Department of Energy
Idaho Operations Office
1955 Fremont Avenue
Idaho Falls, ID 83415

March 19, 2015

Attn: Document Control Desk
Director, Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: License Exemption Request for the Fort Saint Vrain Independent Spent Fuel Storage Installation (Docket 72-9) (SNM-2504) (EM-FMDP-15-019)

Dear Sir or Madam:

Pursuant to 10 CFR 72.7, Department Of Energy, Idaho Operations Office (DOE-ID), requests a license exemption to the Fort Saint Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) Material License SNM-2504 as documented in enclosed material.

This license exemption request results from a recent telephone conversation between DOE-ID and the USNRC technical staff on February 23, 2015. The exemption request is relative to maintenance required to be performed by June 30, 2015. Accordingly, your approval of this license exemption is requested no later than May 2015.

Please contact me at (208) 526-8888 with any questions.

Sincerely,

Steven R. Ahrendts
NRC Licensed Facilities Director

Enclosure

cc:
William Allen, NRC Project Manager, w/o enclosure
Greg Hall, CWI, w/o enclosure

NMSS26

Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI): Application for Specific Exemption from a Requirement in the Technical Specifications, and a Commitment in the Safety Analysis Report

This application is submitted in response to a DOE-ID request for an extension request.[1] The DOE-ID request was generated subsequent to a telephone conversation between DOE-ID and the USNRC technical staff on February 23, 2015. This application is developed in accordance with 10 CFR 72.7 for two specific exemptions; one from a Technical Specification surveillance required by 10 CFR 72.44(c)(3), and another from an aging management program commitment made during the FSV ISFSI license renewal process.

Exemption from 5-Year Seal Leak Test

The Limiting Condition for Operation (LCO) for Technical Specification 3.3.1 states that the Fuel Storage Container (FSC) or storage well seal leakage rate shall not exceed 1×10^{-3} standard cc/sec.[2] Surveillance Requirement (SR) 3.3.1.1 calls for one FSC from each vault to be leak tested every five years. The basis for SR 3.3.1.1 is that performance of a leak test of at least six FSC closures every five years provides reasonable assurance of continued integrity. Three FSCs were last leak tested on June 21, 2010 (FSCs located in positions A35, B41, and C41) and another three FSCs were last leak tested June 22, 2010 (FSCs located in positions D41, E41, and F28). The next FSC seal leak testing must be performed no later than June 21 and 22, 2015. Therefore, a one-time specific exemption from SR 3.3.1.1 is hereby requested for an additional year to complete the seal leak test surveillance. Each of the six FSCs identified above were seal leak tested in 1991 after being loaded with fuel blocks, and another four times (1996, 2001, 2005, and 2010) since they were stored at the ISFSI. In each case the seal leak test results demonstrated leakage rates less than the required limit of $1x\ 10^{-3}$ standard cc/sec. Seal leak rate testing will be completed no later than June 2016 at which time the seal leak rates are expected to remain less than $1x\ 10^{-3}$ standard cc/sec based on data trend analysis. The results of the attached Licensing Evaluation FSV-15-001, performed in accordance with 10 CFR 72.48, indicate this specific exemption will not have an adverse effect on a design function.

Exemption from Hydrogen Sampling

The FSV ISFSI Aging Management Program includes a commitment to sample one FSC in each vault for hydrogen no later than June 2015.[3] The commitment to sample FSCs for hydrogen resulted from discussions with NRC technical reviewers during the license renewal process via formal Requests for Additional Information regarding the potential for hydrogen generation from corrosion.[4] The specific FSC numbers, storage locations, and date of hydrogen sampling were set in order to coincide with the FSC seal leak rate testing schedule.

---

[1] E-mail from S.R. Ahrendts (DOE-ID) to F.J. Borst and G.G. Hall (CH2M-WG Idaho, LLC), Extension Request to NRC, February 24, 2015

[2] Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) license (SNM-2504), Appendix B, Technical Specification 3.3.1, Seal Leak Rate

[3] FSV ISFSI Safety Analysis Report, Revision 11, Section 9.8, Aging Management Program

[4] Request for Additional Information, Renewal to the Fort St. Vrain Independent Spent Fuel Storage Installation Site Specific License, Docket No. 72-09, ADAMS Ascension No. ML 100980230, April 12, 2010

A specific exemption from the Aging Management Program commitment date for sampling is hereby requested to be extended one year to coincide with the seal leak testing schedule. Instead of one-time sampling for hydrogen 24 years into a 40-year license duration, the FSCs will be sampled 25 years into a 40-year license duration. The FSV ISFSI SAR, Section 4.2.3.2.3 commitment that FSCs will be analyzed for flammable concentrations of hydrogen gas prior to handling or removal of the FSC lid bolts, and evacuated or purged with air as necessary, remains in effect. The FSV ISFSI SAR, Section 4.2.3.2.3 reiterates the basis for the unlikelihood of any significant buildup of hydrogen within an FSC as previously documented by Public Service Company of Colorado and evaluated by the NRC.[5,6] The reasons for determining the unlikelihood of any hydrogen buildup included the following.

- General corrosion, as opposed to galvanic corrosion (which would require water to allow ionization to take place), was determined to be the only corrosion mechanism of concern for the conditions that would exist inside a fuel storage container.
- General corrosion of carbon steel inside a fuel storage container would not result in the production of significant quantities of hydrogen since the pH of water evaporating from the graphite blocks would essentially be neutral.
- Corrosion on the internal wall of a fuel storage container due to potential water contained in the graphite fuel elements was not detrimental to the safe function of the fuel storage containers during their 40-year design lifetime.
- Prior to loading fuel into storage containers, the fuel blocks were maintained in a dry helium environment throughout their storage period in the Reactor Building; stored in either the reactor vessel or the fuel storage wells.
- The spent fuel blocks were dry when they were loaded into the fuel storage containers.

The results of the attached Licensing Evaluation FSV-15-002, performed in accordance with 10 CFR 72.48, indicate this specific exemption will not have an adverse effect on a design function.

The information in this letter has been reviewed in accordance with DG-SGI-1 and CB-NRC-1. For additional information regarding this application for specific exemptions, please contact Gregory G. Hall at (208) 533-0380.

---

[5] A.C. Crawford letter (P-96071) to W.D. Travers, NRC Bulletin 96-04, August 19, 1996

[6] L.E. Kokajko letter to M.J. Fisher, Staff Evaluation of Response to NRC Bulletin 96-04, Chemical, Galvanic, or Other Reactions in Spent Fuel; Storage and Transportation Casks for the Fort St. Vrain Independent Spent Fuel Storage Installation, April 18, 1997

Licensing Evaluation FSV-15-001

Application for Specific Exemption from a Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) Technical Specification Requirement

Introduction

The Limiting Condition for Operation (LCO) 3.3.1 for Technical Specification 3.3.1 is a Fuel Storage Container (FSC) or storage well seal leakage rate shall not exceed 1E-3 standard cc/sec. The Surveillance Requirement (SR) 3.3.1.1 states one FSC from each vault will be leak tested every five years. The basis for SR 3.3.1.1 is performance of a 5-year leak test of at least six FSC closures provides reasonable assurance of continued integrity. Three FSCs were last leak tested on June 21, 2010 (FSCs located in positions A35, B41, and C41) and another three FSCs were last leak tested June 22, 2010 (FSCs located in positions D41, E41, and F28). SR 3.3.1.1 requires that the next FSC seal leak testing be performed no later than June 21 and 22, 2015. Because of the potential for an adverse effect on a design function, an application for a specific exemption from SR 3.3.1.1 to request an additional year to complete the seal leak test surveillance is evaluated in accordance with 10 CFR 72.48, as implemented through MCP-2925, *Screen and Evaluate Changes*, Revision 18, August 2011.

Evaluation

1. Does the Activity Result in More than a Minimal Increase in the Frequency of Occurrence of an Accident Previously Evaluated in the Safety Analysis Report (SAR)?

The Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of one FSC in a vault module (FSV ISFSI SAR, Section 8.2.15). Two failure modes causing the accident are postulated; failure of the redundant metal O-ring seals, and failure of the FSC due to corrosion. Since no credible failure mechanism for the FSC design features (redundant seals and corrosion protection afforded in the design) is identified, both of the failure modes are considered low probability events. This event is a Design Event IV category; low frequency with a high consequence. The release from a single failed FSC containing six fuel blocks is assumed to occur into the storage vault module over a 10 minute period (chosen to represent an instantaneous loss of containment). Releasable gaseous and particulate matter is assumed to be instantaneously released to the atmosphere via the outlet cooling stack with no filtration of the release. The radiological consequences at the controlled area boundary for a single leaking FSC are within the requirements of 10 CFR 72.106.

Each of the six FSCs identified above were seal leak tested after being loaded with fuel blocks, and four additional times (1996, 2001, 2005, and 2010) since they were stored at the ISFSI. In each case the seal leak test results indicated leakage rates less than the required limit of 1E-3 standard cc/sec. Seal leak rates are also estimated to be less than 1E-3 standard cc/sec in 2017 as documented in Engineering Design File (EDF) No. 10727, *Estimation of 2017 Leak Rates of Fort St. Vrain Fuel Storage Containers,*

March 2015. A seal leak test result is a measure of confinement integrity. If confinement integrity has been jeopardized, the seal leak test result is an after-the-fact determination that a potential radioactive release has occurred. The proposed specific exemption (delay in performing a fifth verification of the confinement safety function of the FSC lid seals and sealing surfaces during the 40-year license duration) will not affect the frequency of occurrence of a seal leak; therefore it will not change the licensing basis of the ISFSI design, and will not impact the original conclusion reached about the acceptability of the FSC and lid seal design. The Maximum Credible Accident will remain a low probability event.

2. Does the Activity Result in More than a Minimal Increase in the Likelihood of Occurrence of a Malfunction of an Item Important to Safety Previously Evaluated in the SAR?

The test method used to leak test an FSC in each vault every five years is essentially a verification of the continued integrity afforded by the lid seals and sealing surfaces. The lid seal material specification is GEC Technical Specification 362 F 0058, described as silver plated Inconel X750 annealed condition (EDF-8612, *FSV ISFSI MVDS Fuel Storage Container and Support Stool Aging Management Review*, Revision 2, March 2010). The FSC container lid material specification is ASME SA-350, GR LF2, described as carbon and low alloy steel forgings requiring notch toughness testing for piping components. The FSC container material specification is ASME SA-333, GR 6, described as seamless and welded steel pipe for low temperature service. The FSV ISFSI [Important to Safety (ITS) components inclusive] has a design life of 40 years. The facility and the FSCs have been exposed to normal design conditions since initial licensing in 1991. The FSC surfaces have been subjected to outside cooling air, elevated temperatures and gamma and neutron radiation from the stored fuel. During the past 24 years of passive storage, seal leak test results have not been indicative of a FSC malfunction. The proposed specific exemption will not affect the material condition of the subcomponents, hence the likelihood of occurrence of a seal or sealing surface malfunction previously evaluated in the SAR.

3. Does the Activity Result in More than a Minimal Increase in the Consequences of an Accident Previously Evaluated in the SAR?

As discussed in Evaluation 1, the Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of a single fully loaded FSC in a vault module (FSV ISFSI SAR, Section 8.2.15). Releasable gaseous and particulate matter is assumed to be instantaneously released to the atmosphere via the outlet cooling stack with no filtration of the release. Therefore, the radiological consequence at the controlled area boundary for a single leaking FSC is only 0.02% of the required limit in 10 CFR 72.106. The Maximum Credible Accident and subsequent offsite consequence bounds a seal leak event. The proposed specific exemption may delay discovery of one or more leaking FSCs, but result in no increase in the consequences of an accident previously evaluated in the SAR.

4. Does the Activity Result in More than a Minimal Increase in the Consequences of a Malfunction of an Item Important to Safety Previously Evaluated in the SAR?

As discussed in Evaluation 3, the Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of a single FSC in a vault module

(FSV ISFSI SAR, Section 8.2.15). Releasable gaseous and particulate matter is assumed to be instantaneously released to the atmosphere via the outlet cooling stack with no filtration of the release. The radiological consequences at the controlled area boundary for one malfunctioning (leaking) FSC are only 0.02% of the required limit in 10 CFR 72.106. The Maximum Credible Accident and subsequent offsite consequence bounds a seal malfunction (leakage) event. The proposed specific exemption may delay discovery of one or more malfunctioning (leaking) FSCs, but result in no increase in the consequences of a malfunctioning item ITS (single FSC) previously evaluated in the SAR.

5. Does the Activity Create a Possibility for an Accident of a Different Type than Any Previously Evaluated in the SAR?

As discussed in Evaluation 1, the Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of a single FSC in a vault module (FSV ISFSI SAR, Section 8.2.15). Two failure modes causing the accident are postulated; failure of the redundant metal O-ring seals, and failure of the FSC due to corrosion. Since no credible failure mechanism for the FSC design features (redundant seals and corrosion protection afforded in the design) is identified, both of the failure modes are considered low probability events. This event is a Design Event IV category; low frequency with a high consequence. The release from a single failed FSC is assumed to occur into the storage vault module over a 10 minute period (chosen to represent an instantaneous loss of containment) and is bounding. Releasable gaseous and particulate matter is assumed to be instantaneously released to the atmosphere via the outlet cooling stack with no filtration of the release. The radiological consequences at the controlled area boundary for a single leaking FSC are within the requirements of 10 CFR 72.106. The proposed specific exemption will not create a possibility for an accident of a different type than any previously evaluated in the SAR.

6. Does the Activity Create a Possibility for a Malfunction of an Item Important to Safety with a Different Result than Any Previously Evaluated in the SAR?

As discussed in Evaluation 1, the Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of a single FSC in a vault module (FSV ISFSI SAR, Section 8.2.15). Two failure modes causing the accident are postulated; failure of the redundant metal O-ring seals, and failure of the FSC due to corrosion. Since no credible failure mechanism for the FSC design features (redundant seals and corrosion protection afforded in the design) is identified, both of the failure modes are considered low probability events. This event is a Design Event IV category; low frequency with a high consequence. The proposed specific exemption will not create a possibility for a malfunction of an item ITS (single FSC) with a different result than any previously evaluated in the SAR. The radiological consequences at the controlled area boundary for a single malfunctioning (leaking) FSC will remain within the requirements of 10 CFR 72.106.

7. Does the Activity Result in a Design Basis Limit for a Fission Product Barrier as Described in the SAR Being Exceeded or Altered?

The design basis of the fission product barrier afforded by the FSC and its subcomponents is confinement of the radioactive contents contained within. The design basis limit is characterized by the

requirements of 10 CFR 72.106. As discussed in Evaluation 1, the Maximum Credible Accident evaluated for the FSV ISFSI is the radiological consequences at the site boundary resulting from the leak of a single FSC in a vault module (FSV ISFSI SAR, Section 8.2.15). The release from a failed FSC is assumed to occur into the storage vault module over a 10 minute period (chosen to represent an instantaneous loss of containment). Releasable gaseous and particulate matter is assumed to be instantaneously released to the atmosphere via the outlet cooling stack with no filtration of the release. The radiological consequence at the controlled area boundary for a single leaking FSC is within the design basis limit (as referred to the requirements of 10 CFR 72.106). The proposed specific exemption may delay discovery of one or more malfunctioning (leaking) FSCs, but not result in a design basis limit for a single FSC as described in the SAR being exceeded or altered.

8. Does the Activity Result in a Departure from a Method of Evaluation Described in the SAR Used in Establishing the Design Bases or in the Safety Analyses?

The method of evaluation described in the SAR and Technical Specification for verifying the confinement integrity (seal leak rate below an acceptable limit) of an FSC is periodic seal leak rate testing. Considering the results of previous seal leak testing, a one-time increase in the periodicity from 5 years to 6 years will still provide reasonable assurance of continued FSC confinement integrity. The proposed specific exemption will not be a departure from a method of evaluation described in the SAR used in establishing the design basis or in the safety analyses.

Conclusion

The results of the evaluation indicate the proposed specific exemption will not have an adverse effect on a design function. This licensing evaluation should accompany the application for the specific exemption.

The information in this licensing evaluation has been reviewed in accordance with DG-SGI-1 and CB-NRC-1.

Evaluator/Date: 3/18/15

Safety Analyst/Technical Reviewer/Date: 3/18/15

Derivative Classifier/Date: Jeff D Jong 3/18/15

FSV ISFSI Manager/Date: for FJ Bargt per telecon 3/18/15

Manager, ISFSI Management/Date: 3/18/15

DOE-ID ISFSI Facility Director/Date: 3/18/15

Licensing Evaluation FSV-15-002

Application for Specific Exemption from a Fort St. Vrain (FSV) Independent Spent Fuel Storage Installation (ISFSI) Safety Analysis Report Commitment

Introduction

The FSV ISFSI Aging Management Program described in FSV ISFSI Safety Analysis Report (SAR), Revision 11, Section 9.8, includes a commitment to sample one Fuel Storage Container (FSC) in each vault for hydrogen no later than June 2015 for NRC information purposes. The commitment to sample FSCs for hydrogen resulted from discussions during the NRC technical review of the license renewal application (Requests for Additional Information) regarding the potential for hydrogen generation as an indication of corrosion. The FSC number, storage locations, and date of sampling were agreed upon to be consistent with the FSC seal leak rate testing schedule; sampling of hydrogen in FSCs located in positions A35, B41, C41, D41, E41, and F28 in June 2015. None of the FSCs have ever been sampled for hydrogen. Because of the potential for an adverse effect on a design function, an application for a specific exemption from the SAR, Section 9.8 commitment to request an additional year to complete the hydrogen sampling in conjunction with seal leak rate testing is evaluated in accordance with 10 CFR 72.48, as implemented through MCP-2925, *Screen and Evaluate Changes*, Revision 18, August 2011.

Evaluation

1. Does the Activity Result in More than a Minimal Increase in the Frequency of Occurrence of an Accident Previously Evaluated in the Safety Analysis Report (SAR)?

There are no off-normal operations or accident analyses documented in the FSV ISFSI SAR that identify hydrogen buildup as the cause for an event. The FSV ISFSI SAR, Section 8.2.4, Fire and Explosions, accident analysis states in Subsection 8.2.4.1 that only minor local fires are considered possible within the ISFSI facility, no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption replacing one-time sampling of six FSCs for hydrogen no later than 24 years into the 40-year license duration with one-time-sampling for hydrogen 25 years into the 40-year license duration will not result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the SAR.

2. Does the Activity Result in More than a Minimal Increase in the Likelihood of Occurrence of a Malfunction of an Item Important to Safety Previously Evaluated in the SAR?

The FSV ISFSI SAR, Section 4.2.3.2.3 makes reference to a Public Service Company of Colorado letter P-96071 (A.C. Crawford letter to W.D. Travers, *NRC Bulletin 96-04*, August 19, 1996) as the basis for the unlikelihood of any significant buildup of hydrogen within an FSC. Section 4.2.3.2.3 also contains a narrative in response to the NRC's evaluation of the letter (L.E. Kokajko letter to M.J. Fisher, *Staff Evaluation of Response to NRC Bulleting 96-04, Chemical, Galvanic, or Other Reactions in Spent Fuel Storage and Transportation Casks for the Fort St. Vrain Independent Spent Fuel Storage Installation*, April

18, 1997) with a commitment that states FSCs will be analyzed for flammable concentrations of hydrogen gas prior to handling or removal of the lid bolts, and evacuated or purged with air as necessary. The FSC container material specification is ASME SA-333, GR 6, described as seamless and welded steel pipe for low temperature service. The FSC container lid material specification is ASME SA-350, GR LF2, described as carbon and low alloy steel forgings requiring notch toughness testing for piping components. The lid seal material specification is GEC Technical Specification 362 F 0058, described as silver plated Inconel X750 annealed condition. The FSV ISFSI [Important to Safety (ITS) components inclusive] has a design life of 40 years. The proposed specific exemption will not affect the material condition of the subcomponents of the FSC, hence the likelihood of occurrence of a malfunction of an ITS FSC previously evaluated in the SAR.

3. Does the Activity Result in More than a Minimal Increase in the Consequences of an Accident Previously Evaluated in the SAR?

As discussed in Evaluation 1, the Fire and Explosions accident analysis states that no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption therefore will not result in more than a minimal increase in the consequences of an accident previously evaluated in the SAR.

4. Does the Activity Result in More than a Minimal Increase in the Consequences of a Malfunction of an Item Important to Safety Previously Evaluated in the SAR?

As discussed in Evaluation 3, the Fire and Explosions accident analysis states that no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption therefore will not result in more than a minimal increase in the consequences of a malfunction of an item Important to Safety previously evaluated in the SAR.

5. Does the Activity Create a Possibility for an Accident of a Different Type than Any Previously Evaluated in the SAR?

As discussed in Evaluation 1, the Fire and Explosions accident analysis states that no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption therefore will not create a possibility for an accident of a different type than any previously evaluated in the SAR.

6. Does the Activity Create a Possibility for a Malfunction of an Item Important to Safety with a Different Result than Any Previously Evaluated in the SAR?

As discussed in Evaluation 3, the Fire and Explosions accident analysis states that no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption therefore will not create a possibility for a malfunction of an item Important to Safety with a different result than any previously evaluated in the SAR.

7. Does the Activity Result in a Design Basis Limit for a Fission Product Barrier as Described in the SAR Being Exceeded or Altered?

The design basis of the fission product barrier afforded by the FSC and its subcomponents is confinement of the radioactive contents contained within. The design basis limit is characterized by the off-site exposure requirements of 10 CFR 72.106. As discussed in Evaluation 1, the Fire and Explosions accident analysis states that no means of propagating internal explosions are foreseen, and loading from such explosions are not considered. The proposed specific exemption will not result in a design basis limit as described in the SAR being exceeded or altered.

8. Does the Activity Result in a Departure from a Method of Evaluation Described in the SAR Used in Establishing the Design Bases or in the Safety Analyses?

There is no design basis established for the FSC based on the potential for hydrogen generation. The design basis is confinement of the radioactive material contained within an FSC. Therefore, the proposed specific exemption does not involve a change to a method of evaluation described in the SAR used in establishing the design basis or in the safety analyses.

Conclusion

The results of the evaluation indicate the proposed specific exemption will not have an adverse effect on a design function. This licensing evaluation should accompany the application for the specific exemption.

The information in this licensing evaluation has been reviewed in accordance with DG-SGI-1 and CB-NRC-1.

Evaluator/Date: 3/18/15

Safety Analyst/Technical Reviewer/Date: 3/18/15

Derivative Classifier/Date: Jeff D Long 3/18/15

FSV ISFSI Manager/Date: for FJ Hoyt per telecon 3/18/15

Manager, ISFSI Management/Date: 3/18/15

DOE-ID ISFSI Facility Director/Date: 3/18/15