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Project Execution Plan

Three-Mile Island Unit 2 Independent Spent Fuel Storage Installation License Renewal

Idaho Cleanup Project

CH2M•WG Idaho, LLC is the Idaho Cleanup Project contractor for the U.S. Department of Energy

CONTENTS

ACRONYMS

ACWP	actual cost of work performed
AMP	aging management program
AMR	aging management review
BCP	baseline change proposal
BCWP	budgeted cost of work performed
BCWS	budgeted cost of work scheduled
BWR	boiling water reactor
CONOPS	conduct of operations
CWI	CH2M-WG Idaho, LLC
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
DSC	dry shielded canister
ESH&Q	Environment, Safety, Health, and Quality
EVMS	earned value measurement system
FSV	Fort St. Vrain
FY	fiscal year
HEPA	high-efficiency particulate air
HSM	horizontal storage module
ICARE	Issue Communication and Resolution Environment
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ISFSI	Independent Spent Fuel Storage Installation

ISMS	Integrated Safety Management System
LCB	life-cycle baseline
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
PBS	process breakdown structure
PEP	Project Execution Plan
PP&I	Program Planning and Integration
PWR	pressurized water reactor
RAI	Request for Additional Information
RWMC	Radioactive Waste Management Complex
SAR	safety analysis report
SSCs	systems, structures, and components
TAN	Test Area North
TLAA	time limited aging analyses
TMI-2	Three-Mile Island, Unit 2
WBS	work breakdown structure

1. PROJECT IDENTIFICATION

The U.S. Department of Energy (DOE) uses a modified NUHOMS® spent fuel storage system, designated NUHOMS®-12T, in the Three-Mile Island, Unit 2 (TMI-2) Independent Spent Fuel Storage Installation (ISFSI) located at the Idaho National Laboratory (INL) for interim storage of TMI-2 core and core handling debris. The TMI-2 core debris is in stainless steel canisters. The NUHOMS®-12T spent fuel storage system provides for the horizontal dry storage of up to twelve TMI-2 canisters inside a dry shielded canister (DSC) which is placed inside a concrete horizontal storage module (HSM).

The TMI-2 ISFSI design is based on the licensed NUHOMS® spent fuel storage system. The NUHOMS® spent fuel storage system has an extensive licensing and technical basis. The original NUHOMS® Topical Report was approved by the United States Nuclear Regulatory Commission (NRC) on March 28, 1986 for storage of seven spent pressurized water reactor (PWR) fuel assemblies per DSC and HSM.[1, 2] The NUHOMS® Topical Report was revised to provide the generic design criteria and safety analysis for the larger 24 spent PWR fuel assembly design (NUHOMS®-24P) and an associated on-site transfer cask.[3] NRC approval of the NUHOMS®-24P Topical Report was granted on April 26, 1989.[4] The standardized NUHOMS® design has since been expanded to include the NUHOMS®-52B for dry storage and on-site transfer of fifty-two boiling water reactor (BWR) fuel assemblies.[5] The NRC issued Certificate of Compliance 72-1004, dated January 23, 1995, for the standardized NUHOMS® spent fuel storage system, addressing both the NUHOMS®-24P and the NUHOMS®-52B spent fuel storage systems. The approved NUHOMS®-24P Topical Report forms the basis for the NUHOMS®-12T spent fuel storage system. The NUHOMS®-12T spent fuel storage system was adapted for TMI-2 canister use and the system accommodates the internal baskets designed specifically to hold TMI-2 canisters.

The TMI-2 ISFSI is located at the INL and operated by CH2M-WG Idaho, LLC (CWI) for DOE. The TMI-2 ISFSI is licensed (License No. SNM-2508) by the NRC pursuant to 10 CFR 72 for authorization to receive, acquire, possess and store TMI-2 core and core handling debris at the TMI-2 ISFSI located at the INL within the perimeter of the Idaho Nuclear Technology and Engineering Center (INTEC) site in Scoville, Idaho.[6] Although the TMI-2 ISFSI is located inside a DOE facility operated under DOE Regulations, Orders and Directives; NRC regulations apply to the TMI-2 ISFSI and take precedence over DOE Orders, Requirements and Guidelines. The TMI-2 ISFSI is exempted from those DOE Orders that duplicate or overlap NRC requirements.

Subsequent to the March 1979 accident at the TMI-2 Nuclear Power Station, DOE agreed in March 1982 to accept the entire TMI-2 damaged core for research, development, and storage at a DOE facility.[14] DOE selected the INL to perform the TMI-2 core debris investigations. Defueling of the TMI-2 reactor began in October 1985 and was completed in January 1990. The TMI-2 core debris was shipped from the TMI-2 Nuclear Power Station to the INL from July 1986 until April 1990 and received, examined, and stored at the TAN-607 Hot Shop and Fuel Storage Pool.

In March 1999 the TMI-2 ISFSI was licensed by the Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 72 for authorization to receive, possess, store, and transfer spent fuel and fuel debris, resulting from the 1979 TMI-2 accident, for a twenty-year term. The first core debris transfer from TAN-607 was completed in March 1999. Nine additional transfers were completed during 2000. The remaining nineteen transfers were completed during 2001, with the last one completed in April 2001. The TMI-2 ISFSI license expires on March 19, 2019. A license renewal application must be developed and submitted to the NRC no later than March 19, 2017.

1.1 Purpose

The NRC has published a Standard Review Plan (NUREG-1927) which defines an acceptable method satisfying the applicable regulatory requirements for the development of license renewal applications.[7] The method defined in NUREG-1927 for preparation of the license renewal application for the TMI-2 ISFSI includes a General Information Review, Scoping Evaluation, and an Aging Management Review.

The license renewal activity will be included in Work Breakdown Structure (WBS), T.M.02.01.02, NRC Facilities (Task TMI-2 ISFSI License Renewal FY11 to FY19) with $2.7 million (adders included) allocated for the activity (subject to DOE approval). The project will be performed in the timeframe spanning January 2011 through March 2019. The schedule for the TMI-2 ISFSI License Renewal project, based on actual time durations and cost ($924,383 from FY07 through FY10) realized during the Fort St. Vrain (FSV) ISFSI License Renewal project, and adjusted for known time-intensive yet necessary aging management reviews and programs ($1,296,860 and multiple years for HSM repair, and $496,294 and one year for canister inspection), is summarized.

Activity	Start Date	Completion Date
Scoping Evaluation	April 2011	October 2011
Pre-Application Meeting with NRC	October 2011	October 2011
Aging Management Review	October 2011	January 2016
Renewal Application	January 2016	March 2017
Requests for Additional Information	March 2017	March 2019

1.2 Facility Description/History

The TMI-2 canisters were stored in the Fuel Storage Pool at the INL Test Area North (TAN) as early as July 1986. Since the TAN Hot Shop was scheduled for decommissioning as part of the overall INL plan, dry storage of the TMI-2 canisters was selected as the interim storage approach. Since the NUHOMS® was a proven system for dry storage which had been in use at reactor sites since March 1989, the INL chose this design for the TMI-2 ISFSI to provide temporary dry storage for 100% of the TMI-2 canisters. The TMI-2 ISFSI design includes an extra HSM with a pre-installed DSC overpack in case a challenged canister needs additional confinement. The INL TMI-2 ISFSI and NUHOMS®-12T components are also designed to allow retrieval of the TMI-2 canisters for further processing, alternate storage, or disposal.

Since the dry storage for the TMI-2 canisters utilizes an adaptation of the standardized NUHOMS® system, there are notable differences between the TMI-2 canisters and commercial fuel assemblies. TMI-2 core debris is canisterized whereas commercial fuel is clad. The canisters contain TMI-2 core debris and debris from core handling equipment resulting from the 1979 TMI-2 accident. The TMI-2 canisters provide a much stronger structural element, as compared to commercial fuel assemblies, for support within the DSC basket. The heat load for the TMI-2 canister is much less than a commercial spent fuel assembly. The TMI-2 canisters have the potential for hydrogen gas generation due to radiolysis. Based on these considerations, the NUHOMS® system is modified to accommodate these conditions. Specifically, the NUHOMS®-12T DSC is modified to include venting of the DSC through high efficiency particulate air (HEPA) grade filters during storage. The vent system allows for release of the hydrogen gas and allows for monitoring and/or purging of the system during operation.

DOE's schedule for licensing, construction and operation of the INL TMI-2 ISFSI was established by the Settlement Agreement entered into by the State of Idaho, the Department of Energy, and the Department of Navy.[8] The TMI-2 ISFSI is located within the INL, a DOE-controlled site occupying 571,800 acres within Butte County and surrounding counties in eastern Idaho, and sited within the boundaries of the INTEC, a facility with the mission to receive and store nuclear fuels and radioactive wastes. The INTEC occupies about 120 acres of the south-central portion of the INL, and is located 42 miles west of Idaho Falls. The INL TMI-2 ISFSI is sited in a two acre dedicated area within the INTEC boundaries.

The INL TMI-2 ISFSI utilizing the NUHOMS®-12T system provides for the horizontal, dry storage of canisterized TMI-2 core debris in a concrete HSM. The storage system components for the NUHOMS®-12T consist of a reinforced concrete HSM and a DSC with an internal basket assembly which holds the TMI-2 canisters. The NUHOMS®-12T system also utilized transfer equipment to move each DSC from the TAN facility (where they were loaded with TMI-2 canisters and readied for storage) to the HSMs where they are stored. The transfer system included the transfer or transportation cask, lifting slings, a hydraulic ram system, a prime mover for towing, a transport trailer, a cask transportation skid, and a skid positioning system. The transfer system interfaced with the INL TAN Hot Shop cask handling crane. Auxiliary equipment such as a vacuum drying system and an automated welding system were also used to facilitate DSC loading, purging and sealing operations.

The HSM is a low profile, reinforced concrete structure designed to withstand all normal condition loads as well as the abnormal condition loads created by earthquakes, tornadoes, and other natural phenomena. The HSM is also designed to withstand abnormal condition loadings postulated to occur during design basis accident conditions.

The DSC design addresses a postulated design basis transfer cask drop accident. The DSC shell, and the closures on each end, ensures that the intended safety functions of the system are not impaired following a postulated transfer cask drop accident. The limits established for equivalent decelerations due to a postulated drop accident envelop a range of conditions such as the cask handling operations, the type of handling equipment used, the cask on-site transport route, the maximum feasible drop height and orientation, and the conditions of the impacted surface.

The decay heat of the TMI-2 core debris is rejected from the DSC shell to the HSM walls by radiant heat transfer. The heat is conducted through the HSM walls and removed from the HSM outer surfaces by natural convection and by radiant heat transfer to the ambient air. Under worst case extreme summer ambient conditions, thermal calculations show that no cooling air vents are required to remove the decay heat generated from the TMI-2 core debris.

Given the corrosion resistant properties of materials used for construction of the NUHOMS®-12T system components and the dry environment which exists within the HSM, no limits on the range of acceptable external atmospheric conditions are required. All metal components are steel and are coated with inorganic coatings or galvanized where practicable. Hence, all metallic materials are protected against corrosion wherever possible. However, a corrosion allowance is included in the structural evaluation of the carbon steel components. The interior of the HSM is a concrete surface and is void of any substance which would be conducive to the growth of organic or vegetative matter.

Each DSC is vented to prevent the accumulation of gases generated due to radiolysis. Although the TMI-2 canisters contain hydrogen recombiners, the vent system design conservatively assumes that the recombiners are not functional relative to reducing hydrogen concentrations. A vent assembly with HEPA

grade filters is installed on each DSC, with access through a small vented door in the rear of the HSM. The design features, operations, surveillance and maintenance plans were developed to assure that the system can be tested and monitored for gas accumulation in the DSCs. Although no significant release of radioactive gases or particulate was anticipated, monitoring of air and gases vented through the HEPA filters was also addressed in the surveillance and maintenance plans. A photograph of the TMI-2 ISFSI is shown in Figure 1.

Figure 1. TMI-2 ISFSI.

1.3 Project Justification

The TMI-2 ISFSI has a twenty year, renewable, NRC License pursuant to 10 CFR 72 (Materials License No. SNM-2508) to receive, possess, transfer, and store at the TMI-2 ISFSI radioactive material from the TMI-2 reactor core damaged by the March 28, 1979, reactor accident, as well as radioactive material related to receipt, storage, and transfer of the radioactive material from the TMI-2 reactor core. The driver for this project is the TMI-2 ISFSI license expiration date of March 19, 2019, and it is unlikely a spent nuclear fuel repository will be available for transfer and permanent storage. A license renewal application must therefore be developed and submitted to the NRC no later than March 19, 2017.

1.4 Project Funding

Funding for the TMI-2 ISFSI License Renewal Project will come from PBS sources described in WBS T.M.02.01.02, NRC Facilities (TMI-2 ISFSI Work Package).

2. PROJECT SCOPE

The description of the license renewal project work activities will be included in WBS T.M.02.01.02, NRC Facilities (TMI-2 ISFSI Work Package).

2.1 Scope

The scope of the TMI-2 ISFSI License Renewal Project includes a Scoping Evaluation and an Aging Management Review.

2.2 Project Documents

This project execution plan (PEP) is a principal communication vehicle for use by the project. The primary purpose of the PEP is to provide guidance to the project team on how to work together to achieve project results that satisfy the DOE, NRC, and all other stakeholders. The PEP will be supplemented by work activity summary letters, which will provide additional detail for lower-tier tasks. The license basis documents for the TMI-2 ISFSI include the following:

- TMI-2 ISFSI Safety Evaluation Report
- TMI-2 ISFSI License and Technical Specifications
- TMI-2 ISFSI Safety Analysis Report
- TMI-2 ISFSI Technical Specification Bases
- TMI-2 ISFSI Physical Protection Plan
- TMI-2 ISFSI Emergency Response Plan
- TMI-2 ISFSI Environmental Report
- Safeguards Information Protection Plan.

3. TECHNICAL APPROACH

The technical approach to development of the TMI-2 ISFSI license renewal application is based on NUREG-1927.[7] For each key license renewal work activity, technical approaches and methodologies have been selected that guide the overall work activity and upon which the path to the selected end state is determined. These technical approaches are discussed below. Refer to NUREG-1927 for a more detailed discussion.

3.1 Technical Strategy

3.1.1 General Information Review

The purpose of the general information review is to ensure the license application will meet the applicable requirements of 10 CFR 72, specifically the following:

- Application content addressed in 72.48
- Licensee information addressed in 72.22(a)(b)(c)(d)
- Financial information addressed in 72.22(e)
- Environmental report information addressed in 72.34 and 72.122.[9]

Since the licensee is DOE, the application must specify the organization responsible for the operation of the TMI-2 ISFSI and describe any delegations of authority and assignments of responsibilities. The application must also contain either an updated Environmental Report or supplement thereto, as required by 10 CFR 51.60.[10] The supplement may be limited to incorporating by reference, updating, or supplementing the information previously submitted to reflect any significant environmental change, including proposed decommissioning activities.

The application content must include sections addressing general information, scoping evaluation, aging management review, time-limited aging analyses, aging management program, and any additional information related to the updated safety analysis report and any changes or additions to technical specifications. Refer to NUREG-1927 for specific guidance on drawings and any changes that have occurred in the design of structures, systems and components (SSCs) of the ISFSI. The license renewal request must not include any changes to the current licensing basis. Such changes must be requested through a separate license amendment process.

As set forth in 10 CFR 72.22(e), DOE is not required to provide detailed financial information to demonstrate its financial qualifications. DOE-ID has funding to operate the TMI-2 ISFSI and will request the necessary funding from Congress for the continued operation, maintenance and decommissioning of the facility in future years. License Condition No. 15 for the currently held 10 CFR Part 72 license (SNM-2508) addresses the funding of TMI-2 ISFSI activities.

3.1.2 Scoping Evaluation

The purpose of the scoping evaluation is to identify the SSCs of the ISFSI that should be reviewed for aging effects. The license application must include information on the following areas to meet the applicable requirements of 10 CFR 72:

- Scoping process addressed in 72.24(g) and 72.42(b)
- SSCs within the scope of license renewal addressed in 72.3, 72.24(b)(c)(d)(g), 72.120(a)(d), and applicable sections of 72.122
- SSCs not within the scope of license renewal addressed in 72.24(b)(c)(d)(g), 72.120(a)(d), and applicable sections of 72.122.[9]

The NRC will base the license renewal on the continuation of the existing licensing basis throughout the period of extended operation and on the maintenance of the intended functions of the SSCs important to safety. If new safety related deficiencies are discovered during the aging management review, they must be dispositioned through the license amendment process. The renewal process cannot be used to facilitate approval of design changes.

The scoping evaluation process will be performed and documented as a scoping study and include the following:

- A description of the scoping process and methodology for the inclusion of SSCs in the renewal scope
- A list of the SSCs and appropriate subcomponents that are identified as within the scope of renewal, their intended function, and safety classification or basis for inclusion in the renewal scope (refer to NUREG/CR-6407 for additional guidance describing SSCs that may be included within the scope of license renewal)[11]
- A list of the sources of information used (may include SARs, technical specifications, operating procedures, regulatory compliance reports, design basis documents, drawings, quality assurance plan or program, docketed correspondence, operating experience reports, 10 CFR 72.48 reviews, and vendor information)
- Any discussion needed to clarify the process, SSC designations, or sources of information used.

SSCs within the scope of renewal must fall into one of the following scoping categories:

- Classified as important to safety because they are relied upon (important to safety functions are met for criticality, shielding, confinement, heat transfer, structural integrity, and retrievability) to either maintain the conditions required by the regulations or license to store fuel safely, prevent damage to the spent fuel during handling and storage, or provide reasonable assurance that spent fuel can be received, handled, packaged, stored, and retrieved without undue risk to the health and safety of the public, or

- Classified as not important to safety but, according to the licensing basis, their failure could prevent fulfillment of a function that is important to safety, or their failure as support SSCs could prevent fulfillment of a function that is important to safety.

The in-scope SSCs are further reviewed to identify and describe the subcomponents that support the intended function(s) of the SSCs. The intended function(s) of the subcomponents are the specific function(s) that support the safety function(s) of SSCs of which they are a part. Such intended functions may include providing criticality control of spent fuel, providing heat transfer, directly or indirectly maintaining a pressure boundary, providing radiation shielding, and providing structural support, functional support, or both, to SSCs that are important to safety. Refer to NUREG-1927, Appendix B for examples of SSCs that the scoping evaluation may consider.

For those SSCs that are not within the scope of renewal, such SSCs will be verified to not fall into either one of the two categories discussed above. Refer to NUREG-1927 for some specific SSCs that are not important to safety and may be eliminated from the scope.

3.1.3 Aging Management Review

The purpose of the aging management review (AMR) is to assess the SSCs determined to be within the scope of renewal. The AMR addresses aging effects that could adversely affect the ability of the SSCs to perform their intended functions during the period of extended operation. The AMR approach will be coordinated with structural, health physics, thermal, criticality, and quality assurance disciplines as appropriate. The renewal application must include specific information that clearly describes the AMR performed on the in-scope SSCs in the context of the following areas:

- Identification of materials and environments for those SSCs and associated subcomponents determined to be within scope
- Identification of aging effects requiring management
- Identification of aging management programs (AMPs) for managing the effects of aging
- Identification of time-limited aging analyses (TLAAs).
- Retrievability

The SAR and supporting documents related to the ISFSI design are the primary documents that describe the safety classification, intended function(s), materials, and environmental conditions for SSCs of the ISFSI identified as in scope for renewal. Other documents may include calculations, specifications, drawings, technical reports, vendor manuals, and procedures. Industry reports, reference books, and codes and standards should be consulted as appropriate to evaluate aging effects. Refer to NUREG-1927, Appendix C for an example of an AMR for a horizontal storage module. Consult ASTM C 1562 for additional technical guidance such as degradation mechanisms of materials.[12]

The AMR matrix of 10 CFR 72 requirements for license renewal includes the following areas:[9]

- Aging effects addressed in 72.24(d), 72.104(a), 72.106(b), 72.120(a)(d), 72.122(a)(b)(c)(h)(l), 72.124, and 72.162
- Aging management, maintenance, or surveillance programs addressed in 72.82(d), 72.122(f)(h)(i), 72.128(a), 72.162, 72.168, 72.170, and 72.172
- TLAAs addressed in 72.24(d), 72.104(a), 72.106(b), 72.120(a)(d), 72.122(a)(b)(c)(f)(h)(i)(l), 72.124, 72.128, and 72.170
- Retrievability addressed in 72.122(a)(b)(c)(h)(l).

To facilitate the identification of the materials of construction and the environments to which the materials are exposed, refer to NUREG-1927, Appendix B, for an example of the typical SSC material description(s), operating environment, and intended function the application should provide. The renewal application must also include environmental data that includes temperature, wind, relative humidity, exposure to rain or water, radiation field, and gaseous environment such that the operating and service conditions of the SSCs can be determined.

Potential aging effects must be evaluated in terms of material and environment combinations. The application must provide an analysis and documentation that identifies all the potential and actual aging effects pertinent to the SSCs determined to be within the scope of renewal. Aging effects that may theoretically occur, as well as aging effects that have actually occurred, based on industry and site operating experience(s) and component testing must be included. If an SSC is determined to be within

scope and is found to have no potential aging effects for the period of extended operation, then no further action is warranted. However, the SAR supplement accompanying the application must document the SSCs requiring no further review.

Synopses of root cause evaluations, repair or modification history, and maintenance activities identified under a corrective action program, including both site-specific and industry wide experience, possibly indicative of repetitive or periodic conditions that may require an aging management program, should be discussed in the application. Possible mitigating measures for one-time events during the period of extended operation should be considered and also included in the application.

Aging effects requiring either a TLAA or an AMP must be identified in the renewal application. A TLAA is a process to assess SSCs that have a time-dependent operating life. The time dependency may be fatigue life or time limited. Examples of possible TLAAs include a neutron fluence level that causes embrittlement of metallic components, depletion of neutron absorber material, and thermal fatigue of the canister shell. The renewal application must provide appropriate analyses of all SSCs with a time-dependent operating life, and a conclusion that continued operation of the SSC is acceptable for the period of extended operation. Future monitoring of any potential aging effects analyzed in TLAAs should be considered. Refer to NUREG-1927 for the criteria used in determining the appropriateness of a TLAA for existing or newly identified SSCs with a time-dependent operating life.[7]

The purpose of the AMP is to ensure that no aging effects result in a loss of intended function of the SSCs that are within the scope of renewal for the term of the renewal. Although the elements of an AMP or inspection may vary, depending on the specific SSC, the elements of an AMP that should be considered to determine the adequacy and applicability of any proposed method for managing an aging effect include the scope of the program, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience. Refer to NUREG-1927 for further discussion of these elements, and Appendix D of NUREG-1927 for potential aging effects and possible aging mechanisms that the AMP should consider.[7]

NUREG-1927, Appendix E provides component-specific aging management guidance for lead canister external remote visual inspection and HSM canister support steel.[7] Canister (DSC) materials are selected to be resistant to environmentally induced degradation during the initial license period. To ensure confinement function of the canister for the license renewal, it is necessary to demonstrate that canisters have not undergone unanticipated degradation. An accepted way to verify canister condition at an ISFSI is by remote visual inspection of one or more lead canisters. A lead canister is selected on the basis of longest time in service, or hottest thermal load, and/or other parameters that contribute to degradation. The interior of the associated concrete HSM should also be examined as part of the lead canister inspection. The inspection must be performed prior to submittal of the license renewal application. The inspection results become part of the justification for license renewal. The canister and HSM inspection results should be provided with the updated SAR. Typically a repeat inspection is conducted at 20-year intervals as a license condition for renewal, although the licensee may propose alternative inspection intervals for NRC approval.

The canister support structure should also be inspected to support the license renewal application. This may be done on a sampling basis with support structure selection based on longest service time, material, and/or environmental conditions. A re-inspection interval for the support structure based upon the findings of the initial license renewal inspection should be specified.

Storage systems are designed to allow ready retrieval of spent fuel for further processing or disposal for the duration of the licensing period. ISG-2 provides additional guidance regarding retrievability.[13] The renewal application must address any potential retrievability issue and provide justification for the continued operation during the period of extended operation. As an example, the possibility for galling causing a seizure between the canister shell and support structure rails during the canister retrieval process should be addressed during the license renewal process. More specific to the TMI-2 ISFSI is the potential for DSC rotation during transfer between the transfer cask and the HSM as was experienced during one of the HSM loadings.

3.1.4 License Basis Document Changes

The TMI-2 ISFSI SAR will be supplemented with a summary description of the programs and activities relied upon to manage the effects of aging and the evaluation of TLAAs for the license renewal period. The TMI-2 ISFSI SAR update submitted as part of the license renewal application will remain in its current format in accordance with Regulatory Guide 3.48 specifications.[15] Technical specification changes or additions that are necessary to manage the effects of aging during the renewal period may be proposed and comply with the applicable requirements of 10 CFR 72.44.

3.1.5 Development and Submittal of Renewal Application

A license renewal application for the TMI-2 ISFSI will be developed for DOE-ID, allowing adequate time for their review and approval, and submitted to the NRC no later than March 19, 2017 (24 months prior to termination of the current license). The license renewal application will consist of an updated Safety Analysis Report; updated Technical Specifications; updated Technical Qualifications; updated Decommissioning, Funding and Financial Assurance Plans; an updated Emergency Plan; and an updated (supplemental) Environmental Report.

3.1.6 Interface/Meetings with DOE/NRC and Responses to Requests for Additional Information

NRC Regulatory Issue Summary 2004-20 provides guidelines (Rules of Engagement) for interactions between applicants and Spent Fuel Project Office staff.[16] Such guidelines address pre-application interactions, NRC point-of-contact, telephone interactions, submittals, administrative review of the license renewal application, and requests for additional information. It is anticipated that DOE-ID will notify the NRC well in advance of the planned application submittal date of their plans to submit a license renewal application for the TMI-2 ISFSI. Subsequent to such notification, pre-application meetings with the NRC will be scheduled and attended by both DOE-ID and contractor personnel. The NRC requires that these meetings be open to the public. During the minimum 2-year application review period, requests for additional information from the NRC may require additional meetings and formal written responses.

3.2 Project Closure

This license renewal project will culminate in a license extension for the TMI-2 ISFSI no later than March 19, 2019. A closeout report for the license renewal project will be prepared. The report will describe all activities completed and include any significant variations from original decision documents. The report will substantiate the activities performed to achieve successful license renewal. The report will also include an index of project records and indicate where records will be archived for reference during future license renewal projects.

4. PERFORMANCE CRITERIA

Performance criteria have been identified by the TMI-2 ISFSI License Renewal Project, as necessary, to successfully accomplish the project. These criteria (milestones and performance indicators and measures) are discussed in the following sections.

4.1 Enforceable and Supporting Milestones

TMI-2 ISFSI License Renewal Project milestones are presented in Section 1.1.

4.2 Performance Metrics

Performance metrics used on the TMI-2 ISFSI License Renewal Project will include the number of activities started/finished relative to the number of activities planned to start/finish. Project schedule and cost will be measured at the WBS Level 5 for NRC Facilities. Minor milestones may be developed and tracked as necessary within the TMI-2 ISFSI License Renewal Project and with DOE-ID. Accomplishment of key milestones per monthly schedule will be the performance indicator developed to provide a method of evaluating project performance.

5. PROJECT RISK MANAGEMENT

The TMI-2 ISFSI License Renewal Project will effectively mitigate existing and future potential risks to achieve the end state. Uncertainties that could impact success have been comprehensively identified along with effective risk elimination and mitigation strategies for each.

5.1 Assumptions

5.1.1 General

- Funding is available throughout the nine-year project life to support baseline achievement.
- ISFSI Management is allowed to match skill needs throughout the project and to align resources as scope is completed.
- TMI-2 ISFSI License Renewal Project management methodology will reflect lessons learned documented RIS 2004-20 and NRC expectations documented in NUREG-1567.[16, 17]
- Adequate funding will be available to attend pre-application meetings (NRC) and conferences (DOE, NRC, NEI sponsored) as necessary to support application development.
- Activities will be outsourced as necessary.
- DOE-ID will be an integral participant throughout the process and agrees to pursue a 30-year license extension.

5.1.2 10 CFR 72.42(a) Exemption

TMI-2 ISFSI License No. SNM-2508 expires on March 19, 2019. 10 CFR 72.42(a) states that the license term for an ISFSI must not exceed 20 years from the date of issuance, therefore implying that a license renewal is limited to 20 years. 10 CFR 72.7 allows exemption from the regulation if the

exemption will not endanger life or property or the common defense and security and are otherwise in the public interest. DOE-ID decided to not request a 72.42(a) exemption for the FSV ISFSI since the facility was designed for 40 years. A 72.42(a) exemption request for the TMI-2 ISFSI could be justified because the facility is designed for 50 years, but this may be offset by limitations within the Governor's Agreement.[8] The decision ultimately resides with DOE-HQ (specifically GC-52). The NRC is also considering rescinding the exemption requirement, thereby making this a mute point by the time the license renewal application is submitted in 2017.

5.2 Risks

ISFSI Management will manage risks by identifying, quantifying, and mitigating risks. A key component to risk mitigation will be ISFSI Management's revised integrated work control plan, which requires that those responsible for planning work identify, visualize, and anticipate risks associated with execution of an activity. In the mitigation step, a planner will be responsible for developing alternative plans that eliminate, avoid, and/or mitigate risks.

5.3 Risk Codes

Risk codes have been assigned to each TMI-2 ISFSI License Renewal Project activity for the purpose of risk planning. The following describes each of the risk codes, in increasing order of risk, that were used to plan.

- Resources are readily available. No special materials, equipment, or labor skills are required. Ample previous experience with this type of work exists, and costs are readily known. Regulators have routinely approved this approach. There is minimal impact on other activities and little or no schedule and/or cost risk exists [Risk 1].

- Resources are commonly available. Some special materials, equipment, or labor skills may be required. Ample previous experience with this type of work or known technology exists, and costs are readily known. Regulators have approved this approach. There are minor impacts to other activities and no significant schedule and/or cost risk exists [Risk 2].

- Labor resources are available, but special materials, equipment, or labor skills may be required. Some experience with this type of work or technology exists, and there is a good basis for costs. Regulators may have expressed some difficulty with this approach. Other activities may be impacted if resources are unavailable; there is potential for schedule and/or cost risk [Risk 3].

- Required materials, equipment, labor skills, and availability may be limited. Other activities will be significantly impacted if resources are unavailable. There has been limited previous experience with this type or work or technology, and a limited basis for costs exists. Activity engineering bases and methodologies may be uncertain or unproven. Regulators may have difficulty with this approach. There is greater potential for schedule and/or cost risk [Risk 4].

- Special resources, equipment, and labor skills are required and may be in short supply. Other activities will be significantly impacted if resources are unavailable. There is no previous experience with proposed methodology or technology. Costs are unknown or difficult to estimate. Regulators have never been presented with this approach or similar approaches. Significant schedule and/or cost risk exists [Risk 5].

5.4 Significant Project Risks

The following is a preliminary summary of significant risks to the TMI-2 ISFSI License Renewal Project, outcome assessments, and mitigation strategies:

Work Activity	Cost Risk	Schedule Risk	Mitigation Strategy
Scoping Evaluation	1	1	CWI has projected its future workforce needs and will have finalized the workforce skill mix plan and subsequent impact on the ISFSI Management organization prior to initiation of the TMI-2 ISFSI license renewal activities.
Aging Management Review	2	2	
Renewal Application	1	1	
Requests for Additional Information	1	1	

6. METHOD OF ACCOMPLISHMENT

Work will be performed in two ways: (1) utilizing the workforce currently assigned to the project and (2) outsourcing. It is the intent to use the existing operations workforce that is trained and familiar with the TMI-2 ISFSI. Some work may be outsourced whenever feasible and cost effective.

7. ENVIRONMENTAL, HEALTH, SAFETY, AND QUALITY

The TMI-2 ISFSI adheres to the CWI Environmental Policy by conducting its operations in a safe, compliant, and cost-effective manner that protects human health and the environment. This is achieved by integrating environmental requirements and pollution prevention into its work planning and execution, and taking actions to minimize the environmental impacts of its operations. Each activity will also utilize the ISMS to provide a consistent approach to ensure environmental, worker, and public safety. Safety professionals will be dedicated to each activity as necessary to provide oversight and assistance in safely performing the work scope. All elements of the established quality assurance program will be implemented as applicable to the license renewal project activities.

7.1 Environmental Compliance

The TMI-2 ISFSI License Renewal Project is fully committed to regulatory compliance and environmental stewardship. Safety and environmental requirements are established through PDD-1004 and PDD-1012.[18,19] The Environmental Management System integrates environmental protection, pollution prevention, and regulatory compliance into work planning and execution throughout all work areas as a function of the five core elements of ISMS and the elements of the ISO-14001, Environmental Management System Standard.[20] Instructions to comply with environmental requirements are contained in MCP-3480.[21] The TMI-2 ISFSI has completed an environmental checklist in accordance with MCP-3480 and determined that an environmental review is adequately documented in the NRC letter dated March 19, 1999, Issuance of Materials License SNM-2508 for the Three Mile Island, Unit 2, Independent Spent Fuel Storage Installation, and the Final Environmental Impact Statement (NUREG-1626) referenced therein.[22]

7.2 Applicable Regulatory Requirements Documentation

The CWI contract with DOE specifies applicable DOE directives and other requirements relevant to the scope of work at INTEC. Section 2.2 of this document specifies applicable License Basis Documents for the TMI-2 ISFSI. The following NRC regulations are also applicable to the license renewal project:

- 10 CFR 2, Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders
- 10 CFR 19, Notices, Instructions, and Reports to Workers
- 10 CFR 20, Standards for Protection Against Radiation
- 10 CFR 21, Reporting Defects and Noncompliance
- 10 CFR 51, Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
- 10 CFR 71, Packaging and Transportation of Radioactive Material
- 10 CFR 72, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste
- 10 CFR 73, Physical Protection of Plants and Materials.

All work performed under this PEP will comply with the applicable requirements.

7.3 Health and Safety

The TMI-2 ISFSI ensures the safety of the workers and the public. Environment, Safety, Health, and Quality (ESH&Q) during the license renewal activities will continue to be implemented through PRD-317 and PLN-466.[23,24] Accountability for specific license basis compliance rests with the TMI-2 ISFSI Facility Manager and Facility Safety Officer. The Regulatory Compliance group within the ISFSI Management organization assists the TMI-2 ISFSI License Renewal Project in establishing safety margins and independently verifies maintenance of the safety margins.

CWI has established a centralized safety and health training organization to provide cost-effective, quality training to the workers, DOE employees, and subcontractors.

The CWI ES&H Program interfaces with the INL Occupational Medicine Program, which is compliant with the requirements of 29 CFR, 10 CFR (including 10 CFR 851), and 40 CFR. The program will continue as stewards for the existing worker surveillance programs relevant to the hazards at the TMI-2 ISFSI.

The Radiation Protection Program for the TMI-2 ISFSI and license renewal activities complies with 10 CFR 20. Qualified personnel will continue to execute an effective radiation protection program, using the following processes:

- Provide in-field support to the project.
- Maintain and provide calibrated, state-of-the-art radiation monitoring equipment.
- Administer dosimeter programs to maintain compliance with 10 CFR 20.

Fire protection engineering and safety management is integrated into the work planning processes for all license renewal activities.

7.4 Quality Assurance

The TMI-2 ISFSI complies with the quality assurance program established in the Safety Analysis Report and as documented in PLN-466. The quality engineering lead for the ISFSI Management organization ensures compliance with requirements through document reviews, surveillances, and assessments. ISFSI Management provides Issue Communication and Resolution Environment (ICARE) coordination and issue management expertise to project personnel. The support includes initiating, screening, disposition, tracking, and closing nonconformance and deficiency reports.

8. WASTE MANAGEMENT AND MINIMIZATION

Radioactive waste has not been generated at the TMI-2 ISFSI since initial fuel loading, and generation of radioactive waste during license renewal activities is not anticipated. If waste is generated at the TMI-2 ISFSI during license renewal activities, it will be efficiently and effectively handled in a manner that avoids the spread of contamination, generation of excessive volumes, cross-contamination of different types of waste, and accumulation of quantities in excess of regulatory limits.

8.1 Waste Management

The disposition of wastes from the TMI-2 ISFSI will be fully integrated with the Radioactive Waste Management Complex (RWMC) project, which serves as the central clearinghouse and provides the program and infrastructure for the overall integration, management, and disposition of all waste types that could conceivably be generated by the TMI-2 ISFSI.

8.2 Waste Minimization

The TMI-2 ISFSI will apply waste minimization practices that will be established for substantive license renewal activities. The approach avoids generation of waste, minimizes generation of waste once it has been determined that it must be treated as waste, and uses packaging techniques to minimize storage space required. Administrative controls will be in place to limit/avoid purchasing materials that contain hazardous constituents.

9. STAKEHOLDERS

Stakeholder involvement in this project is the policy of the DOE, NRC, and the practice of CWI. Stakeholders include regulators, the public, project workers (including subcontractors), and anyone affected by the project. Specific activities that involve public comment on decision documents are reflected in the WBS dictionary for those scope elements and the schedule. The purpose of stakeholder involvement is to provide a forum for collaboration with the project team to develop and endorse the project decisions early in the process. Involvement occurs at the ISFSI Management organization level.

10. ORGANIZATION AND RESPONSIBILITIES

This section first discusses the organizations with which the project typically interacts and their general responsibilities, followed by a detailed description of project organization, responsibilities of team

members, and detailed interface responsibilities between the project and other CWI and/or INL Site organizations.

10.1 General Responsibilities

10.1.1 Internal Organizations

The general responsibilities for the internal organizations are as follows:

Organization	Responsibilities
DOE-ID	• Enforcement of NRC regulations • Communications with external organizations, including those at DOE Headquarters, regarding the license renewal activities • Oversight of license renewal activities • Communications with ICP/ISFSI Management on external and DOE inputs, including funding and overall direction • Interfacing with NRC, stakeholders, and the public
ISFSI Management	• Communications with DOE-ID and the public regarding license renewal status • Integrated management of the license renewal activities, including project and subcontractor funding and guidance • Approval and forwarding of appropriate documents to DOE-ID
TMI-2 ISFSI License Renewal Project	• Development of communications to be sent to the ICP management team, DOE-ID, and the public regarding license renewal activity status • Management of all activities for the license renewal project, including the work of subcontractors • Preparation of any documents required to be submitted to DOE-ID for stakeholder interactions and submission of these documents to the ICP contracting officer • Development and maintenance of reporting systems by which ICP, DOE, and stakeholders receive information about the project
Subcontractors	• Communications with ISFSI Management regarding the performance and status of the subcontracted work • Demonstrating to ISFSI Management that alternate methods of performing subcontracted activities comply with regulatory requirements • Performance of subcontracted activities • Submittal of the required documentation

10.1.2 External Organizations

The external organizations with major interests in the TMI-2 ISFSI License Renewal Project and their responsibilities are presented below.

Organization	Responsibilities
Idaho Department of Environmental Quality	Regulatory oversight and enforcement of environmental laws delegated to the State of Idaho
NRC	Review and approval of the license renewal application
EPA	Enforcement of environmental laws not delegated to the State of Idaho
Other organizations as necessary	Participation in activities appropriate to jurisdiction

10.2 Project Organizational Structure

The TMI-2 ISFSI License Renewal Project organization, under the direction of the Manager, ISFSI Management, consists of three tiers with each tier having an integrated team of qualified individuals. These tiers will consist of both permanently assigned and matrixed personnel as well as possible subcontractors. The organizational relationship is depicted in the chart below.

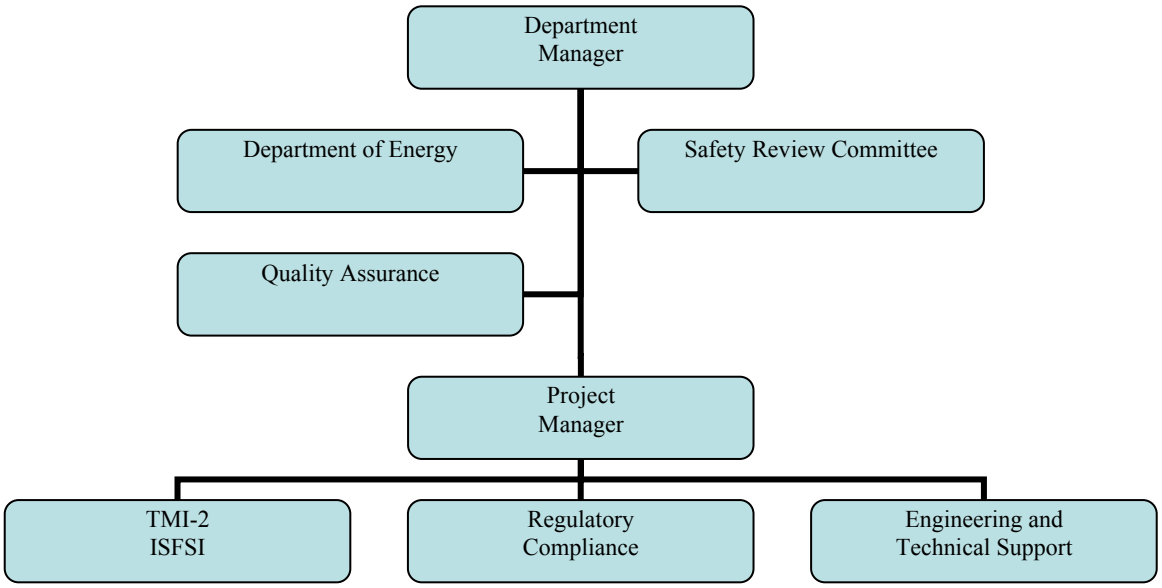

Figure 2. TMI-2 ISFSI license renewal management, organization, and interface structure.

10.3 Responsibilities

The Manager, ISFSI Management is responsible for identifying and implementing standards and requirements that will ensure protection of the worker, the public, and the environment and will adequately address other vulnerabilities (e.g., financial, legal, and physical protection) during the license renewal activities. All project personnel work closely with one another to ensure seamless and compliant implementation of standards and requirements in license renewal activities.

The roles and responsibilities of the TMI-2 ISFSI License Renewal Project positions are adequately described in the TMI-2 ISFSI SAR, Section 9.1. There is a clear line of responsibility from the Manager, ISFSI Management to the Project Manager/Regulatory Compliance Lead, through to the project personnel performing the license renewal work scope in the field.

10.4 Interfaces

Primary interfaces with other INL organizations may include Planning and Integration, ES&H, Quality Assurance, Safeguards and Security, and Engineering. Interfaces outside of the INL organizations and with DOE will occur through appropriate channels. Reports will be available, as appropriate, through DOE, and meetings will be held with interested groups on a periodic basis. Interface with other projects will be minimal to nonexistent.

Subcontract interface protocol is a key aspect to safe and effective work performance. The direct oversight of subcontracted work is by subcontract technical representatives assigned by the Project Manager. Ongoing direct, open communication exists between the Project Manager through the subcontract technical representative and the performing subcontractor to provide day-to-day direction and oversight as well as to evaluate work status and performance.

Contract management interface with subcontractors performing work for the ISFSI Management organization is coordinated through the procurement organization. The procurement organization establishes an administrative contractual interface to track the period of performance progress and payment authorization.

11. PROJECT CONTROLS, REPORTING, AND DOCUMENTATION

This section of the PEP discusses the routine, ongoing project activities for the TMI-2 ISFSI License Renewal Project. It includes routinely scheduled meetings, project control activities, and routinely generated reporting. The project control activities include two general topics: (1) internal project methods for establishing earned-value basis and reporting process as well as any internal project analysis and (2) processing this information into the format required for roll-up into the ICP systems.

11.1 Project Meetings

Aside from the routine Safety and INTEC CONOPS meetings, the schedule of regular TMI-2 ISFSI License Renewal Project meetings that are held to communicate project status, identify and mitigate obstacles and risks to successful project completion, and maintain open and effective lines of communication between all internal and external elements of the project team include weekly project status meetings (as part of weekly ISFSI Management staff meeting), project team meetings as necessary, and monthly project review meetings with the Manager, ISFSI Management.

11.1.1 Project Status Meetings

The Project Manager presents a project status weekly to the Manager, ISFSI Management. A special meeting can be held for this purpose or presentation of the status may be a part of the ISFSI Management staff meeting. The format for these presentations is as follows:

- Safety Issues/Activities: Any safety issues or activities either positive or negative that are occurring in the project.
- Key Scheduled Activities for Current Week (Monday–Sunday): Important scheduled activities transpiring in the project.
- Programmatic Issues with Current Activities (Monday–Sunday): Any issues that are impacting ability to accomplish the LCB schedule.
- Week Ahead Planning (one week further out Monday–Sunday): Important scheduled activities planned for the coming week.
- Staffing: Existing headcount and any plans to alter the headcount in the near term.
- Other Items: Other items deemed important to accomplishing the subproject scope within cost and schedule constraints.

11.1.2 Project Team Meetings

The Project Manager holds team meetings on a schedule that is deemed appropriate. These meetings are to discuss items of importance to the project, including upcoming plans and objectives.

11.1.3 Monthly TMI-2 ISFSI License Renewal Project Review

Project review meetings will be conducted monthly. Meeting format will include discussion of safety performance, performance measures, and corrective actions.

11.2 Site Project Control Interface

The Project Control System Description describes the project planning and control system at the ICP level and the methods used by Program Planning and Integration (PP&I) to evaluate, display, and roll up the data generated by the project and the cost accrual system. They include the details on how ICP manages the project control data (e.g., tracks and reports progress, reports earned value, and posts accruals).

The focus of the information roll-up at the project level is the charge number and the activity. The activity identifies the lowest-level cost input in the cost collection system and establishes the schedule start date and duration in the LCB. Collectively for the project, the activities establish the budgeted cost of work scheduled (BCWS).

The Manager, ISFSI Management is required to report monthly on the earned value by activity, resulting in the project budgeted cost of work performed (BCWP). The actual costs are derived from the costs collected on a monthly basis by charge number and applied against the activity to determine the actual cost of work performed (ACWP). Because of these constraints, there may only be one activity per charge number, although there may be more than one charge number per activity, depending on how the project wants to collect cost below the activity level.

11.3 Project Control

The management approach of this project provides for easily maintained schedule and cost controls which supplement the ICP systems. The inputs to the process are the work plans for a logical grouping of

activities. These work plans have sub-activities and schedules which roll up to the activities identified in the LCB. Additionally, the sub-activity costs are identified and collected in a manner that allows them to be rolled up to the activity.

The status of the TMI-2 ISFSI License Renewal Project will contribute to the overall status of the ISFSI Management project which is measured by the use of an earned value measurement system (EVMS). Each reporting period, the work package managers and control account managers will measure progress and report it in terms of BCWP. BCWP will be earned by completing or progressing on certain activities. Progress will generally be measured using the modified milestone method by weighting milestones and completing those milestones to earn a predetermined value measured in dollars. Other methods used include quantitative method, where each unit of completion carries an assigned BCWP; and level of effort which is used for some accounts where such is the nature of the work. In level of effort accounts, the schedule variance is always zero and the schedule performance index is always 1. BCWP will be used to calculate both schedule and budget status against the LCB.

Monthly analysis of project performance determines the management actions necessary to meet the project scope, schedule, and cost requirements and to look for ways to accelerate the project. This analysis leads to planned actions to eliminate variances. If appropriate (due to potential magnitude of impact or lack of clarity on the actual cause), the project team performs a root cause analysis to support response action decisions.

No formal project reporting is required from the project through the area projects to the ICP. All project internal, performance measure, regulatory, and DOE-ID milestones that fall within the span of the schedule will also be clearly indicated on the schedule.

11.4 Change Management

The TMI-2 ISFSI License Renewal Project will adhere to the INTEC Area Cleanup Project's practice of following the change control process provided in the Project Controls System Description document and the ICP Management Control Procedure 1414 Baseline Change Control. A BCP will be used to process changes proposed for the scope, schedule, or cost baselines. Thorough records of all BCPs and their disposition will be maintained by the TMI-2 ISFSI License Renewal Project records management system administrators.

11.5 Value Engineering Activities

Value engineering is an organized application of common sense and technical knowledge directed at finding and eliminating unnecessary costs in a project. The Project Manager has overall responsibility for implementing value engineering principles for the project. The Project Manager will decide whether a formal value engineering study should be performed and who is required to participate in the actual value engineering studies. In these instances an integrated project team approach is used to better enable the primary stakeholders to establish objectives for functionality and performance and make informed decisions about tradeoffs among project objectives, resources, materials, or performance for the short and long term. Schedule and cost savings are major factors in executing the project, however, reliability and the customer's needs for the life of the structure, system, or component receive emphasis as considerations.

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