1. Regulatory Framework Options, Part 50 or Part 70

Gap	Regulations currently exist to license reprocessing facilities under Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," but the regulations in 10 CFR Part 50 have always focused, for the most part, on reactors. The regulations in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," do not currently provide the necessary framework for licensing production facilities, including reprocessing facilities.
Gap Type	Existing regulations pose a significant hindrance to effective and efficient licensing.
Basis for Gap	An application for a reprocessing facility would have to be licensed today under 10 CFR Part 50 or by order. Licensing the facility under 10 CFR Part 50 could require many exemptions, especially given the interest in pursuing one-step licensing for reprocessing facilities. The regulations in 10 CFR Part 70 apply to licensing special nuclear material (SNM), not production facilities.
Additional Information	The Staff Requirements Memorandum (SRM) to SECY-07-0081, "Regulatory Options for Licensing Facilities Associated with the Global Nuclear Energy Partnership," dated June 27, 2007, indicated Commission approval for proceeding to develop a technical basis to support rulemaking for 10 CFR Part 70, with appropriate revisions to 10 CFR Part 50. The staff will consider in the technical basis development the following sections of 10 CFR Part 50 for inclusion in a revised 10 CFR Part 70 or new Part 7X, either in whole or part, or by reference or intent: 50.2, "Definitions" 50.10, "License Required; Limited Work Authorization" (two-step licensing) 50.20, "Two Classes of Licenses" 50.23, "Construction Permits" (two-step licensing) 50.30, "Filing of Applications; Oath or Affirmation" 50.33, "Contents of Applications; General Information" 50.34, "Contents of Applications; Technical Information" (two-step licensing) 50.36, "Technical Specifications" 50.54, "Conditions of Licenses" 50.58, "Hearings and Report of the Advisory Committee on Reactor Safeguards" 50.75, "Reporting and Recordkeeping for Decommissioning Planning Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants Appendix F, "Policy Relating to the Siting of Fuel Reprocessing Plants and Related Waste Management Facilities" Applicable sections of 10 CFR Part 52, "Licenses, Certifications and Approvals for Nuclear Power Plants," can be consulted as a

	resource for developing one-step licensing requirements. Additionally, staff may identify other areas of 10 CFR Part 50 that are necessary for consideration in the regulatory framework during the technical basis development. The NEI white paper titled "Regulatory Framework for an NRC Licensed Recycling Facility," dated December 24, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML083590114; further referred to as "the NEI white paper") recommended a new regulatory Part, 10 CFR Part 7X, specific for reprocessing. The reasoning indicated is the complexity of the existing 10 CFR Part 70, the clarity needed to distinguish licensing requirements between reprocessing facilities and other fuel cycle facilities and avoiding potential impacts to currently licensed Part 70 facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	Currently, licensing a reprocessing facility under 10 CFR Part 50 would pose a significant hindrance to effective and efficient licensing. 10 CFR Part 70, as currently written, does not provide a regulatory framework to license a production facility.
Priority for Resolution	High
Path Forward	The staff will proceed in accordance with the direction in SRM-SECY-07-0081 to pursue rulemaking under 10 CFR Part 70. The gap analysis reflects changes that are needed to incorporate licensing and regulatory requirements for reprocessing facilities under 10 CFR Part 70.
Resources	High

2. Independent storage of high level waste

Gap	No independent waste storage options are available under 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater Than Class C Waste," to accommodate interim, commercial independent storage of solidified high-level waste (HLW) from reprocessing facilities.
Gap Type	Lack of regulations.
Basis for Gap	Two independent waste storage options are available under 10 CFR Part 72. An independent spent fuel storage installation (ISFSI) accommodates spent fuel and solidified greater-than-Class-C reactor waste. The second option, a monitored retrievable storage (MRS) installation, which is a DOE facility licensed by the NRC, can accept these waste forms and solidified HLW. The current 10 CFR Part 72 regulations, however, do not provide for interim, commercial independent storage of solidified HLW from reprocessing facilities.
Additional Information	Currently, the NRC does not have experience licensing an MRS. If DOE chooses to pursue the licensing of such a facility to support reprocessing, this would pose a challenge for the NRC. A reprocessing facility applicant could also opt not to store solidified HLW at an independent facility. In this case, commercial onsite HLW storage could be authorized under a facility license issued under a revised 10 CFR Part 70 or a new Part 7X. This approach would allow HLW interim storage in much the same way that current provisions in 10 CFR Part 50 allow for onsite wet storage of spent fuel at reactor facilities. Under this approach, an applicant would not need to submit two applications for its facility (10 CFR Part 70/7X and Part 72).
Implications for Regulating and/or Licensing Reprocessing Facilities	A technical basis will need to be developed to establish the regulatory framework necessary for both the onsite storage and commercial independent storage of solidified HLW. Without this basis, there are no viable regulatory options for interim storage of solidified HLW from reprocessing facilities.
Priority for Resolution	High
Path Forward	Develop the technical basis for both an independent storage facility for HLW and onsite storage. The regulations can be under a revised10 CFR Part 70 or Part 72, or new Part 7X.
Resources	Moderate

3. Waste incidental to reprocessing

Gap	The NRC lacks regulations defining certain waste streams resulting from spent fuel reprocessing as waste incidental to reprocessing, or incidental waste, rather than HLW.
Gap Type	Lack of regulations.
Basis for Gap	The staff has long held the view that not all waste resulting from reprocessing would be considered HLW, thus allowing its disposition in facilities other than a deep geologic repository. Examples of incidental wastes are HLW tank residues, chopped and leached fuel hulls, irradiated fuel hardware, reprocessing facility equipment, personnel protection equipment, rags, etc.
Additional Information	The Department of Energy (DOE) has long consulted with NRC on DOE's non-HLW determinations for residual wastes associated with plutonium production facilities at its sites (Hanford, Savannah River Site, and Idaho National Laboratory). During the NRC's long history of consultation with DOE on such determinations, NRC developed criteria for incidental waste determinations. In fact, Congress, in 2004, passed legislation (Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005) that prescribes criteria very similar to those developed previously by the NRC, for DOE non-HLW determinations in the covered States of Idaho and South Carolina. Incidental waste criteria were previously established by the NRC in the "1993 Denial of Petition for Rulemaking by the States of Washington and Oregon" in the *Federal Register* (58 FR 12342; March 3, 1993), by DOE in its 1999 Order 435.1, "Radioactive Waste Management," by the NRC in the 2002 West Valley Policy Statement, and by Congress in Section 3116 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (see NUREG-1854, "NRC Staff Guidance for Activities Related to U.S. Department of Energy Waste Determinations" issued August 2007).
Implications for Regulating and/or Licensing Reprocessing Facilities	If the NRC does not develop an incidental waste rule, then an applicant for a reprocessing facility would face regulatory uncertainty with regard to differentiating HLW from incidental wastes produced at its facility.
Priority for Resolution	High
Path Forward	Develop a technical basis for a rule based largely on prior Commission decisions and recent legislation, as described above.
Resources	Moderate

4. Exclusion of irradiated fuel reprocessing facilities in 10 CFR 74.51

Gap	The regulation in 10 CFR 74.51, "Nuclear Material Control and Accounting for Strategic Special Nuclear Material," currently excludes irradiated fuel reprocessing facilities from Category I material control and accounting (MC&A) requirements.
Gap Type	Lack of regulations.
Basis for Gap	It is necessary to remove this exclusion to ensure the security of material in any proposed Category I reprocessing facility.
Additional Information	
Implications for Regulating and/or Licensing Reprocessing Facilities	Category I reprocessing facilities would not have the same MC&A requirements as other Category I facilities if the exclusion is not removed, yet comparable requirements may be needed to protect against theft and diversion of separated special nuclear material and other materials.
Priority for Resolution	High
Path Forward	Remove the exclusion for reprocessing facilities in 10 CFR 74.51. The staff will remove this exemption in the MC&A rulemaking directed by SRM-SECY-08-0059, "Rulemaking Plan: Part 74—Material Control and Accounting of Special Nuclear Material," dated February 5, 2009.
Resources	Low

5. Risk considerations for a production facility licensed under 10 CFR Part 70

Gap	The risk assessment required by 10 CFR Part 70 involves an integrated safety analysis (ISA), and a qualitative characterization of the consequences and likelihoods of credible accident sequences. Currently, these existing requirements do not adequately address the increased risk a reprocessing facility poses relative to that of other fuel cycle facilities.
Gap Type	Gap resulting from potentially licensing a production facility under 10 CFR Part 70.
Basis for Gap	Reprocessing facilities will have a higher source term than that of other fuel cycle facilities. The higher source term increases the relative risk of these facilities. The NRC revised 10 CFR Part 70 in 2000 based on a limited number of lower risk fuel cycle facilities, and the revision did not consider higher risk reprocessing facilities. These higher risks are not adequately addressed in the methodology established in 10 CFR Part 70.
Additional Information	Various approaches are being considered to address this gap. Options include both qualitative and quantitative analyses. Examples of options include expanding the performance requirement risk indices (e.g., high consequence and highly unlikely to very high consequence and very highly unlikely, respectively), probabilistic risk assessment (PRA), and other approaches. The Nuclear Energy Institute (NEI) white paper addresses the topic of risk, and NEI has indicated that a more quantitative risk assessment method would apply to accident sequences that involve fission product releases to members of the public. The Advisory Committee on Nuclear Waste and Materials (ACNW&M) issued NUREG-1909, titled “Background, Status, and Issues Related to the Regulation of Advanced Spent Nuclear Fuel Recycle Facilities” in June 2008. In this NUREG, ACNW&M indicates a preference for use of a more quantitative approach toward risk, such as PRA. The main argument used for an ISA approach in 10 CFR Part 70 is that the consequences of accidents at fuel cycle facilities are less severe than at reactor facilities. While this is true, consequences from a reprocessing facility are between those of a fuel cycle facility and a reactor facility. The regulatory approach determined from the technical basis development will address the intermediate risk of reprocessing facilities. The ACNW&M letter to Chairman Klein dated October 11, 2007 states that the use of ISA is an important step towards quantifying risk. The ACNW&M also indicated that the effort required to prepare an ISA for a reprocessing facility is likely to approach the effort that would be required to evaluate risks using a PRA. The ACNW&M and the Advisory Committee on Reactor Safeguards continue to recommend that a regulation based on PRA is preferable to one based on ISA because the latter has significant limitations in its

	treatment of dependent failures, human reliability, uncertainties, and aggregation of event sequences. The August 16, 1995, Commission policy statement on the use of PRA (60 FR 42622) set policy that the NRC should expand the use of PRA to the extent practicable, within the bounds of the state-of-the-art in PRA methods. However, the statement also recognizes that for some facilities or applications, PRA is not appropriate and that analysts must consider the uncertainties and the reliability of data used for modeling. Currently, the use of PRA in existing reprocessing facilities is very limited. A PRA analysis is useful only if there is meaningful and representative data to input into the model. With few applicable existing facilities and very limited access to reliable data for use in a PRA model, the staff will need to assess, during preparation of the technical basis, the relevancy of a quantitative requirement for reprocessing facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	The requirements for reprocessing facilities licensed under 10 CFR Part 70 will be the same as those for the lower risk fuel cycle facilities, if revisions are not made to consider the risk of these facilities.
Priority for Resolution	High
Path Forward	The staff will address the gap through the technical basis development and consider various qualitative and quantitative approaches.
Resources	High

6. Definition for reprocessing related terms

Gap	There are currently no definitions of the terms “reprocessing,” “recycling,” and “vitrification.”
Gap Type	Lack of regulations
Basis of Gap	Existing regulations 10 CFR Parts 20, 50, 51, 60, 63, 70 and 72 use the term “reprocessing” without a definition. Such definitions will need to be developed to describe both reprocessing and reprocessing facilities for 10 CFR Chapter I.
Additional Information	SECY-08-0134, “Regulatory Structure for Spent Fuel Reprocessing,” dated September 12, 2008 identifies the need to develop regulatory definitions, particularly for “reprocessing” and “recycling,” as an issue related to the regulation of a reprocessing facility. The NEI White Paper addresses the issue of definitions used in reprocessing of spent nuclear fuel and provides suggestions for such definitions. In NUREG-1909, the ACNW&M defines “recycle,” “reprocessing,” and other terminology used in reprocessing spent nuclear fuel.
Implications for Regulating and/or Licensing Reprocessing Facilities	Clarity and comprehension could be compromised without clear definitions for reprocessing-related terminology. Clear definitions are needed to establish the meaning and significance of terms related to licensing reprocessing facilities, decrease regulatory uncertainty, and provide boundaries for acceptable practice and action by NRC.
Priority for Resolution	High
Path Forward	Staff will propose definitions for reprocessing-related terminology in the technical basis for the revision of 10 CFR Part 70 or development of the new Part 7X.
Resources	Moderate

7. Licensed operators and criteria for testing and licensing operators

Gap	Section 107 of the Atomic Energy Act of 1954, as amended, (AEA) requires production facilities to have licensed operators. The NRC needs to develop criteria in 10 CFR Part 55, "Operators' Licenses," or the reprocessing specific regulation in a revised 10 CFR Part 70 or new Part 7X, for testing and licensing operators of reprocessing facilities.
Gap Type	Lack of regulations.
Basis for Gap	Existing criteria in Part 55 are not applicable, in whole, to operators of reprocessing facilities.
Additional Information	The NEI white paper also addresses the issue of licensed operators. NEI indicates a threshold for licensed operators only for areas that might be necessary to mitigate accident sequences that involve fission product releases that would affect health and safety of the public.
Implications for Regulating and/or Licensing Reprocessing Facilities	In the absence of criteria developed in 10 CFR Part 55, licensing conditions would need to be established to define such criteria.
Priority for Resolution	High
Path Forward	In developing the technical basis for rulemaking, incorporate and develop criteria comparable to that existing in 10 CFR Part 55 for reactors.
Resources	Moderate

8. Risk-Informing 10 CFR Part 73 and 10 CFR Part 74

Gap	The current quantity-based categorization scheme in the existing regulations may pose an undue regulatory burden in operating a reprocessing facility. Risk-informing 10 CFR Part 73, "Physical Protection of Plants and Materials," and 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," is needed to prevent unintended consequences associated with a quantity-based material categorization scheme for potential materials resulting from a reprocessing operation.
Gap Type	Existing regulations may pose an undue regulatory burden for reprocessing facility licensees.
Basis for Gap	A new material categorization scheme for 10 CFR Part 73 and 10 CFR Part 74 that incorporates attractiveness levels, based on material composition, for currently designated SNM (i.e., plutonium, uranium-233, or enriched uranium-233 or uranium-235), would provide a risk-informed approach toward reprocessing processes, fuel products and associated fuel assembly shipments. The current quantity-based categorization scheme would likely require shipments and other plant operations, such as reprocessed fuel fabrication, to be designated as Category I, whereas protection and control at that level may not be necessary. An approach that considers other factors that contribute to the ultimate attractiveness of commercial fuel derived from reprocessing, and associated assemblies and production processes, would result in more risk-informed regulatory requirements.
Additional Information	SRM-SECY-08-0059 directed the staff to consider integrating the MC&A proposals presented in SECY-08-0059, "Rulemaking Plan: Part 74—Material Control and Accounting of Special Nuclear Material," dated April 25 2008, into the development of the regulatory framework for reprocessing. Material categorization tables were one option to be considered for incorporation into the reprocessing regulatory framework, with the distinction that the option be applied to currently designated SNM. This is consistent with the current Commission policy towards expanding the requirements for SNM set forth in SRM-SECY-08-0059.
Implications for Regulating and/or Licensing Reprocessing Facilities	Current requirements for facility processes and reprocessed fuel assemblies may result in excessive security and safeguards measures for relatively unattractive materials, resulting in undue regulatory burden.
Priority for Resolution	High
Path Forward	Incorporation of attractiveness levels in the existing material categorization scheme would risk-inform 10 CFR Part 73 and 10 CFR Part 74. However, the resources required to complete this would be significant. Alternatively, specific requirements for some plant operations and shipments of reprocessed fuel assemblies could also be established.
Resources	High for attractiveness tables; low for specific requirements.

9. Baseline design criteria

Gap	Existing baseline design criteria (BDC) in 10 CFR Part 70 do not comprehensively address hazards posed by the operation of a reprocessing facility.
Gap Type	Gap resulting from potentially licensing a production facility under 10 CFR Part 70.
Basis for Gap	Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 provides general design criteria (GDC) for nuclear power plants. Currently, no GDC are specific to reprocessing facilities. The regulations in 10 CFR Part 70 have a few BDC directed more toward lower risk fuel cycle facilities.
Additional Information	Some of the GDC's in Appendix A, and those in 10 CFR Part 70 and 10 CFR Part 72 may be appropriate for reprocessing and recycling facilities. These can be the starting point for development of BDC's for reprocessing facilities. The NEI white paper contained examples of BDC, expanded beyond those in 10 CFR Part 70. The BDC comprehensively cover five main categories: Overall requirements, Radiological Protection, Chemical and Hazardous Materials Protection, Equipment Services Protection, and Facility Confinement Protection. These categories encompass many of the important and significant safety aspects related to reprocessing and associated facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	Appropriate BDC for reprocessing facilities should be established.
Priority for Resolution	High
Path Forward	The regulations in 10 CFR Parts 50, 70, and 72 and the BDC described in the NEI white paper can be used as a foundation for establishing these criteria.
Resources	Moderate

10. One-step licensing and inspection, testing and acceptance criteria (ITAAC) requirements

Gap	Clarity is needed in 10 CFR Part 70 to provide reasonable assurance that a reprocessing facility, undergoing a one-step licensing process, will have been constructed and will operate in conformity with the license, the AEA, and the Commission's rules and regulations.
Gap Type	Gap resulting from potentially licensing a production facility under 10 CFR Part 70.
Basis for Gap	Currently, regulations for one-step licensing of reprocessing facilities do not exist. One-step licensing necessitates requirements to verify that the constructed facility conforms to the approved, licensed design. For reactors, 10 CFR Part 52 identifies these requirements as ITAAC. The regulations in 10 CFR Part 52 do not apply to reprocessing or other production facilities, nor do the requirements for the approval of applications set forth in 10 CFR 70.23, "Requirements for the Approval of Applications," address reprocessing facilities.
Additional Information	§ 70.23 also includes construction requirements for plutonium processing facilities and specific requirements for different fuel cycle facilities, (e.g., enrichment facilities and plutonium processing facilities). Specifically, § 70.23(a)(8) requires approval of the construction of principal structures, systems, and components to be completed in accordance with the application only for plutonium processing and fuel fabrication plants. These construction requirements do not include production facilities. Industry has expressed interest in pursuing one-step licensing. Separately, the NEI white paper indicates interest in licensing flexibility, and their framework includes options for one- and two-step licensing processes. One-step licensing requires criteria to confirm that the constructed facility meets the approved design and licensing basis. ITAAC requirements for reprocessing facilities can be modeled after those in 10 CFR Part 52. The NEI white paper also indicates that reprocessing facility applicants should submit a plan for ITAAC for one-step licensing processes.
Implications for Regulating and/or Licensing Reprocessing Facilities	A plan for ITAAC submitted by the applicant will prevent the need to establish specific requirements for reprocessing facilities. Regulatory clarity is needed in 10 CFR Part 70 to provide reasonable assurance that a reprocessing facility will have been constructed and will operate in conformity with the license, the AEA, and the Commission's rules and regulations for one-step licensing processes.
Priority for Resolution	High
Path Forward	To accommodate one-step licensing, it may be necessary to establish a requirement for one-step applications to submit a plan akin to that required under 10 CFR Part 52 for ITAAC.
Resources	Moderate

11. Technical specifications

Gap	Technical specifications for reprocessing facilities in 10 CFR Part 50 require modification to reflect the risk basis for safe operation of production facilities under 10 CFR Part 70.
Gap Type	Gap resulting from potentially licensing a production facility under Part 70.
Basis for Gap	Section 182a. of the AEA requires technical specifications for any production or utilization facility. Current regulations in § 50.36(c)(1)(i)(B) and § 50.36(c)(1)(ii)(B) provide technical specifications for reprocessing facilities. Currently, 10 CFR Part 70 does not require technical specifications; it should incorporate technical specifications for reprocessing facilities from § 50.36(c)(1)(i)(B) and § 50.36(c)(1)(ii)(B). Technical specification requirements should be in accordance with items relied on for safety (IROFS) and the integrated safety analysis (ISA) methodology included in 10 CFR Part 70. For example, § 50.36(c)(1)(ii)(B) provides the requirement for technical specifications for limiting control settings for automatic alarms or protective devices related to variables with significant safety functions. The regulations in 10 CFR Part 70 would refer to these as IROFS and their settings are derived from an ISA. Technical specifications are licensing requirements and are incorporated into a license. IROFS and ISA information are not usually incorporated directly into a license, like technical specifications are for 10 CFR Part 50 licensed facilities.
Additional Information	Technical specifications control important processes and protect against the uncontrolled release of radioactivity. They include safety limits, limiting safety system settings, and limiting control settings, and are developed by the applicant and reviewed by the NRC staff. The NEI white paper discusses the need to establish technical specifications tailored for reprocessing facilities. NEI would prefer requirements that are broader than § 50.36(c)(1)(i)(B) and § 50.36(c)(1)(ii)(B) and that would incorporate elements of the risk basis for 10 CFR Part 70 facilities, specifically IROFS and ISAs. Also, NEI indicates a threshold for the development of technical specifications only for IROFS necessary to mitigate accident sequences involving fission product releases that would affect health and safety of the public. The rationale provided in the white paper is that the technical specification requirements apply to the processes that are more like those used at production facilities and avoiding the regulatory burden associated with imposing technical specifications on processes more typical of fuel cycle facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	Requirements for technical specifications for reprocessing facilities currently exist in 10 CFR Part 50. Such requirements may not be compatible with 10 CFR Part 70. For incorporation into 10 CFR Part 70, revisions will be needed to clarify the division between IROFS/ISA and technical specifications. Additionally, changes to

	technical specifications would require a license amendment; similar changes under 10 CFR Part 70 licensed facilities could proceed under the facility change process in 10 CFR 70.72, “Facility Changes and Change Process,” if the changes meet these requirements.
Priority for Resolution	High
Path Forward	In developing the technical basis for rulemaking, staff will incorporate requirements in the reprocessing regulations that are comparable to the existing requirements in 10 CFR Part 50, and that also embrace the primary controls on risk in the 10 CFR Part 70 framework (e.g., IROFS, ISA).
Resources	Low

12. Financial protection requirements and indemnity agreements (10 CFR Part 140)

Gap	Price Anderson protection and indemnity fees and amounts for reprocessing facilities are currently not included in 10 CFR Part 140, “Financial Protection Requirements and Indemnity Agreements.” Additionally, several appendices to 10 CFR Part 140 do not include forms for reprocessing facilities.
Gap Type	Lack of regulations.
Basis for Gap	Fee requirements and forms for liability policies and indemnity agreements are not established for reprocessing facilities.
Additional Information	Subpart E, ”Extraordinary Nuclear Occurrences” to 10 CFR Part 140, broadly covers production and utilization facilities and is general enough to apply to reprocessing facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	A reprocessing facility cannot be licensed without financial protection and indemnity agreements.
Priority for Resolution	High
Path Forward	The staff will address this gap in the reprocessing framework.
Resources	Moderate

13. Schedule of fees (10 CFR Part 170)

Gap	The scope of 10 CFR Part 170, "Fees for Facilities, Materials, Import and Export Licenses, and Other Regulatory Services under the Atomic Energy Act of 1954, as Amended," does not include a production facility licensed outside 10 CFR Part 50.
Gap Type	Gap resulting from potentially licensing a production facility under 10 CFR Part 70.
Basis for Gap	The NRC's fees for licensing services and the provisions regarding their payment are established in 10 CFR Part 170. The schedule of fees for production facility licensing services appears in 10 CFR 170.21. However, 10 CFR 170.2(g) details the scope of 10 CFR Part 170 as applying to production facilities licensed under 10 CFR Part 50. Reprocessing facilities will be licensed under a revised 10 CFR Part 70 or a new 10 CFR Part 7X.
Additional Information	The definition of a production facility in 10 CFR 170.3, "Definitions," contains exceptions for production facilities that process irradiated material below described quantity limits on SNM. A commercial reprocessing facility will exceed these limits; therefore, this exception will not apply to commercial reprocessing facilities.
Implications for Regulating and/or Licensing Reprocessing Facilities	Clarity is needed for application of 10 CFR Part 170 to reprocessing facilities.
Priority for Resolution	High
Path Forward	Remove the language that specifies the 10 CFR Part a production facility is licensed under.
Resources	Low

14. Annual fees (10 CFR Part 171)

Gap	The regulations in 10 CFR Part 171, "Annual Fees for Reactor Licenses and Fuel Cycle Licenses and Materials Licenses, Including Holders of Certificates of Compliance, Registrations, and Quality Assurance Program Approvals and Government Agencies Licensed by the NRC," do not include annual fees for reprocessing facility licenses. The scope of the regulation, described in 10 CFR 171.3, does not specifically include reprocessing or production facilities.
Gap Type	Lack of regulations.
Basis for Gap	The annual fees for licenses issued are established in 10 CFR Part 171, but the regulation sets no such annual fees for licenses of reprocessing facilities, and these facilities are not included in the scope of the regulation.
Additional Information	Annual fees for a 10 CFR Part 72 licensed facility that does not have a Part 50 or Part 52 license are established in 10 CFR 171.15, "Annual Fees: Reactor Licenses and Independent Spent Fuel Storage Licenses." This will apply to potential ISFSIs that may store spent fuel before its reprocessing.
Implications for Regulating and/or Licensing Reprocessing Facilities	Annual fees are not currently established for reprocessing facility licenses. This gap will need to be addressed prior to licensing reprocessing facilities.
Priority for Resolution	High
Path Forward	Annual fees can be established for a reprocessing facility.
Resources	Moderate

15. Waste confidence for reprocessing facilities

Gap	In their environmental report, applicants for reprocessing facility licenses will need to address long-term storage of their waste.
Gap Type	Existing regulations pose a significant hindrance to effective and efficient licensing.
Basis for Gap	The waste confidence decision published in the *Federal Register* on August 31, 1984 (49 FR 34658) discusses waste from reprocessing facilities in the first and third finding. The generic waste confidence rule in § 51.23, "Temporary Storage of Spent Fuel after Cessation of Reactor Operation—Generic Determination of No Significant Environmental Impact," applies only to waste from reactor facilities. The staff will need to develop a technical basis to expand the waste confidence rule to encompass waste from a reprocessing facility.
Additional Information	The 1984 waste confidence decision was reaffirmed in 1990 (55 FR 38474) and is proposed to be reaffirmed in the 2008 update (73 FR 59551). The first and third findings of the 1984 waste confidence decision (49 FR 34658) discuss waste from reprocessing facilities. The first finding details the effect of reprocessing on waste form and waste packages related to the disposal of radioactive waste. In this finding, the Commission indicates that "the storage and disposal of reprocessed waste would involve substantially the same problems as those being addressed for spent fuel….Thus DOE's program is proceeding on a basis that would permit the disposal of either high-level waste or spent fuel" (49 FR 34670-71). In the 1990 update, the Commission stated that "[a]s long as DOE uses conservative assumptions and test conditions for evaluating the performance of different waste forms against NRC licensing requirements, the Commission has no basis to change its finding that there is reasonable assurance that reprocessing does not reduce confidence in the technical feasibility of designing and building a waste package that will meet NRC licensing requirements in a variety of geologic media." (55 FR 38489). In the third finding, the Commission found that high-level radioactive waste will be managed safely until sufficient repository capacity is available to ensure its safe disposal. In this finding, it states, "[i]n all cases where the interim storage is at a licensee's site, safe management will be assured by compliance with NRC regulations and specific license conditions" and "[f]acilities for reprocessing high-level waste, should any be constructed or become operational before a repository is available, would be licensed under 10 CFR Part 50, and solidification and interim storage of high-level waste would be provided for at such facilities" (49 FR 34680; reaffirmed 55 FR 38507). It is clear from reading the 1984 waste confidence decision, the 1990 update and the proposed 2009 update, that reprocessing waste was considered for disposal in a repository and for interim

	waste management. Additionally, the Commission details technical considerations of the suitability of reprocessing waste forms and packages in the first finding. At the time of the 1984 waste confidence decision, the Commission indicated that the disposal of reprocessing waste was studied longer than the disposal of spent fuel and that information exists for the technical feasibility of developing suitable reprocessing waste forms (49 FR 34670). Thus, having technical confidence in the suitability of the waste forms for permanent disposal may also provide some evidence of the technical feasibility for interim storage of these waste forms prior to disposal. The current waste confidence rule, at 10 CFR 51.23, applies only to the interim storage of spent fuel generated by light-water reactors. Reprocessing waste forms were considered in the original waste confidence decision, as indicated above. However, any expansion of the waste confidence rule to include HLW generated from spent fuel reprocessing would require a rulemaking and the preparation of a technical basis by the staff to support such a rulemaking. Sufficient information is available from continued studies on reprocessing waste forms conducted in DOE's national laboratories to support inclusion of this gap in the technical basis.
Implications for Regulating and/or Licensing Reprocessing Facilities	If the technical basis supports expansion of the waste confidence rule to include HLW, and if the rule is amended, then consideration of the environmental impacts of interim HLW storage will be considered generically. If, on the other hand, the waste confidence rule is not amended to include HLW generated from spent fuel reprocessing facilities, then the environmental impacts of interim HLW storage will need to be analyzed on a site-specific basis (by the applicant in its environmental report and then by the staff in its National Environmental Policy Act environmental analysis).
Priority for Resolution	Moderate
Path Forward	If resources are appropriately allocated, the staff can begin processes to assemble the technical basis to support this rulemaking. During the technical basis development phase, the staff will decide whether it will pursue resolution of this gap.
Resources	High

16. Waste classification

Gap	The tables in 10 CFR 61.55, "Waste Classification," do not include all reprocessing-related radionuclides. As a result, some waste streams may be considered Class A but may not be generally acceptable for near surface disposal.
Gap Type	Lack of regulations.
Basis for Gap	The waste classification tables in 10 CFR 61.55 include many radionuclides that would be associated with reprocessing waste streams. However, a few waste streams that contain radionuclides (e.g., krypton-85 separated from gaseous effluent, noble metals and some lanthanides) were not considered in the development of 10 CFR 61.55, and are not listed in either Table 1 or Table 2. As a result, some reprocessing facility wastes containing radionuclides that are not listed in Table 1 or 2 could be considered Class A, for which near-surface disposal is considered, by rule, to be generally acceptable. However, large quantities of some wastes containing radionuclides that are not included in Tables 1 and 2 may not actually be suitable for near surface disposal.
Additional Information	During licensing of the Louisiana Energy Services (LES) uranium enrichment facility in Lea County, NM, the Commission considered a contention regarding whether large quantities of depleted uranium should be considered Class A wastes, and suitable for near-surface disposal. In Order CLI-05-20 (In the Matter of Louisiana Energy Services [LES], October 19, 2005), the Commission directed staff, "outside of the LES adjudication, to consider whether the quantities of depleted uranium (DU) at issue in the waste stream from uranium enrichment facilities warrant amending section 61.55(a)(6) or the section 61.55(a) waste classification tables." In its response (SECY-08-0147, "Response to Commission Order CLI-05-20 Regarding Depleted Uranium," dated October 7, 2008), the staff recommended that the Commission approve limited rulemaking in which disposal facilities must perform a site-specific analysis to show that large quantities of DU are suitable for near-surface disposal. In its SRM for SECY-08-0147, the Commission approved the staff's recommended option for limited rulemaking for DU. The Commission also directed the following: > As a longer term action, in a future budget request the staff should propose the necessary resources for a comprehensive revision to risk-inform the 10 CFR Part 61 waste classification framework, with conforming changes to the regulations as needed, using updated assumptions and referencing the latest International Committee on Radiation Protection methodology. As part of this effort, staff should also identify any corollary or conforming legislative changes necessary to support this rulemaking, if any, as well as recommendations on how to proceed absent such legislation being enacted and other agencies

	that may be impacted by any changes. This effort should explicitly address the waste classification of depleted uranium. In addition, this effort should include the performance of a technical analysis for public comment concerning the disposal in a near surface facility of any long-lived radionuclide, including uranium. This analysis and the resulting comments should inform the staff's eventual recommendation to the Commission on an appropriate generic requirement addressing such disposals. The ACNW&M letter to Chairman Dale Klein of October 11, 2007, titled "Regulations of Advanced Spent Nuclear Fuel Reprocessing and Refabrication Facilities," discusses impacts of reprocessing waste on waste management and classification of LLW.
Implications for Regulating and/or Licensing Reprocessing Facilities	If the gap is not addressed, some wastes associated with reprocessing facilities could be classified as Class A, but they may not be suitable for near-surface disposal at some sites. As an alternative to revising the classification scheme, as staff becomes aware of specific wastes with long-lived radionuclides for which near surface disposal should be restricted in some way, it could develop guidance, and/or recommend license conditions for specific Agreement State-licensed LLW disposal facilities for which disposal of such wastes poses a specific concern.
Priority for Resolution	Moderate (consistent with SRM-SECY-08-0147)
Path Forward	As directed in SRM-SECY-08-0147, staff will immediately undertake a limited rulemaking for DU. In the longer term, the staff will request resources to risk-inform the waste classification tables in 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."
Resources	Moderate

17. Diversion path analysis requirements

Gap	There are no existing regulations for a diversion path analysis requirement under 10 CFR Part 74.
Gap Type	Lack of regulations.
Basis for Gap	Establishing diversion path analysis requirements would make 10 CFR Part 74 more risk-informed and would provide an effective detection and response program to mitigate potential safeguards vulnerabilities and system weaknesses.
Additional Information	SRM-SECY-08-0059 directed the staff to consider incorporating some of the proposals from that SECY into the reprocessing regulatory framework development efforts. This gap is Option 3 from SECY-08-0059 and represents one proposal that the staff has considered for incorporation into the regulatory framework for reprocessing, as directed by the Commission.
Implications for Regulating and/or Licensing Reprocessing Facilities	By including a diversion path analysis requirement, affected reprocessing facilities would develop a more risk-informed safeguards program that considers a wide range of malevolent activities that might involve overt or covert adversaries. A burden would be imposed upon such facilities to conduct a diversion path analysis and address any identified vulnerability.
Priority for Resolution	Moderate
Path Forward	If resources were allocated, the staff could address this gap for inclusion in the reprocessing regulatory framework. External assistance would be required to develop the technical basis for the regulatory framework and to establish applicable guidance.
Resources	High

18. Approaches toward material accounting management

Gap	Approaches to meet the timeliness and goal quantities for material inventory accounting will be addressed for changes and/or improvements.
Gap Type	Lack of regulations.
Basis for Gap	Modern technology that has been developed or is being developed will help reprocessing facilities to meet the existing timeliness and quantity goals. Additionally, incorporating a material holdup management program requirement into 10 CFR Part 74 to minimize the impact of material holdup could facilitate more accurate inventory accounting.
Additional Information	Modern reprocessing facilities are likely to have large throughputs and inventories. Currently, § 74.59(f) gives predefined quantity limits and timeliness requirements for Category I facilities which must perform physical inventories every 6 months. Predefined limits on inventory difference determinations and the restriction on inventory periods could pose a regulatory challenge for reprocessing facilities. Improved technology, such as near real time accounting, has been used at certain overseas reprocessing plants. This and other technologies can provide a more frequent inventory analysis without a facility shut-down, and will facilitate meeting the current timeliness and quantity goals. Without the assistance of modern technology, meeting the established timeliness and goal quantities could be a challenge for new facilities. Additionally, staff is considering adding regulations consistent the Series 5 regulatory guides regarding a holdup material management program for MC&A purposes to facilitate more accurate accounting measurements. A revised approach toward holdup material management was also indicated in a correspondence received from the Union of Concerned Scientists titled, “Revising the Rules for Materials Protection, Control and Accounting”.
Implications for Regulating and/or Licensing Reprocessing Facilities	Timeliness and goal quantity requirements may be a challenge to future reprocessing facilities to meet without the use of modern accounting technologies and/or revision of regulatory requirements. If 10 CFR Part 74 is revised to include provisions consistent with current NRC guidance, then reprocessing facilities will need to address the requirement for a material holdup management program.
Priority for Resolution	Moderate
Path Forward	During the development of the technical basis, the staff will consider whether to appropriately incorporate relevant information from the regulatory guides indicated above to clarify the requirements for holdup material accounting.
Resources	High

19. Effluent controls and monitoring

Gap	The requirements of 10 CFR Part 70 do not sufficiently address effluent controls and monitoring for reprocessing facilities.
Gap Type	Gap resulting from potentially licensing a production facility under 10 CFR Part 70.
Basis for Gap	Some requirements for effluent controls and monitoring releases from production and utilization facilities are codified in 10 CFR Part 50. Requirements for effluent controls and monitoring may be needed for reprocessing facilities because of their increased source term and greater potential for emissions.
Additional Information	The regulations in 10 CFR 50.34a, "Design Objectives for Equipment To Control Releases of Radioactive Material in Effluents—Nuclear Power Plants," and 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors," would require modification to address reprocessing and recycling facilities. The regulations in 10 CFR 50.36b identify requirements for protecting the environment during the construction, operation, and decommissioning of production facilities. Some 10 CFR Part 50 GDC also pertain to confinement and the control of effluents. Because most of these areas are associated with utilization facilities, they can be considered for modification in the technical basis development. In addition, 10 CFR 20.1302, "Compliance with Dose Limits for Individual Members of the Public," specifically addresses monitoring requirements for effluents. The regulation in 10 CFR 70.22(a)(7) describes "measuring and monitoring instruments," among other things, that the applicant must address in an application. These regulations will also be considered in the technical basis development. Also, a reprocessing facility will be required to meet the effluent limits established by the U.S. Environmental Protection Agency in 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations." These limits apply to "uranium fuel cycle" operations," which includes the "reprocessing of spent uranium fuel" (40 CFR 190.02(b), 40 CFR 190.10).
Implications for Regulating and/or Licensing Reprocessing Facilities	Effluent release is a more significant issue for reprocessing facilities than currently regulated or proposed 10 CFR Part 70 facilities. The staff can determine during the technical basis development whether additional control and monitoring requirements in 10 CFR Part 70 may be necessary to provide for adequate assurances of safety.
Priority for Resolution	Moderate
Path Forward	This gap can be considered during the development of the technical basis.
Resources	Moderate

20. Advanced fuel cycles and transuranic special nuclear material (SNM) classification

Gap	Existing regulations do not address security risks for other fissile material that can be separated in more advanced fuel cycle separations.
Gap Type	Lack of regulations.
Basis for Gap	Certain fissile elements such as americium (Am), neptunium (Np), and others are currently not regulated or treated as other fissile or SNM material. Such elements will be constituents in spent nuclear fuel and reprocessing facilities.
Additional Information	The policy indicated by the Commission in SRM-SECY-08-0059 does not support expanding requirements for SNM to other elements. Some advanced fuel cycle separation methods have the ability to separate actinides such as Am and others, resulting in separated and pure fissile products. However, such advanced fuel cycle separation methods are not industrially mature and are still being researched. If advanced fuel cycles that separate other fissile elements not classified as SNM become a commercial interest, the Commission may consider revisiting the policy on SNM communicated in SRM-SECY-08-0059. At this stage, it is not clear that such requirements need to be incorporated into the reprocessing regulatory framework due to the immaturity of the technology for separating such actinides.
Implications for Regulating and/or Licensing Reprocessing Facilities	Currently, to truly risk-inform 10 CFR Parts 73 and 74, control of certain elements as SNM may be warranted and necessary. If such requirements were imposed for Am, Np, and perhaps other elements, broader changes may be needed throughout the regulations. Before the NRC can license a process that separates materials such as Am and Np, the development of a measurement program (i.e., guidance, regulations and certified laboratory standards that are the basis for accrediting a measurement program) would require significant time. Other examples of possible regulatory changes could involve redefinition of strategic, moderate strategic and low strategic SNM; general licensing of certain gauges; and the classification of waste streams for processes where such material is handled as waste. Also, imposing requirements on such transuranics may have impacts on existing treaties and the international community. Additionally, if the NRC were to receive an application that proposed separation of fissile material other than SNM, the Commission would need to evaluate such applications for the potential issuance of orders to the licensee.
Priority for Resolution	Low. However, if an applicant proposes separating quantities of concern of the indicated transuranics, then the priority would increase to high.
Path Forward	Due to the Commission direction in SRM-SECY-08-0059 staff will not pursue the expansion of SNM requirements to other material in the development of the regulatory framework for reprocessing facilities. The Commission may need to evaluate potential applications demonstrating an advanced fuel cycle with separated fissile material on a case-by-case basis.
Resources	High

21. Tables S-3 and S-4 in 10 CFR Part 51

Gap	The current generic fuel cycle rule at 10 CFR 51.51, "Uranium Fuel Cycle Environmental Data—Table S-3," and 10 CFR 51.52, "Environmental Effects of Transportation of Fuel and Waste—Table S-4," does not provide environmental impact data for a closed fuel cycle that includes recycle of plutonium, neptunium, and other actinides.
Gap Type	Requirements exist, but modifications may be needed for clarity.
Basis for Gap	The current generic fuel cycle rule provides environmental impact data associated with both an open and closed fuel cycle for uranium only. The data provided in Tables S-3 and S-4 does not include environmental impacts associated with recycle of plutonium, neptunium, or other actinides in mixed-oxide fuel, for example. As a result, if one or more reprocessing facilities and associated fuel cycle facilities are licensed and operating in the future, then applicants for future power reactors would need to address closed fuel cycle environmental impacts in environmental reports submitted with their applications, to the extent that the generic rule does not already address these impacts. The NRC staff would also need to address closed fuel cycle environmental impacts in environmental impact statements associated with issuance of future plant licenses.
Additional Information	The current generic fuel cycle rule at 10 CFR 51.51 and 10 CFR 51.52 specifies environmental impact values for spent fuel reprocessing and radioactive waste management in the light-water power reactor fuel cycle, and fuel-cycle-related subjects that are to be considered in individual licensing proceedings as part of the environmental cost-benefit analysis for a light-water power reactor. The consideration of these contributions necessarily involves a wide-ranging inquiry and a certain amount of speculation. As a result, the fuel cycle impacts for a particular facility must be estimated hypothetically. In short, when this rule was promulgated, the Commission decided that the study of fuel cycle impacts involved difficult generic analysis and prediction well outside the normal scope of facility-specific subjects dealt with in individual licensing proceedings. So, it decided that uranium fuel cycle data should be treated, where possible, by a generic rulemaking, rather than case-by-base adjudication. (see Statements of Consideration for final rule in 44 FR 45362, dated August 2, 1979). Notwithstanding the fact that fuel cycle impacts are somewhat speculative, and were estimated hypothetically, sufficient data now exists from both worldwide and domestic experience in the past 35 years that an update to Table S-3 is possible. For example, some effluent radionuclides associated with reprocessing (e.g., technetium-99, cesium-134/137, and strontium-90) should be added to Table S-3. Some current data in Table S-3 were based on reactor conditions that are much different today (e.g., fuel burn-up is typically higher today than in the 1970s). The data in Table S-4 in

	10 CFR Part 51.52 are used to support the preparation of environmental statements by each power reactor applicant regarding the impacts of transportation of fuel and radioactive wastes to and from the reactor. Table S-4 does not include the transportation-related environmental impacts of reprocessing for the purposes of recovering elements other than uranium. The Statement of Considerations for the final rule states the following: > The rule need not be comprehensive in scope to be a useful and valid exercise of rulemaking authority. A record is not yet available to support a comprehensive rule dealing with all generic aspects of fuel cycle impacts relevant to reactor licensing, but the Commission is free to adopt a narrower rule that for the present leaves some of these matters for consideration in individual proceedings. The table of impacts adopted as a final rule in this proceeding serves as an important first step in this consideration, relieving adjudicatory boards from the need to determine those numerical impacts of the uranium fuel cycle which have been extensively considered in generic rulemaking.
Implications for Regulating and/or Licensing Reprocessing Facilities	If this gap is not addressed, review of future power plant applications will need to consider and address, on a case-by-case basis, the environmental impacts associated with a closed fuel cycle that are not currently addressed by this rule.
Priority for Resolution	Low
Path Forward	For the purposes of completing a gap analysis for licensing reprocessing facilities, it is sufficient to state that the generic rulemaking for fuel cycle facilities (also known as Tables S-3 and S-4) is complete, *as far as it goes*. In other words, there may be a gap, should the Commission decide as a policy matter that it wishes to extend the applicability of that generic rule beyond its original bounds. The following are three options to consider for potential rulemaking in this area: (1) initiate no rulemaking to extend the generic rule beyond its existing bounds, thus relying on case-by-case adjudication to deal with advanced fuel-cycle-related impacts in the near term, until a technical basis for a new generic rule is determined, (2) expand the generic rule to include an advanced fuel cycle relative to modern commercial reprocessing efforts but continue to limit its applicability to reactor licensing, or (3) expand the generic rule to include an advanced fuel cycle relative to modern commercial reprocessing efforts and extend its applicability to licensing of reprocessing facilities. The same options indicated here can be applied to 10 CFR 51.52.
Resources	Option (1): None Option (2): High Option (3): High

22. Content of an application

Gap	Different licensing options (e.g., one- and two-step) may necessitate additional requirements than those currently in 10 CFR Part 70.
Gap Type	Requirements exist, but modifications may be needed for clarity.
Basis for Gap	The regulation in 10 CFR 52.79, "Contents of Applications; Technical Information in Final Safety Analysis Report," outlines the technical information required in applications for a combined operating license. In accordance with 10 CFR 52.77, "Contents of Applications; General Information," this information is in addition to the requirements for these applications given in 10 CFR 50.33, "Contents of Applications; General Information."
Additional Information	The NEI white paper indicated a preference for licensing flexibility to include the various options: one-step, two-step, and the ability to combine other facility licenses under the reprocessing facility license.
Implications for Regulating and/or Licensing Reprocessing Facilities	Additional information may be needed to complete the licensing review for one-step license applications. This information could be obtained through requests for additional information during the acceptance review.
Priority for Resolution	Low
Path Forward	Applicable portions of 10 CFR Part 52 can be incorporated into 10 CFR Part 70.
Resources	Low

23. Illustrative list of reprocessing plant components (Appendix I to 10 CFR Part 110)

Gap	The illustrative list of reprocessing plant components found in Appendix I, "Illustrative List of Reprocessing Plant Components under NRC Export Licensing Authority," to 10 CFR Part 110, "Export and Import of Nuclear Equipment and Material," is focused mainly on aqueous methods. The list does not include equipment related to pyroprocessing or other related reprocessing facilities (e.g., vitrification).
Gap Type	Regulations exist, but modifications may be necessary for clarity
Basis for Gap	The illustrative list comprises reprocessing plant components that are under NRC export licensing authority. The list does not address components of pyroprocessing, or other related reprocessing facilities.
Additional Information	The list in Appendix I to Part 110 is illustrative and thus not meant to be all-inclusive. It is used for illustrative purposes and is based on the Nuclear Suppliers Group Trigger List (International Atomic Energy Agency, INFCIRC/254/Rev. 9/Part 1, dated December 7, 2007).
Implications for Regulating and/or Licensing Reprocessing Facilities	Currently, no commercial-scale pyroprocessing facilities exist. If this changes, the NRC has export and import licensing authority over production facilities as defined in the AEA (see 10 CFR 110.8(d) and 110.9a.)
Priority for Resolution	Low
Path Forward	The staff does not see the need for any changes to 10 CFR Part 110 at this time.
Resources	Moderate