to address use of consumables (ear plugs, pencils, reagents, etc.) which should not be the primary focus of the cost-benefit analysis. Recommend deleting this sentence.

SECTION 10: ENVIRONMENTAL APPROVALS AND CONSULTATIONS

Section 10.3: Acceptance Criteria

- §10.3, Item (5), Page 10-2: Inclusion of the words "*since the last licensing application*" in Item (5) suggests that this requirement pertains to license renewals and amendments. For clarity recommend modifying this Item (5) as follows: "*...For license renewals and amendments the applicant summarizes public meetings and meetings held with...*"

APPENDIX A: GUIDANCE FOR REVIEWING HISTORICAL ASPECTS OF SITE PERFORMANCE FOR LICENSE RENEWALS AND AMENDMENTS

- General Comment: the Appendix correctly directs the reviewer to examine the licensee's performance in several areas. However, at least two of the criteria are really not related to performance and are irrelevant to amendment of the license. Several of the criteria are appropriate for preparing a Licensee Performance Review (LPR) or other assessments of the licensee's overall safety performance. They may also be appropriate for processing a license renewal application. But these same criteria are inappropriate for judging the merits of a specific license amendment, which are generally very specific and technical. For example, the last paragraph recommends a performance review that may be appropriate for evaluating a license renewal request, but which is inappropriate and unneeded for a license amendment. The second and third criteria from the bottom of the list pertain to the EA – which would certainly not be required for a license amendment request.

We recommend that some clarification be added to address what information need be consulted in the case of a license renewal or amendment. For the former, an additional criterion that should be added to the list would be "*inspection reports and LPR reports.*"

- ¶1, Line 2, Page A-1: punctuation correction: "...*quality monitoring, provides valuable information...*"
- First bullet, Line 1, Page A-1: for evaluation of license renewal applications, suggest adding the following criterion: "*• NRC inspection reports and License Performance Reports (LPR)*"
- Second bullet, Line 1, Page A-1: in support of the "risk-informed, performance-based" regulatory approach that is promoted in this SRP, recommend changing to read: "... *• safety-significant license violations*"
- Third bullet, Line 1, Page A-1: the manner in which the license conducted a root-cause analysis and implemented corrective action would seem to be of the greatest interest and importance to the NRC. Revise to read: "...*excursions, incident investigations or root cause analyses and resultant cleanup histories or status...*"
- Fourth bullet, Line 1, Page A-1: greater specificity is recommended. Revise to read: "...*exceedences of any regulatory standard or license condition pertaining to radiation exposure...*"
- Seventh bullet, Line 1, Page A-1: clarification is needed to explain "effects" on what?
- Eighth and ninth bullets, Line 1, Page A-1: these two criteria are inappropriate for a license amendment as, for example, a license amendment would not necessitate revision of an EA
- ¶2, Page A-1: this paragraph is appropriate for a facility inspection or for preparing an LPR evaluation and the last sentence is appropriate for a license renewal request evaluation. But neither is appropriate for a license amendment.

APPENDIX B: RELATIONSHIP OF 10 CFR PART 40, APPENDIX A REQUIREMENTS TO STANDARD REVIEW PLAN SECTIONS

- General Comment: this is a very useful compilation of regulatory requirements and the SRP guidance. We would recommend a slight modification to the "*Locations in NUREG-1569*" column on Page B-4. for Criteria 8 & 10. As both of these are only partially applicable to ISL operations, perhaps the note in the "*Locations in NUREG-1569*" column should read "*partially applicable.*" For criterion 8, the milling operations, ore storage and tailings placement regulations are inapplicable.

Similarly, for criterion 10, there will generally be no long-term surveillance and control requirement for ISL operations.

APPENDIX C: EFFLUENT DISPOSAL AT LICENSED *IN SITU* LEACH URANIUM EXTRACTION FACILITIES

- Section C1.0, ¶1, Lines 9-11, Page C-1: the Commission has recently agreed that designation of wellfield restoration waters as 11e.(2) byproduct material is incorrect. This designation is inconsistent with current Commission treatment of mine waters from conventional open pit and underground uranium mines. The NRC may wish to delay issuing the final version of NUREG-1569 until Commission clarification of this error is made.
- Section C2.0, ¶1, Line 1, Page C-1: correct the text to address the inability of an applicant to “demonstrate” at the time of license application the evaporation pond integrity. Revise to read: “...*For a surface impoundment, it must be demonstrated that the proposed disposal facility must be is designed, operated and decommissioned in a manner...*”
- Section C5.0, ¶2, Line 4, Page C-2: punctuation error: Revise to read: “...*In particular, proposals must satisfy...*”
- Figure, Page C-4: this figure seems to be located incorrectly in Appendix C. It is identical to Figure 5-1 in Appendix E, and should likely be deleted from Appendix C.

APPENDIX D: RECOMMENDED OUTLINE FOR SITE-SPECIFIC *IN SITU* LEACH FACILITY RECLAMATION AND STABILIZATION COST ESTIMATES

- ¶1, Line 7, Page D-1: punctuation correction: “*updated annually; as specified in the license...*”
- ¶1, Line 12, Page D-1: for better flow, recommend adding one word to read: “...*performed at the site, and not simply deduct the cost...*”
- §I, ¶1, Line 1, Page D-1: the first sentence of this paragraph should be revised to make it consistent with the last sentence(which states that structures can be decontaminated and free- released. Revise to read: “...*This includes dismantling and decommissioning, free release or disposal of all structures and equipment...*”
- §I, ¶(c) (2)(b): delete the closed parenthesis at the end of the text.
- §II, ¶(e)(3): typographical error. Correct to read: “...*material to be he used for plugging...*”
- ¶1, Line 2, Page D-5: 10 CFR 40, Appendix A, Criterion 10 is not applicable to ISL mines, but rather to the long-term oversight and

maintenance of tailings impoundments at conventional Class I operations. Recommend deleting the final clause: "~~...and transfer the long-term surveillance and control fee to the U.S. Department of the Treasury before license termination...~~"

- ¶2, Lines 2 & 3, Page D-5: the assertion that "~~...equipment owned by the licensee and the availability of licensee staff should not be considered in the estimate...~~" is grossly unfair to the licensee. Why should not the licensee be able to use the installed pumps, the existing well, the production plant RO and IX equipment in the restoration? The SRP seems to suggest that new wells might have to be drilled and new equipment purchased. This is ridiculous. Why can not the licensee's knowledgeable and radiation safety-trained staff be employed to perform the restoration? Even in the event that the licensee has declared bankruptcy, surely the NRC would want to take full advantage of the licensee's remaining and functioning equipment and trained staff. This sentence should be deleted: "~~...percentage of the total. Equipment owned by the licensee and the availability of licensee staff should not be considered in the estimate, to reduce cost calculations. All costs should...~~"

APPENDIX E: MILDOS-AREA: AN UPDATE WITH INCORPORATION OF IN SITU LEACH URANIUM RECOVERY TECHNOLOGY

- §4.1, line 2, Page E-6: there seem to be some missing words after the word "using". ("~~Because all exploration drill holes are drilled using _____ and are sealed with high-viscosity bentonitic mud...~~"