



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION IV  
1600 E. LAMAR BLVD.  
ARLINGTON, TX 76011-4511

August 19, 2016

Richard B. Provencher, Manager  
Department of Energy  
Idaho Operations Office  
1955 Fremont Ave., MS 1203  
Idaho Falls, ID 83415

**SUBJECT: THREE MILE ISLAND, UNIT 2, INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION INSPECTION REPORT 072-00020/2016-001**

Dear Mr. Provencher:

On July 21, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection of activities associated with your Independent Spent Fuel Storage Installation (ISFSI). The results of the inspection were discussed with you and members of your staff at the exit briefing conducted at the conclusion of the site visit on July 21, 2016. The focus of this safety inspection was to verify ongoing compliance with the Three Mile Island, Unit 2 (TMI-2) site specific ISFSI license SNM-2508 and its associated Technical Specifications, the TMI-2 Safety Analysis Report, and the regulations in Title 10 of the *Code of Federal Regulations* (CFR) Parts 20 and 72.

The NRC inspector interviewed personnel, toured the ISFSI facility, reviewed records, and assessed the areas of radiation safety, quality assurance, hydrogen monitoring, corrective action program, safety evaluations, and ISFSI facility maintenance. The inspector reviewed changes made to your ISFSI program since the last NRC ISFSI inspection. Your ISFSI operations were found to be in compliance with the applicable NRC regulations and requirements and your ISFSI facility was found to be in good physical condition. No violations of NRC regulations were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site, <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

R. Provencher

Should you have any questions concerning this inspection, please contact Mr. Eric Simpson at 817-200-1553 or the undersigned at 817-200-1197.

Sincerely,

/RA/

Jack E. Whitten, Chief  
Fuel Cycle and Decommissioning Branch  
Division of Nuclear Materials Safety

Docket: 072-00020  
License: SNM-2508

Enclosure:  
Inspection Report 072-00020/2016-001

Attachment: Supplemental Information

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Dockets No.: 072-00020  
Licenses No.: SNM-2508  
Report No.: 072-00020/2016-001  
Licensee: United States Department of Energy – Idaho Operations  
Facility: Three Mile Island, Unit 2  
Independent Spent Fuel Storage Installation  
Location: Idaho Operations Office  
1955 Fremont Avenue  
Idaho Falls, ID 83415  
Dates: July 20-21, 2016  
Inspector: Eric J. Simpson, ISFSI Inspector  
Fuel Cycle and Decommissioning Branch  
Approved By: Jack E. Whitten, Chief  
Fuel Cycle and Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure

## EXECUTIVE SUMMARY

United States Department of Energy  
NRC Inspection Report 072-00020/2016-001

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection of the licensee's programs and activities for safe handling and storage of spent fuel at the Three Mile Island, Unit 2 (TMI-2) Independent Spent Fuel Storage Installation (ISFSI) on July 20-21, 2016. The U.S. Department of Energy-Idaho Operations Office (DOE-ID) was licensed by the NRC to operate the TMI-2 ISFSI located at the Idaho National Laboratory (INL) site. The onsite inspection evaluated the current condition of the ISFSI loaded with spent fuel and reviewed a number of topics to evaluate compliance with the applicable NRC regulations and the provisions of DOE-ID site specific license. The NRC routine inspection involved personnel interviews, tours of the ISFSI, and reviewed documentation relevant to ISFSI activities and operations that have occurred at TMI-2 since the last NRC ISFSI inspection that was performed in April 2014. The documentation reviewed included quality assurance (QA) records, radiological conditions, corrective actions, compliance with technical specifications, and the requirements of the Safety Analysis Report (SAR). The inspector confirmed that the ISFSI was being maintained in good physical condition. Radiological dose rates attributable to the ISFSI were determined by the NRC inspector to be low. A review of the environmental monitoring program demonstrated that radiological exposures to offsite locations from the ISFSI were low and within the NRC regulatory requirements. The QA program and corrective action program were being effectively implemented by the licensee in such a manner as to capture and correct issues related to the spent fuel storage program. In summary, the licensee was conducting ISFSI activities in compliance with regulatory and license requirements.

### Away from Reactor ISFSI Inspection Guidance (60858)

- The NRC inspector reviewed all Deficiency Reports (DRs) resulting from the QA audits, surveillances, and assessments of the TMI-2 ISFSI program. These were evaluated by the NRC inspector to assess the licensee's QA program. The DRs were evaluated by the NRC inspector to ensure that the problems that were identified were properly categorized based on their safety significance, captured in the corrective action program (CAP), and resolved in a manner commiserate with their significance. All identified deficiencies that had been entered into the licensee's CAP were being adequately resolved by the licensee. The licensee's audit and surveillance program was effectively identifying issues and areas for improvement in the ISFSI program. (Section 1.2.a)
- Selected Deficiency Reports (DRs) were reviewed for the period since the last NRC routine ISFSI inspection in April 2014. A wide range of issues had been identified and subsequently resolved. The DRs reviewed by the NRC inspector were well documented and properly categorized based on the safety significance of the issues identified. The corrective actions taken by the licensee were determined to be appropriate for the specific situations captured in the CAP. No adverse trends were identified by the NRC inspector during the review. The licensee's CAP met applicable regulatory requirements. (Section 1.2.b)

- The ISFSI facility was toured and the NRC inspector determined that the ISFSI was being maintained in good physical condition. The radiological conditions observed by the NRC inspector at the ISFSI were as expected for the age, configuration, and disposition of the spent fuel stored there. (Section 1.2.c)
- Radiation data reviewed by the NRC inspector from calendar years (CYs) 2014 and 2015 TMI-2 Radiological Environmental Operating Reports determined that the licensee had been adequately monitoring effluents and direct radiation impacts from the ISFSI. The NRC inspector determined that DOE-ID had remained in compliance with all environmental monitoring regulatory requirements related to their ISFSI operations. (Section 1.2.d)
- All documents reviewed by the NRC inspector demonstrated the licensee had complied with the Technical Specifications and SAR requirements for periodic Horizontal Storage Module (HSM) monitoring, Dry Shielded Canister (DSC) sampling, DSC filter housing leak tests, and hydrogen monitoring. No abnormal occurrences were found for the inspection period regarding the surveillance requirements for the TMI-2 ISFSI. (Section 1.2.e)
- Title 10 *Code of Federal Regulations* (10 CFR) Part 72.70 requires ISFSI licensees to submit to NRC a biennial SAR update report. The most recent SAR update report provided by the licensee, dated March 11, 2015, reported that no ISFSI program changes were made at TMI-2 in any of the following areas: Safety Analysis Report; Changes, Tests, and Experiments (10 CFR 72.48 evaluations); Technical Specification Bases; Radiological Environmental Monitoring Program; Training Program; or QA program. The licensee further indicated that no additional changes had been made to any ISFSI programs from March 2015 up to the date of the current NRC routine ISFSI inspection. (Section 1.2.f)
- The ISFSI organization changes since the last inspection were reviewed for compliance with the TMI-2 ISFSI SAR staffing requirements and qualifications of personnel. The personnel added to the DOE-ID ISFSI program since the last NRC inspection met the requirements specified in the SAR. The Safety Review Committee had met at least annually and reviewed issues consistent with requirements of the SAR and Technical Specifications. (Section 1.2.g)
- The NRC inspector determined that the TMI-2 emergency response plan (ERP) was being properly maintained. The latest revision to the plan was reviewed during the inspection and was verified to not reduce the effectiveness of the plan. Drills, exercises, and training were performed in accordance with requirements in the ERP. Offsite support agencies participated in the site-wide exercise on July 22, 2015. (Section 1.2.h)
- The NRC inspector determined that DOE-ID TMI-2 had implemented an aging management program for the TMI-2 ISFSI as a result of previously identified concrete degradation. The concrete degradation was due to water intrusion and freeze-thaw cycling that can occur in the Idaho climate. All original repairs made to the HSMs in 2011 were confirmed by the NRC inspector to have remained intact through the

subsequent winter freeze-thaw cycles. At the time of the inspection, the NRC inspector confirmed that the ISFSI pad and HSMs were in good condition and the licensee had performed all of the required inspections and repairs to the ISFSI associated with the program. The licensee's aging management program was assessed by the NRC inspector and was determined to adequately monitor the condition of the TMI-2 ISFSI concrete structures. No NRC concerns or findings were identified in review of the ongoing maintenance of their facility. (Section 1.2.i)

Review of 10 CFR 72.48 Evaluations (60857)

- All required safety screens of changes to ISFSI designs or procedures as described in the SAR had been performed in accordance with site procedures and the regulatory requirements of 10 CFR 72.48. All screens reviewed by the NRC inspector were determined to have been adequately screened and evaluated. (Section 2)

## Report Details

### Summary of Facility Status

The TMI-2 ISFSI is located within the security perimeter of the Idaho Nuclear Technology and Engineering Center at the INL site. The storage system used at the TMI-2 ISFSI is the NUHOMS® - 12T cask system. A license was issued by the NRC to the DOE-ID on March 19, 1999. On March 31, 1999, the first DSC containing TMI-2 core debris was moved from the test area north facility to the ISFSI. Each DSC contained 12 TMI-2 fuel canisters, which provided primary containment for the fuel debris from the damaged TMI-2 reactor core. The 29th, and final, DSC was loaded into the ISFSI on April 20, 2001 and completed the loading of the TMI-2 ISFSI. The facility during this inspection was being maintained by Spectra Tech, Incorporated (STI) as the management and operations contractor for the DOE-ID. The DOE-ID contractor STI replaced the former management and operations contractor for the ISFSI, CH2M♦WG Idaho, LLC (CWI). NRC received notice of this change in ISFSI management in a letter dated January 12, 2016. The official transition date was March 31, 2016. The ISFSI is being maintained under site specific license SNM-2508, Amendment 4, and SAR Revision 7. A tour of the ISFSI area, interview of personnel, and a review of site records confirmed the facility to be in good physical condition and was in compliance with regulatory and license requirements.

## **1 Away from Reactor ISFSI Inspection Guidance (60858)**

### **1.1 Inspection Scope**

An inspection of the status of the loaded spent fuel at TMI-2 was completed by the NRC inspector to verify compliance with requirements of their NRC issued Site Specific License SNM-2508, their ISFSI SAR, and NRC regulations. The inspection addressed a broad range of topics including QA audits and surveillances conducted by the licensee, interviews of staff, reviewed condition reports related to the ISFSI, aspects of the emergency response program, and environmental radiological data collected around the ISFSI for the past several years, reviewed the annual maintenance records, and safety evaluations conducted under the license. The inspector conducted an inspection of the ISFSI pad area, radiological dose rates were measured by the inspector around the perimeter of the ISFSI pad and at locations near the storage casks.

### **1.2 Observations and Findings**

#### **a. Quality Assurance Audits and Surveillances**

As the NRC license holder, DOE-ID maintained the ISFSI QA and oversight program for the TMI-2 ISFSI. The DOE-ID contractor, CWI/STI, was responsible for the day-to-day management and operations of the ISFSI. CWI/STI implemented a supplemental QA program for the ISFSI site operations.

The DOE Environmental Management's Office of Standards and QA (EM-43), DOE-ID, and CWI/STI, contractor, had performed numerous QA audits and surveillances of the operations at the TMI-2 ISFSI since the last NRC inspection in April 2014. A total of

three audit reports, five surveillance reports (which included two QA management assessment reports) and one QA program annual trending report were reviewed by the NRC inspector. The NRC inspector determined that the majority of the QA audits were combined operational assessments of the three NRC licensed facilities. Those facilities were the ISFSIs associated with Fort Saint Vrain, the Idaho Spent Fuel Facility, and TMI-2. The focus of this inspection was to review the QA documents related to the TMI-2 ISFSI operations.

The QA audit reports generated by DOE-ID and its contractor, CWI/STI, included reviews of the ISFSI SAR requirements, ISFSI organization, QA program, implementing documents, document control, CAP, inspections, and other areas of evaluation. Audit findings and issues were categorized based on their significance and were placed into the CAP for resolution. Issues adverse to quality were reported as DRs and significant conditions adverse to quality are reported as Corrective Action Requests. When identified by DOE, the items were placed into the Corrective Action Tracking Trending System. When issues were contractor identified, they were placed into the contractor's Issues Communication and Resolution Environment system. Once in the CAP the issues were tracked and closed upon resolution. The audits reviewed by the NRC inspector did not result in the identification of any significant conditions adverse to quality. However, 12 DRs that were of low significance were identified by the licensee and its contractor and placed into the site's CAP for final disposition.

The QA surveillances reviewed operational programs such as procurement document control, reporting and posting requirements, the ISFSI program change/modification (10 CFR 72.48) screen and evaluation program, and others areas. The NRC reviewed the licensee's surveillances and determined that none of the surveillance conducted resulted in the identification of any significant conditions adverse to quality. One DR of low significance was identified. That DR was placed into the site's CAP for final disposition by the licensee.

The NRC inspector reviewed all DRs resulting from the QA audits, surveillances, and assessments maintained by the licensee for the TMI-2 ISFSI program. These DRs were evaluated by the NRC inspector to help assess the licensee's QA program. The DRs were assessed by the NRC inspector to ensure that the problems identified were properly categorized based on their safety significance, entered promptly into the CAP, and resolved by the licensee in a manner commiserate with their significance. All identified deficiencies had been entered into the licensee's CAP and were being adequately resolved by the licensee.

b. Corrective Action Program

A list of TMI-2 ISFSI related DRs and Corrective Action Requests (referred to in this report collectively as DRs) that were issued by the licensee for the TMI-2 site since the last NRC inspection in April 2014 was provided to the NRC inspector for review. Issues identified by DOE-ID personnel were processed in accordance with ISFSI QA Procedure (IQP) IQP 16.01, "Corrective Actions," Rev. 8. When issues were contractor identified (CWI or STI), they were processed using Management Control Procedure (MCP) MCP-598, "Corrective Action System," Revision 33. The contractor, CWI or STI would



document the problem in the Issues Communication and Resolution Environment system as a DR and would assign a DR number to the report to track the issue. Similarly, DOE-ID documented their identified issues in Corrective Action Tracking Trending System for tracking until closure (see Section 1.2.a, “Quality Assurance Audits and Surveillances,” above).

Of the list of ISFSI related DRs, approximately eight were selected for further review by the NRC. The DRs related to a number of different topics, including QA deficiencies, expired equipment in storage (shelf life exceedance), and procedure discrepancies.

The deficiency reports reviewed by the NRC inspector were well documented and properly categorized based on the significance of the issues being identified. The corrective actions taken were determined by the NRC inspector to be appropriate for the situations. No adverse trends were identified during the review. The licensee’s CAP met applicable regulatory requirements.

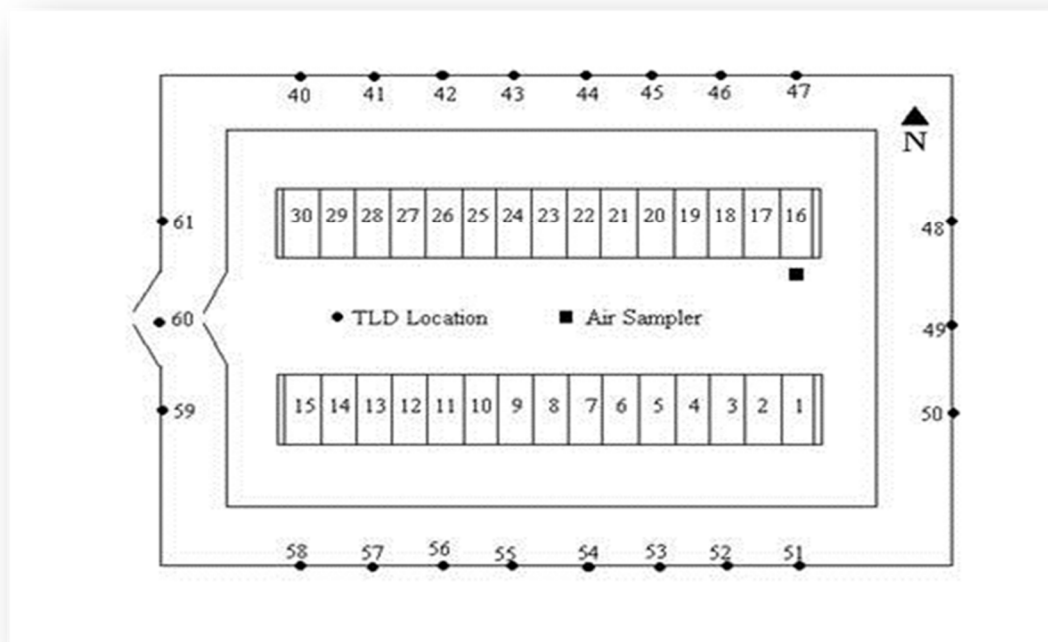


Figure 1, TMI-2 ISFSI

c. Radiological Conditions and Tour of the ISFSI

An inspection of the physical condition and radiological characteristics of the TMI-2 ISFSI was performed during this NRC inspection. The DOE ISFSI Facility Director, Contractor ISFSI Manager, NRC License Manager, and others accompanied the NRC inspector during the inspection of the ISFSI site.

Thirty HSMs were situated on the TMI-2 ISFSI pad, with all but one containing spent fuel from the damaged TMI-2 reactor. The additional HSM situated on the pad was to serve as a backup storage location if problems arose with existing HSMs or DSCs. The 30 storage casks were arranged in two east-west rows of 15 with the door openings facing inward. The HSM casks 1–15 were situated in the southern row and casks 16–30 on the northern row (see Figure 1, above).

The inspection of the physical condition of the ISFSI found the concrete to be in good condition. The NRC inspector did not observe any vegetative growth in or around the concrete pad or any flammable or combustible materials stored on the ISFSI pad. A low volume air sampler was situated on the ISFSI pad in close proximity to HSM #16. The purpose of the air sampler is to determine radiological effluent releases from the TMI-2 ISFSI.

The physical condition of the concrete HSMs was observed to be very good. Signs of past concrete repairs were evident on many of the storage modules; however, all concrete repairs to the ISFSI were intact and appeared to be free from further degradation. All hardware, doors, latches, and ports installed in the TMI-2 HSMs inspected were in good condition. The NRC inspector utilized a Ludlum Model 19 sodium-iodide gamma survey meter (NRC #033906, calibration due 3/8/2017) to measure gamma exposure rates in microRoentgens per hour ( $\mu\text{R}^1/\text{h}$ ). Radiological conditions were observed and recorded by the NRC inspector on approach to the TMI-2 ISFSI, at the outer boundary locations of the pad, and at the HSM front and rear door locations. Ambient radiation levels at the INL site were elevated due to the influence of radioactive materials stored onsite that were unrelated to materials stored in the TMI-2 ISFSI. Ambient levels were approximately 150  $\mu\text{R}/\text{h}$  on approach to the ISFSI pad front gate. Measurements taken by the NRC inspector at various locations around the pad ranged from 70 – 190  $\mu\text{R}/\text{h}$ . Contact measurements were taken at various HSM front door locations and ranged from 190 – 1100  $\mu\text{R}/\text{h}$  (1.1 milliRoentgens/h). The HSM rear door panel contact measurements ranged for the HSMs from 40 – 500  $\mu\text{R}/\text{h}$ . All measurements were determined by the NRC inspector to be well below Technical Specification 3.2.1 and 3.2.2 dose rate limit requirements of no more than 100 millirem/hour for the front and rear access doors.

The radiological conditions of the ISFSI were as expected for the age, configuration, and disposition of the spent fuel stored there. The ISFSI facility overall determined by the NRC inspector as being maintained in good physical condition.

d. Radiological Environmental Monitoring Reports

Site monitoring data from the CYs 2014 and 2015 Annual Radiological Environmental Monitoring Reports for the TMI-2 ISFSI were reviewed. The NRC inspector reviewed the

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<sup>1</sup> For the purposes of making comparisons between NRC regulations based on dose-equivalent (rem) and measurements made in Roentgens, it may be assumed that one Roentgen equals one rem. (<http://www.nrc.gov/about-nrc/radiation/protects-you/hppos/qa96.html>)

data to confirm that radiological conditions at the site had remained stable and within regulatory requirements since the last NRC inspection occurring in April 2014. The licensee is required by Technical Specification 5.5.3(c) to submit an annual report to the NRC within 60 days after January 1st of each CY. Two reports had been submitted by the licensee since the last inspection: the CY 2014 report, dated February 2015 (ML15084A138) and the CY 2015 report, dated February 2016 (ML16067A127).

The TMI-2 Radiological Environmental Monitoring Program (REMP) was designed by DOE-ID to monitor the two predominant radiation exposure pathways possible given the design of the ISFSI. Those pathways being potential airborne radioactivity releases and direct radiation exposure. The airborne radioactivity release pathway is monitored using a combination of loose surface radioactive contamination surveys and periodic airborne radioactivity sampling. The direct radiation exposure pathway was monitored using 22 thermoluminescent dosimeters (TLDs) placed along the outer perimeter fence at the boundary of the ISFSI. The TLDs were changed out and processed quarterly. Control TLD stations were located offsite and outside of the INL campus.

The following table provides the annual average exposure rates reported in the annual environmental monitoring reports for each of the TLD monitoring locations.

**Table 1, TMI-2 Annual Radiological Monitoring Program Results<sup>2</sup>**

ISFSI Fence Area	TLD Location ID	2014 (millirem/d)	2015 (millirem/d)
NORTH	#40	0.6	0.8
	#41	0.6	0.7
	#42	0.6	0.7
	#43	0.6	0.7
	#44	0.5	0.7
	#45	0.5	0.6
	#46	0.5	0.6
EAST	#47	0.5	0.6
	#48	0.5	0.6
	#49	0.6	0.7
SOUTH	#50	0.6	0.8
	#51	0.7	0.9
	#52	0.7	0.9
	#53	0.8	1.0
	#54	0.8	1.0
	#55	0.8	1.1
	#56	0.8	1.2
	#57	0.9	1.2
	#58	0.9	1.2

<sup>2</sup> Values taken directly from the *Annual Radiological Environmental Monitoring Program Report for the Three Mile Island, Unit 2 Independent Spent Fuel Storage Installation* from CYs 2014 and 2015 (ML15084A138 and ML16067A127).

ISFSI Fence Area	TLD Location ID	2014 (millirem/d)	2015 (millirem/d)
WEST	#59	0.8	1.1
	#60	0.7	1.0
	#61	0.7	1.0
<b>AVERAGE YEARLY DOSE</b>		256 mrem	329 mrem

The ISFSI TLD results for CYs 2014 and 2015 showed an increase in radioactivity near the TMI-2 ISFSI from CY 2014 to 2015. Discussions with the TMI-2 contractor, STI, indicated to the inspector that the apparent elevation in dose between CY 2014 and CY 2015 was a fluctuation in ambient radiation levels that was consistent with the 12 previous years of monitoring data for the ISFSI site.

A seven-day low-volume air particulate sample was taken by the licensee onsite once per month to assess possible airborne impacts from the ISFSI operations. The air samples were used in conjunction with loose surface radioactive contamination surveys performed at the vent and purge ports of each DSC and the drain port of each loaded HSM to assess potential radioactive releases from the stored spent fuel. The loose surface contamination surveys were performed annually. Both air and loose surface contamination sample media were analyzed for gross beta radioactivity. An annual composite of the loose contamination samples was measured by gamma isotopic analyses to detect the existence of fission products, if any, which may be associated with spent nuclear fuel.

The licensee explained that the REMP had specific actions in place that would be taken by the licensee if or when the airborne beta activity exceeded an action threshold of 0.04 picoCuries per cubic meter. The action threshold was established by the licensee based on the maximum gross beta in air measurements that had been obtained during preoperational monitoring for the TMI-2 ISFSI. At any time when this action level was exceeded, a follow-up nuclide specific gamma spectroscopic analysis would be performed on the air filter sample. During the CYs 2014 and 2015 monitoring periods, the airborne beta activity exceeded the REMP's established action threshold on one occasion, February 2014 (see bolded values at 0.6 in Table 2, below). However, follow-up gamma spectroscopy results made by the licensee of the yearly composited air samples did not indicate the presence of any fission product activity.

The NRC inspector reviewed all of the CYs 2014 and 2015 survey results for removable surface contamination that would have provided a direct indication of a fission product released from the spent fuel canisters stored in the ISFSI. All gross smear activity results when reviewed were determined to be less than the minimum detectable activity.

**Table 2, TMI-2 ISFSI Air Sample Gross Beta Results (pCi/m<sup>3</sup>)**

<b>Sample Date</b>	<b>2012</b>	<b>2013</b>
January	0.01	0.03
February	<b>0.06</b>	0.02
March	0.01	0.01
April	0.02	0.02
May	0.01	0.01
June	0.02	0.02
July	0.02	0.02
August	0.02	0.02
September	0.02	0.02
October	0.02	0.02
November	0.04	0.03
December	0.03	0.02

Radiation data reviewed by the NRC inspector from the CYs 2014 through 2015 environmental operating reports determined that the licensee had been adequately monitoring for effluents from the ISFSI. The DOE-ID with the assistance of its contractor remained in compliance with all environmental monitoring regulatory requirements related to their ISFSI operations.

e. ISFSI Monitoring, Contamination Surveys, and Hydrogen Monitoring

The NRC inspector reviewed ISFSI records for two annual HSM surveys required by Technical Specifications (TS) 3.2.2, "Vent System HEPA Filters" and TS 3.2.3, "DSC Hydrogen Concentration." The inspector also reviewed the records for the required test for TS 3.1.1, "Leak Testing DSC Vent Housing Seals." For the reviewed period, there were no instances in which radiation survey dose measurements approached TS limits; no instances were noted of removable contamination samples measuring above the minimum detectable activity limit; and no measurements of hydrogen levels in the DSCs at or above the TS limit of 0.5 percent by volume (5,000 parts per million) hydrogen in air.

In the required testing outlined in TS 3.1.1, there was one leak rate exceedance identified by the licensee for HSM-23 on May 14, 2015. The licensee performed a contamination survey of the vent housing interface as a TS required action. That survey did not reveal any removable contamination. There was no indication of a release of radioactivity from the DSC. After the contamination survey, the vent port seals were resealed and torqued to the required tightness. The vent housing seals for HSM-23 passed subsequent vent housing seal leak tests.

All documents reviewed by the NRC inspector demonstrated the licensee had complied with TS and SAR requirements for periodic HSM monitoring, DSC sampling, DSC filter housing leak tests, and hydrogen monitoring. No abnormal occurrences were identified in the TS surveillances performed at the TMI-2 ISFSI.

f. Biennial Update Reports and SAR Revisions

One 10 CFR 72.70 required biennial ISFSI SAR update report was submitted to NRC during the current inspection period. The biennial report provided information related to the existence of any changes made to the ISFSI SAR and other ISFSI programs during the previous two years, as required by site TSs.

The 2015 biennial report, dated March 11, 2015, reported that no ISFSI program changes were made in any of the following areas: Safety Analysis Report; Changes, Tests, and Experiments (10 CFR 72.48 evaluations); Technical Specification Bases; Radiological Environmental Monitoring Program; Training Program; or Quality Assurance Program. The licensee further indicated that no additional changes had been made to any ISFSI programs from March 2015 up to the date of the current NRC routine ISFSI inspection.

g. Safety Review Committee and Personnel Qualifications

Technical Specification 5.2.1.4 required that a Safety Review Committee (SRC) be formed to oversee operations at the TMI-2 ISFSI. The SRC is stipulated in the license as having a minimum of three committee members including required representation of technical disciplines appropriate for matters under consideration with the Facility Director required to establish a quorum.

The NRC inspector reviewed the minutes from three SRC meetings that took place on September 18, 2014, November 6, 2014, and September 30, 2015. The frequency of the meetings satisfied the 12 month frequency TS requirement. A review of the attendance lists for the meetings also confirmed that a quorum had been established for each meeting. Additionally, the NRC inspector confirmed that as required by TS 5.2.1.4 the annual agenda topics covered included performance indicators; evaluations performed pursuant to 10 CFR 72.44(e), 10 CFR 44(f), 10 CFR 72.48, etc.; proposed license amendments; selected activities of the ALARA committee and staff level document review committee; routine operations and preparation for major operations for potential safety hazards; and special reviews at the direction of the TMI-2 Facility Director.

Two individuals had transitioned into management positions at the TMI-2 ISFSI since the last NRC routine inspection. The NRC inspector reviewed the qualifications of those individuals against the position qualifications specified in the TMI-2 ISFSI SAR, Section 9.1.4.1, "Minimum Qualification Requirements," for the position of Quality Assurance Manager. The other position, NRC Licensing Manager, did not have requirements specified in the SAR. The NRC inspector determined that the two individuals' training and experience identified in the SRC minutes met all the specified requirements of the TMI-2 SAR.

h. Emergency Planning

Revisions to the licensee's emergency planning program since the last NRC inspection in April 2014 were reviewed by the NRC inspector. Procedure PLN-1610, "Three-Mile

Island Unit 2 ISFSI Emergency Response Plan,” had been revised by the licensee once since the last inspection. Revision 6 of that plan was submitted to the NRC on November 3, 2014. The changes that were made were editorial in nature. The changes made to the emergency plan through Revision 6 were found not to have reduced the effectiveness of the plan.

Required emergency plan drills/exercises were discussed in Sections 13 and 14 of the ERP. Radiological/health physics drills, medical drills, and fire drills are required to be conducted annually. Exercises were also conducted annually by the Idaho Cleanup Project (ICP). The TMI-2 ISFSI is one of six facilities that make-up the ICP. The ERP is written such that facility participation in an annual exercise occurs at least once every six years. Even though exercises at the ICP may not include the TMI-2 ISFSI, the requirements of 10 CFR 72.32(a)(12)(iii) are implemented as part of the ICP drill and exercise program. The biennial exercises at INL are larger planned events that test the adequacy of the implementing procedures, emergency equipment, and communications networks and ensured the emergency response personnel were familiar with their duties. Offsite response organizations were also invited to participate in the biennial exercises.

The NRC inspector concluded that the licensee had successfully conducted the required exercises and drills specified in the ERP since the last ISFSI inspection. Over fifty-eight drills and exercises had taken place at INL since the previous inspection, with the majority of the drills being fire related. The drill scenarios varied from full site evacuations, earthquakes, explosions, breached drums, dropped casks, et al.

The NRC inspector reviewed the licensee’s written agreements (MOAs and MOUs) with offsite support organizations, as required by ERP Section 3.7, "MOA and MOU." The MOUs were primarily with law enforcement, fire departments, hospitals, and federal, tribal, state, and county governmental agencies. The written agreement for offsite emergency medical services were all up-to-date and had been revised within the past five year period.

i. Aging Management Program

The DOE-ID had established an aging management program to ensure that aging effects would not result in a loss of intended function of ISFSI structures, systems, and components deemed important to safety that were in the scope of the license renewal. The DOE aging management plan is documented in PLN-4493 “Three Mile Island Unit 2 ISFSI Aging Management Program,” Rev. 1, dated August 5, 2015. The program established preventive maintenance inspections and actions to mitigate or prevent applicable aging effects on ISFSI components and structures. Of note, the TMI-2 ISFSI License SNM-2508 expiration date is March 19, 2019. The licensee is currently in the process of submitting their renewal application with NRC.

In April 2011, an NRC Inspection Report (ML11097A028) documented significant cracking that had occurred on the HSMs due to water intrusion and concrete freeze-thaw cycle resulting in deterioration of the concrete in the ISFSI. These degradation issues were subsequently addressed by the DOE-ID. In June of 2012 the NRC conducted a follow up inspection, as documented in NRC inspection report dated August 14, 2012

(ML12228A457), which reviewed and evaluated the concrete repairs on the HSMs. All repairs were determined to have held sufficiently through the subsequent winters. The licensee had implemented the new aging management program to monitor and correct any new degradation in a timely fashion and to address previously made repairs to ensure the prolonged life of their ISFSI.

The licensee had conducted annual visual inspections of the TMI-2 ISFSI concrete modules and the concrete end shield walls. The NRC Inspector reviewed the results of the visual inspections which were documented in RPT-1401, "2014 Visual Inspection of the TMI-2 ISFSI HSMs and the HSMs End Shield Walls," dated August 2015 and RPT 1443, "2015 Visual Inspection of the TMI-2 ISFSI HSMs and the HSMs End Shield Walls," dated December 2015. None of the concrete surfaces inspected by the licensee exhibited cracking in excess of American Concrete Institute (ACI) first-tier criteria of 0.015 inch. Guidance from ACI 349.3R, "Evaluation of Existing Nuclear Safety-Related Concrete Structures," recommends no additional evaluation for cracks below that first tier threshold. Additionally, all earlier repairs made using the epoxy injection process into the previously propagated water intrusion cracks were found to be in good physical condition. The only issues identified were efflorescence, which is primarily a cosmetic issue and some spalling at the base of the HSM end shield walls. This issue had been previously identified and placed in the licensee's corrective action program. Repairs are being planned by the licensee.

### 1.3 Conclusions

The NRC inspector reviewed all DRs resulting from the QA audits, surveillances, and assessments of the TMI-2 ISFSI program. These were evaluated to assess the licensee's QA program. The DRs were evaluated to ensure that the problems that were identified were properly categorized based on their safety significance, promptly entered into the CAP, and resolved in a manner commensurate with their significance. The inspector concluded that all identified deficiencies had been entered into the licensee's CAP and were being adequately resolved by the licensee. The NRC inspector determined that the licensee's audit and surveillance program were effectively identifying issues and any areas needed for improvement in the ISFSI program.

Selected DRs were reviewed for the period since the last NRC routine inspection in April 2014. A wide range of issues had been identified and resolved. The DRs reviewed were well documented, properly categorized based on the safety significance of the issues identified, and promptly entered into the CAP. The NRC inspector in reviewing the corrective actions taken determined they were appropriate for the situations. No adverse trends were identified during the review. The licensee's corrective action program met applicable regulatory requirements.

The NRC inspector concluded that the ISFSI facility is being maintained in good physical condition. The radiological conditions of the ISFSI were as expected for the age, configuration, and disposition of the spent fuel stored there.

Radiation data reviewed by the NRC inspector from CYs 2014 and 2015 TMI-2 Radiological Environmental Operating Reports determined that the licensee had been



adequately monitored effluents and assessed direct radiation impacts from the ISFSI. The DOE-ID remained in compliance with all environmental monitoring regulatory requirements related to their ISFSI operations.

All documents reviewed demonstrated the licensee had complied with the TSs and SAR requirements for periodic HSM monitoring, DSC sampling, DSC filter housing leak tests, and hydrogen monitoring. No abnormal occurrences were identified by the NRC inspector regarding the surveillance requirements for the TMI-2 ISFSI.

The biennial ISFSI SAR update report required by 10 CFR 72.70, dated March 11, 2015, reported that no ISFSI program changes were made in any of the following areas: Safety Analysis Report; Changes, Tests, and Experiments (10 CFR 72.48 evaluations); Technical Specification Bases; Radiological Environmental Monitoring Program; Training Program; or Quality Assurance Program. The licensee further indicated that no additional changes had been made to any ISFSI programs from March 2015 up to the date of the current NRC routine ISFSI inspection.

The ISFSI organization changes since the last inspection were reviewed for compliance with the TMI-2 ISFSI SAR staffing requirements and qualifications of personnel. The personnel added to the DOE-ID ISFSI program since the last NRC inspection met the requirements as specified in the SAR. The SRC had met at least annually and reviewed issues consistent with requirements of the SAR and TS.

The TMI-2 ERP was being properly maintained. The latest revision to the plan was reviewed during the inspection and was verified to not reduce the effectiveness of the plan. Drills, exercises, and training were performed in accordance with requirements in the ERP. Offsite support agencies participated in the site-wide exercise on July 22, 2015.

TMI-2 had implemented an aging management program for the TMI-2 ISFSI due to previously identified concrete degradation noted in the April 7, 2011, and August 14, 2012, inspection reports (ML11097A028 and ML12228A457). The concrete degradation was determined to have been due to water intrusion and freeze-thaw cycling that can occur in the Idaho climate. All previous repairs made to the HSMs in 2011 had remained intact through the subsequent winter freeze-thaw cycles. At the time of the inspection, the ISFSI pad and HSMs were in good physical condition and the licensee had performed all of the required inspections and repairs to the ISFSI associated with the program. The licensee's aging management program was adequately monitoring the condition of their ISFSI concrete structures. No NRC concerns or findings were identified in the NRC inspector's review of the on-going maintenance of their facility.

## **2 Review of 10 CFR 72.48 Evaluations (60857)**

### **2.1 Inspection Scope**

The licensee's 10 CFR 72.48 screenings and evaluations since the last NRC safety inspection were reviewed by the NRC inspector to determine compliance with regulatory requirements.

### **2.2 Observations and Findings**

The licensee's 10 CFR 72.48 screenings and evaluations since the last NRC routine ISFSI inspection were reviewed to determine compliance with regulatory requirements. The licensee had reported that they had not made any significant modifications to their ISFSI since the last inspection. Additionally, no full 10 CFR 72.48 safety evaluations had been performed since the last NRC inspection. From the list of 10 CFR 72.48 screens provided by the licensee, one 10 CFR 72.48 screen made by the licensee was available for review. The change involved an editorial update and the replacement of an organizational chart in the TMI-2 ISFSI SAR Section 9.1, "Organizational Structure." The changes were made to more accurately reflect the organizational structure of DOE-ID. The licensee utilized Procedure MCP-2925, "Screen and Evaluate Changes," Revision 19 to perform the 10 CFR 72.48 safety screens. No screens reviewed required a full 10 CFR 72.48 safety evaluation. All screenings were determined to have been adequately evaluated.

### **2.3 Conclusions**

All required safety screens of changes to ISFSI designs or procedures as described in the SAR had been performed in accordance with procedures and the regulatory requirements of 10 CFR 72.48. All screens reviewed by the inspector were determined to have been adequately evaluated.

## **3 Exit Meeting**

The inspector reviewed the scope and findings of the inspection during an exit conducted on July 21, 2016. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

## **SUPPLEMENTAL INSPECTION INFORMATION**

### **PARTIAL LIST OF PERSONS CONTACTED**

#### Licensee Personnel

S. Ahrendts, Facility Director, DOE-ID  
D. Bland, Program Manager, STI  
J. Long, Facility Manager, STI  
S. Ferrara, NRC License Manager, DOE-ID  
J. Zimmerman, Deputy Manager, Idaho Cleanup Project, DOE-ID

### **INSPECTION PROCEDURES USED**

IP 60858      Away-From-Reactor ISFSI Inspection Guidance  
IP 60857      Review of 10 CFR 72.48 Evaluations

### **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### Opened

None

#### Discussed

None

#### Closed

None

## LIST OF ACRONYMS

ACI	American Concrete Institute
ADAMS	Agencywide Documents Access and Management System
CAP	Corrective Action Program
CAR	Condition Action Request
CFR	Code of Federal Regulations
CY	calendar year
CWI	CH2M♦WG Idaho, LLC
DOE-ID	Department of Energy Idaho Operations Office
DNMS	Division of Nuclear Material Safety
DR	Deficiency Report
DSC	Dry Shielded Canister
FSAR	Final Safety Analysis Report
FSV	Fort Saint Vrain
HSM	Horizontal Storage Module
ICARE	Issue Communication and Resolution Environment system
INL	Idaho National Laboratory
ISFF	Idaho Spent Fuel Facility
ISFSI	Independent Spent Fuel Storage Installation
MDA	Minimum Detectable Activity
mrem	milli-Roentgen equivalent man
µrem/h	micro-Roentgen equivalent man per hour
mrem/d	milli-Roentgen equivalent man per day
NRC	U.S. Nuclear Regulatory Commission
OSQA	Office of Standards and Quality Assurance
pCi/m <sup>3</sup>	pico-Curie per meter cubed
QA	Quality Assurance
REMP	Radiological Environmental Monitoring Program
RP	radiation protection
SAR	Safety Analysis Report
SRC	Safety Review Committee
STI	Spectra Tech, Incorporated
TMI-2	Three Mile Island, Unit 2
TLD	thermoluminescent dosimeter
TS	Technical Specification

R. Provencher

- 2 -

Should you have any questions concerning this inspection, please contact Mr. Eric Simpson at 817-200-1553 or the undersigned at 817-200-1197.

Sincerely,

/RA/

Jack E. Whitten, Chief  
Fuel Cycle and Decommissioning Branch  
Division of Nuclear Materials Safety

Dockets No: 72-20  
Licenses No: SNM-2508

Enclosure:  
Inspection Report 72-00020/2016-001

Attachment: Supplemental Information

Distribution  
See next page

ADAMS ACCESSION NUMBER: ML

<input checked="" type="checkbox"/> SUNSI Review By:EJS	ADAMS: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Sensitive <input checked="" type="checkbox"/> Non-Sensitive	<input type="checkbox"/> Non-Publicly Available <input checked="" type="checkbox"/> Publicly Available	Keyword NRC-002
OFFICE	RIV:DNMS/FCDB			R-IV/C:FCDB
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SIGNATURE	/RA/			/RA/
DATE	8/19/16			8/19/16

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Letter to Richard B. Provencher from Jack E. Whitten dated August 19, 2016

SUBJECT: THREE MILE ISLAND, UNIT 2, INDEPENDENT SPENT FUEL STORAGE  
INSTALLATION INSPECTION REPORT 072-00020/2016-001

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