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CALVERT CLIFFS
NUCLEAR POWER PLANT

July 27, 2012

U. S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Document Control Desk

SUBJECT: Calvert Cliffs Nuclear Power Plant
Independent Spent Fuel Storage Installation
Material License No. SNM-2505, Docket No. 72-8
Response to Request for Supplemental Information, RE: Calvert Cliffs Independent Spent Fuel Storage Installation License Renewal Application (TAC No. L24475)

REFERENCE: (a) Letter from Mr. J. Goshen (NRC) to Mr. G. H. Gellrich (CCNPP), dated March 2, 2012, Request for Supplemental Information No. 3 for the Renewal Application to Materials License No. SNM-2505 for the Calvert Cliffs Site Specific Independent Spent Fuel Storage Installation (TAC No. L24475)

In Reference (a), the Nuclear Regulatory Commission requested Calvert Cliffs Nuclear Power Plant, LLC provide the results of the lead canister inspection that occurred on June 27th and 28th, 2012. Attachment (1) contains Calvert Cliffs inspection report.

NMSS26

Should you have questions regarding this matter, please contact Mr. Douglas E. Lauver at (410) 495-5219.

Very truly yours,

STATE OF MARYLAND :
: **TO WIT:**
COUNTY OF CALVERT :

I, George H. Gellrich, being duly sworn, state that I am Vice President - Calvert Cliffs Nuclear Power Plant, LLC (CCNPP), and that I am duly authorized to execute and file this response on behalf of CCNPP. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other CCNPP employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of St. Mary's, this 27th day of July, 2012.

WITNESS my Hand and Notarial Seal:

Notary Public

My Commission Expires:

March 14, 2015
Date

GHG/KLG/bjd

Attachment: (1) Calvert Cliffs Independent Spent Fuel Storage Installation Lead and Supplemental Canister Inspection Report

cc: N. S. Morgan, NRC
W. M. Dean, NRC
Resident Inspector, NRC
S. Gray, DNR
J. Goshen, NMSS
V. Ordaz, NMSS

ATTACHMENT (1)

CALVERT CLIFFS INDEPENDENT SPENT FUEL STORAGE INSTALLATION LEAD AND SUPPLEMENTAL CANISTER INSPECTION REPORT

Calvert Cliffs Nuclear Power Plant, LLC
July 27, 2012

NRC Question O-4 from Reference 1:

Provide the visual examination results of the lead cask to be performed in April 2012 to the staff for review prior to re-licensing. These results should include any indications of rust blooms on the cask surface, if present, accompanied by appropriate corrective action.

Rust blooms have been demonstrated to be precursors to stainless steel chloride-induced stress corrosion cracking in environments of interest. Observation of any potential rust blooms could indicate the possibility of stress corrosion cracking on the lead cask.

This information is required to evaluate compliance with 10 CFR 72.120(d).

NRC Question RSI-1 from Reference 2:

Provide the results to the staff of the lead canister inspection scheduled June 27, 2012, within 30 days of completion.

The staff has utilized NUREG 1927, "Standard Review Plan for the Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance," in evaluating the licensee's renewal application. Evaluation guidance in NUREG 1927 is based partly on the confirmatory inspections identified in NUREG 1927, Appendix E, "COMPONENT-SPECIFIC AGING MANAGEMENT." The staff recognizes that the licensee has delayed the lead canister inspection in part to facilitate the Electric Power Research Institute inspection effort being performed as part of the stainless steel stress corrosion cracking issue, and finds this acceptable. However, the staff has determined that it cannot complete the safety analysis report for the licensee's renewal application until the inspection results are provided.

This information is required to evaluate compliance with 10 CFR 72.120(d).

CCNPP Supplemental Response to Question O-4 and Response to Question RSI-1:

On June 27th and 28th, 2012, Calvert Cliffs performed an inspection of the interior of two horizontal storage modules (HSMs), and the exterior of the dry shielded canisters (DSCs) they contained. The inspection was conducted in accordance with Calvert Cliffs Nuclear Power Plant Engineering Test Procedure 12-004, "Aging Management and Marine Environment Effects Inspection of ISFSI Horizontal Storage Module and Dry Storage Canisters." The first module examined was HSM-15, which was loaded in November 1996 and contained the "lead canister" identified in Reference 3 to meet NUREG-1927 Appendix E requirements. The second module inspected was HSM-1 which was loaded in November 1993 (the first loading) and represents one of the lowest heat load canisters ever loaded (estimated at 4.2 kW presently). The latter supplemental canister was added as part of the Electric Power Research Institute (EPRI) research efforts on evaluating stress corrosion cracking of stainless steel canisters used for dry storage. The EPRI research effort included salt concentration measurements on the upper shell of the DSC, collection of samples of the deposits on the upper shell of the DSC for off-site analysis, and surface temperature measurements via contact thermocouple for the purpose of benchmarking best-estimate thermal models. The EPRI research will be summarized in a report to be released later this year.

The visual inspection was conducted in both HSM-15 and HSM-1 by remote and direct means with a GE Everest Ca-Zoom 6.2 PTZ100, which is a remote controlled high definition pan-tilt-zoom (PTZ) camera system with a 100mm head. The remote inspection was performed by lowering the camera through the rear outlet vent which allowed for viewing of the majority portion of the DSC, its support structure, and the interior surfaces of the HSM. The direct inspection was performed through the partially open door by mounting the camera on a pole. This allowed for views of the bottom end of the DSC, the seismic restraint, HSM doorway opening, and the backside of the HSM door. Figure 1 provides an overview of the HSM and DSC, and provides information on the orientation of each module used in discussions of various inspection point locations. Varying levels of camera magnification were utilized to highlight various areas of interest during the inspection. Due to that fact, estimates of the size of various features noted on subsequent figures were made by comparison against another object of known dimension in the same view.

DSC Inspection Results

The DSC located in HSM-15 is serial number BGE24P-R006, hereafter referred to as DSC-6. The DSC located in HSM-1 is serial number BGE24P-R011, hereafter referred to as DSC-11. The visual inspection of both DSCs through the rear outlet vent of the HSM focused on scanning down each side of the shell and the top and bottom ends of the canister in a systematic manner. Specific efforts were made to view the longitudinal and circumferential shell welds, and the top cover plate weld. A review of fabrication drawings prior to the inspection determined that the longitudinal DSC shell welds would be located on the east side of HSM-15, and on the west side of HSM-1.

On the upper shell of both DSC-6 and DSC-11, a thick coat of dust and small clumps of unknown material were observed, as shown on Figure 2, except near the outlet vent where there is evidence of water coming in contact with the DSC. As these water marks were observed only near the rear outlet vent, they are likely created by wind driven rain water entering the module via the rear outlet vent. In the case of DSC-11, the heat shield fastener on the ceiling directly above the water mark was observed to have a white stain around it. No signs of rust were seen in areas where water marks were observed. In the case of DSC-11, a sample of the dust deposited on the top surface was collected from a known area as part of the EPRI scope of the inspection. The analysis of the composition and salt concentrations measured will be presented in their report later this year.

On both DSC-6 and DSC-11, the entire surface of the top cover plate and the top cover plate weld were examined and found to be in good condition with no signs of corrosion.

The shell of DSC-6 was observed to be in good general condition. The center circumferential weld and longitudinal welds were examined and no rust spots or signs of cracking were noted. The bottom shield plug circumferential weld was not able to be observed as it was obscured by the steel sleeve of the HSM doorway opening. A few small surface rust spots were noted on the DSC shell base metal, as shown in Figures 3 through 6. The images were compared against those from uncleaned Type 304 stainless steel U-bend samples exposed to a salt-fog and known to have suffered stress corrosion cracking (Reference 5 Section 4.1). The level of corrosion seen in Figures 3 through 6 appears relatively light in comparison to those images. While these visual observations cannot conclusively confirm or deny the existence of stress corrosion cracking at these locations, Calvert Cliffs believes that a more plausible explanation for these few small spots of light rust is that the shell was contaminated with free iron in these locations at some point during fabrication or handling prior to being placed in service. Free iron contamination can occur when carbon/low-alloy steel tools come into contact with the surface (which may explain Figure 4) or particles from grinding, welding, or cutting of carbon/low-alloy steel are transferred to the stainless steel surface (which appears characteristic of Figures 3, 5, and 6). Rusting of such free iron would be expected to have occurred fairly quickly once the outside surface of the DSC was exposed to water, which happens during the normal course of loading when the transfer cask annulus is filled with demineralized water. The resulting light coating of surface rust would be cosmetic in nature and would not result in degradation to the stainless steel shell of the DSC in the sheltered environment of the HSM, and thus are not believed to be a current challenge to the confinement function of DSC-6. However, Calvert Cliffs has initiated CR-2012-006782 to evaluate these locations in further detail to determine if additional and/or more frequent monitoring is required to conclusively ascertain their nature, and take appropriate corrective action if their presence is determined to represent a potential challenge to the confinement function of the DSC.

The shell of DSC-11 (the lower heat load canister) was observed to be in good condition, and no signs of the rust were noted on the base metal or welds. A linear wear mark was noted running the length of the lower shell of DSC-11 near the inner side of the west rail. This mark is believed to be from the demonstration Independent Spent Fuel Storage Installation loading campaign that was conducted prior to the start of formal loading operations in 1993. During that demonstration, DSC-11 was loaded with dummy fuel assemblies and inserted into an HSM, and then withdrawn. Verbal discussions with individuals who worked on the first loading campaign indicated that when the DSC-11 was used for an actual loading, it was rotated from the position used for the demonstration so as to not slide it along the rails in the same location twice. No signs of corrosion were noted on this wear mark. Since the wear occurred from sliding on the Nitronic 60 stainless steel surface of the rail, the lack of corrosion on this wear mark compared with that on the scratch/gouge on DSC-6 in Figure 4, lends additional credence to the idea that the rust on the latter occurred through contact with carbon/low-alloy steel.

As discussed previously, the inspection of the bottom end of DSC-6 and DSC-11 was accomplished through the HSM doorway. The bottom end of both DSCs appeared polished, free of corrosion and in very good condition. Both grapple rings were examined and also appeared to be in good condition.

HSM Inspection Results

The visual inspection of the interior of the HSM focused on examining the subcomponents requiring aging management for the aging effects considered plausible for those subcomponents, as identified in Reference 4, Attachment 1, Table 3.4-1. The HSM subcomponents requiring an aging management program included:

- Concrete walls, roof, and floor (accessible surfaces)
- DSC structural steel support assembly (i.e., coated carbon steel rails, transverse beams, embedments)
- DSC seismic restraint
- Cask docking flange and tie restraints
- Shielded front access door and door supports
- Concrete ventilation air inlet plenum

The aging effects requiring management were Loss of Material (all components), Spalling/Scaling/Cracking (concrete only) and Change in Material Properties (concrete only).

The accessible surfaces of the concrete walls, roof, and floor all appeared to be in good condition with little to no signs of spalling or cracking. There was additional evidence of localized water intrusion to the interior of the module in the form of a few concrete stalactites, which were seen in the 2-inch gap between the heat shield and the concrete ceiling of both HSM-15 and HSM-1 (see Figure 7). These stalactites were seen only near the rear outlet vent, which suggests that the source of the water intrusion is the outlet vent stack. They are formed when water leaches calcium hydroxide out of the concrete, and precipitates it as calcium carbonate on contact with carbon dioxide in the air. There was some indication that the water flowed inward along a surface crack for a few inches, but the pure white color of the stalactites suggests that water has not penetrated to the rebar. Calvert Cliffs does not believe that these few stalactites represent a current operability issue for the HSM, but has initiated CR-2012-006781 to evaluate whether their presence could have implications for performance of the intended functions of the HSM prior to the next aging management inspection. A coating of dirt/dust was present on the floor of both HSMs, but no debris or standing water was noted.

In both HSM-15 and HSM-1, the DSC structural support beams and rails were in good condition, with the coating intact in most areas. There was a large build up of dust on the transverse support beams horizontal surfaces particularly on the beams at the back end of the module. There were no signs of loose or missing bolting or fasteners. The areas shown in Figure 8 represent the only significant areas of coating failure seen and where general corrosion of the carbon steel surface or bolting hardware was observed. As noted in our Reference 3 response, signs of small areas of coating failure and surface corrosion on DSC supports were expected in these particular modules since they are part of Phase 1 and were not subject to recoating following the November 1999 condition report on this issue (IR3-028-233) due to having already been loaded. The small areas of general surface corrosion observed do not represent a current challenge to the function of the DSC structural supports. However, Calvert Cliffs has initiated CR-2012-006783 to evaluate whether the level of general corrosion seen is consistent with the conclusions of the evaluation performed 12 years ago, and determine if additional corrective actions or increased monitoring frequency are needed to ensure they can continue to perform their intended function for the duration of the extended license.

In both HSM-15 and HSM-1, the DSC seismic restraint appeared to be in good condition and free of corrosion, with the exception of light corrosion on the fasteners attaching the handle to the body of the seismic restraint, which would have no impact on its ability to perform its function. A small amount of dirt and small leaves were noted around the seismic restraint in HSM-15, and a somewhat larger amount of dirt, small leaves and spider webs were noted around the seismic restraint in HSM-1. The greater amount seen around that in HSM-1 is likely due to the fact that module faces a wooded area at the north end of the Independent Spent Fuel Storage Installation, while HSM-15 faces south towards Phase 2 and is more centrally located within the row of modules. The presence of this relatively small amount of debris has no impact on the functions of the seismic restraint or the HSM doorway.

The HSM-15 door back side and cask docking flange were examined from within the doorway using the PTZ camera since the door to this module was only lifted 2 feet and cribbed for inspection of this module. No significant signs of coating failure or corrosion were noted on either subcomponent. The bottom portion of the docking flange and front side of the door also appeared free of corrosion when viewed from outside the module. The coating on the HSM-15 door back side was in generally good condition, but a small amount of coating failure and light surface rust was noted on the bottom end of the door. Similarly, a small amount of dirt and light rust was noted on the upper side of the door support frame. On HSM-1 the door was completely removed for the inspection and both the cask docking flange and backside of the HSM door were able to be directly viewed from outside the module. Two small areas of missing coating and subsequent surface rust on the exposed steel were noted on the vertical portion of the HSM-1 cask docking flange. Similarly, a few nicks in the coating were noted on the backside of the HSM-1 door, but the coating was otherwise in good condition. In no case did the small amounts of corrosion noted appear significant enough to impact the function of any of the subcomponents. No signs of corrosion were noted on the cask tie restraints on either HSM.

In both HSM-15 and HSM-1, the concrete ventilation air inlet plenums and the rear outlet vent stack were in good condition, and showed no signs of cracking or spalling. There were no signs of blockage observed in either the inlet plenum or rear outlet vent stack of both HSMs.

References

1. Letter from J. Goshen (NRC) to G. H. Gellrich (CCNPP), dated October 7, 2011, Second Request for Additional Information for Renewal Application to Special Nuclear Materials License No. 2505 for the Calvert Cliffs Site Specific Independent Spent Fuel Storage Installation (TAC No. L24475)
2. Letter from J. Goshen (NRC) to G. H. Gellrich (CCNPP), dated March 2, 2012, Request for Supplemental Information No. 3 for Renewal Application to Materials License No. SNM-2505 for the Calvert Cliffs Site Specific Independent Spent Fuel Storage Installation (TAC No. L24475)
3. Letter from G. H. Gellrich (CCNPP) to Document Control Desk (NRC) dated February 10, 2011, Responses to Request for Supplemental Information, Re: Calvert Cliffs Independent Spent Fuel Storage Installation License Renewal Application
4. Letter from G. H. Gellrich (CCNPP) to Document Control Desk (NRC), dated September 17, 2010, Site-Specific Independent Spent Fuel Storage Installation (ISFSI) License Renewal Application
5. NUREG/CR-7030, Atmospheric Stress Corrosion Cracking Susceptibility of Welded and Unwelded 304, 304L, and 316L Austenitic Stainless Steels Commonly Used for Dry Cask Storage Containers Exposed to Marine Environments, October 2010.

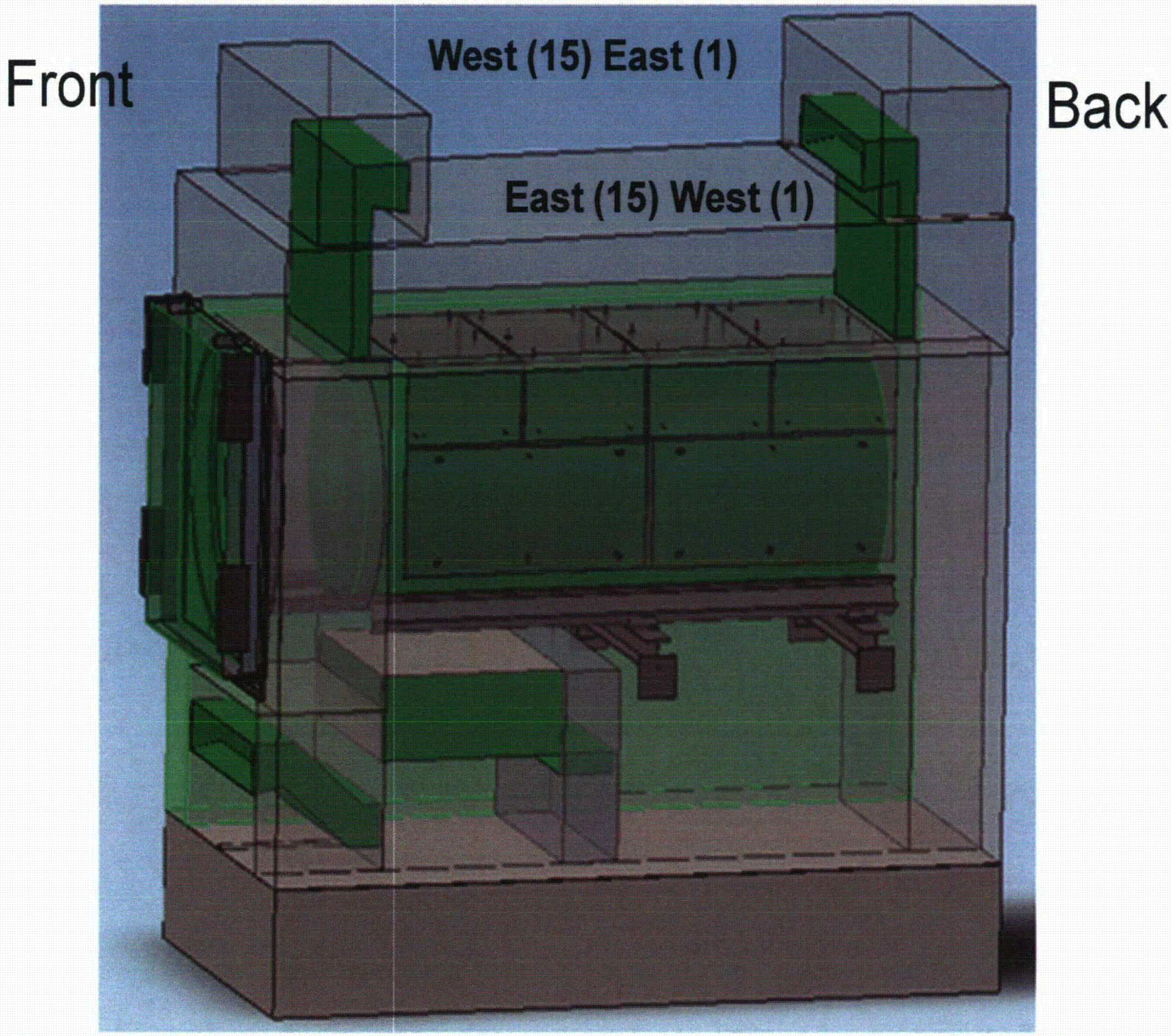


Figure 1 – Overview of HSM showing orientation of the two modules examined (HSM-15 and HSM-1)

Figure 2 – Views of DSC-6 (HSM-15) and DSC-11 (HSM-1) showing dust and signs of and water contact from rear outlet vent

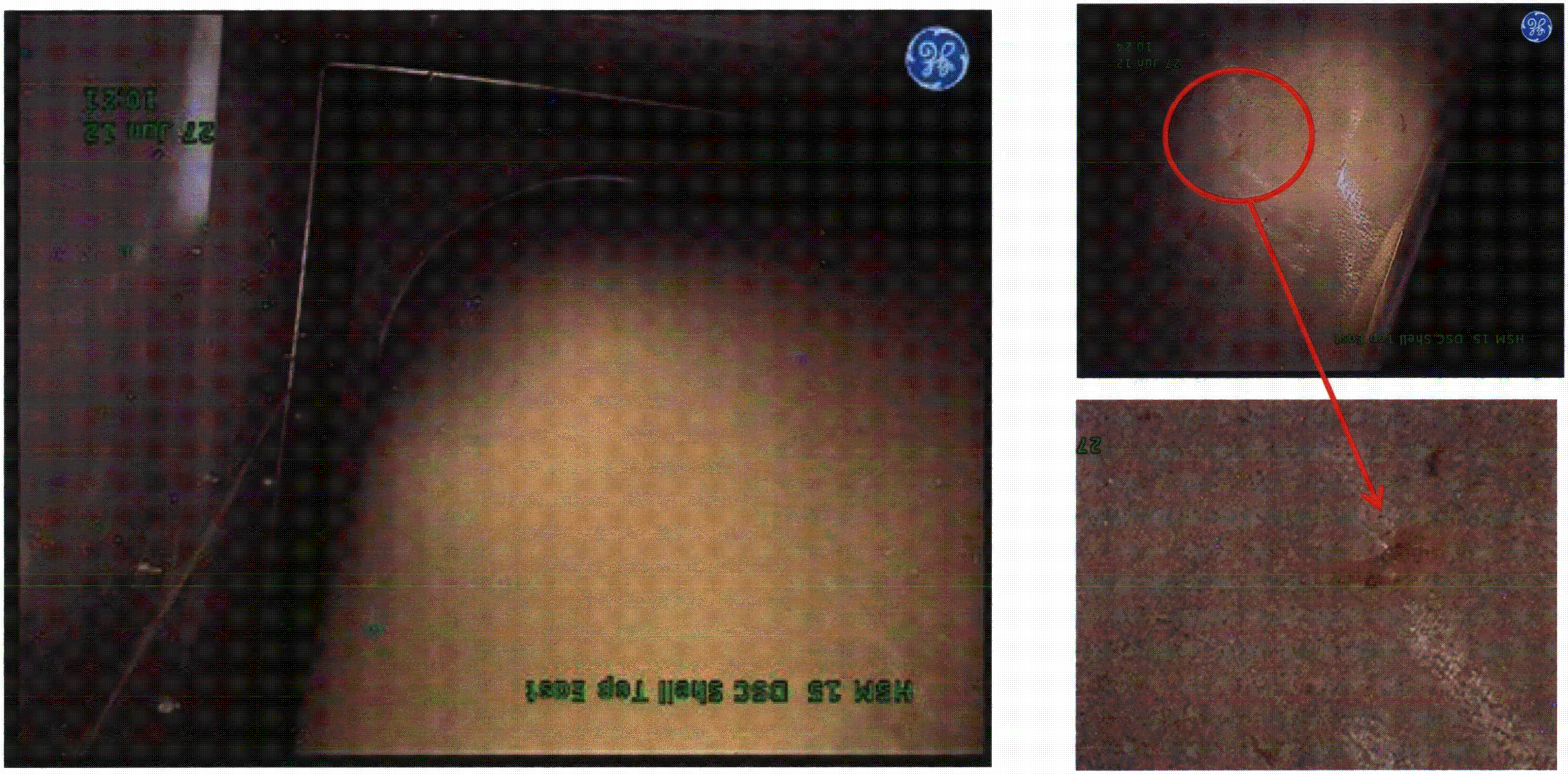


Figure 3 – Highlights of Upper East Shell of DSC-6 in HSM-15

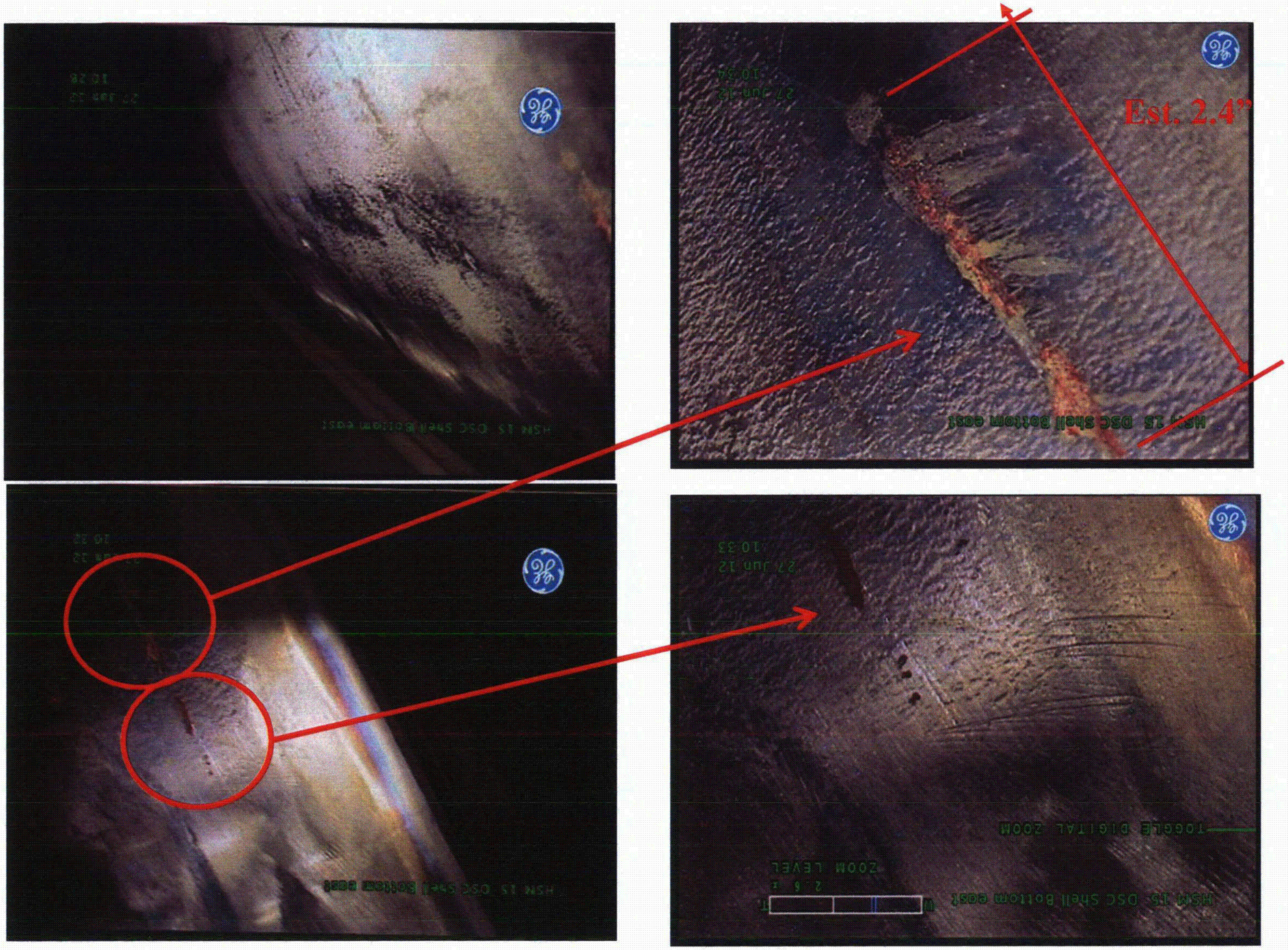


Figure 4 – Views of the Lower East Shell of DSC-6 in HSM-15

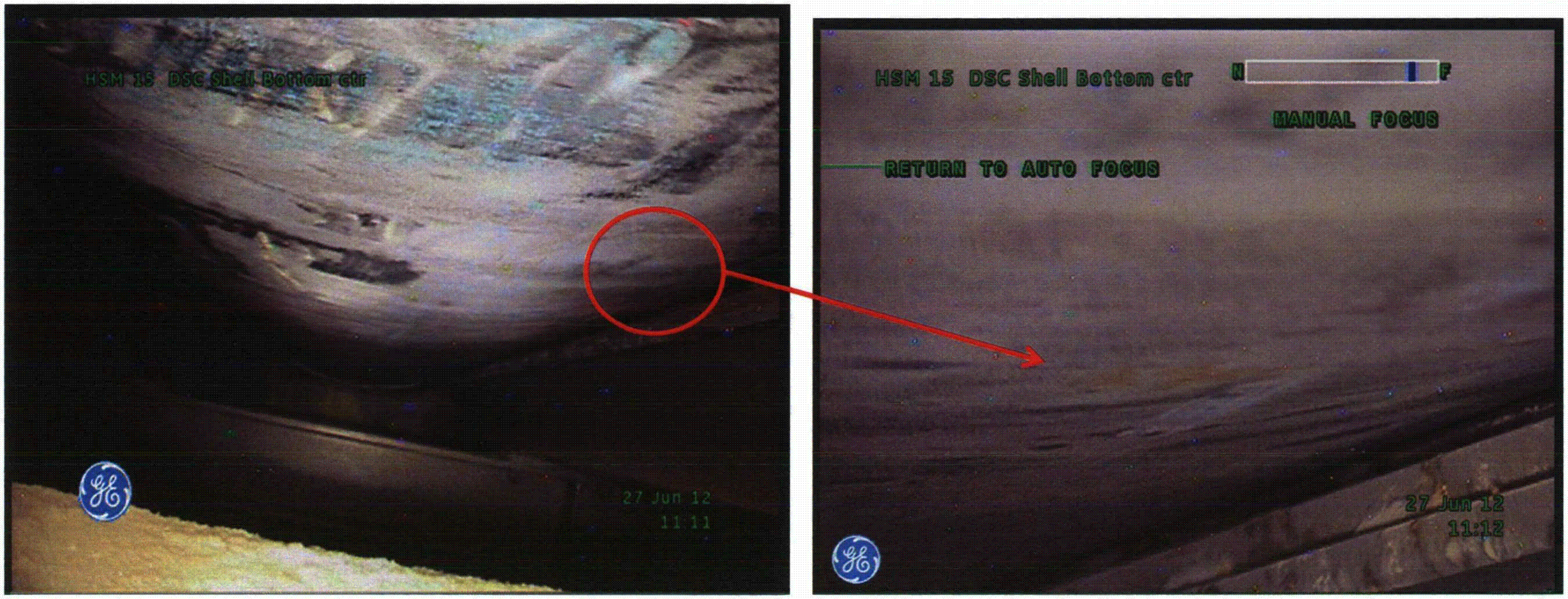


Figure 5 – Views of the Bottom of DSC-6 Shell between rails in HSM-15

Figure 6 – Views of the Lower West Shell of DSC-6 in HSM-15

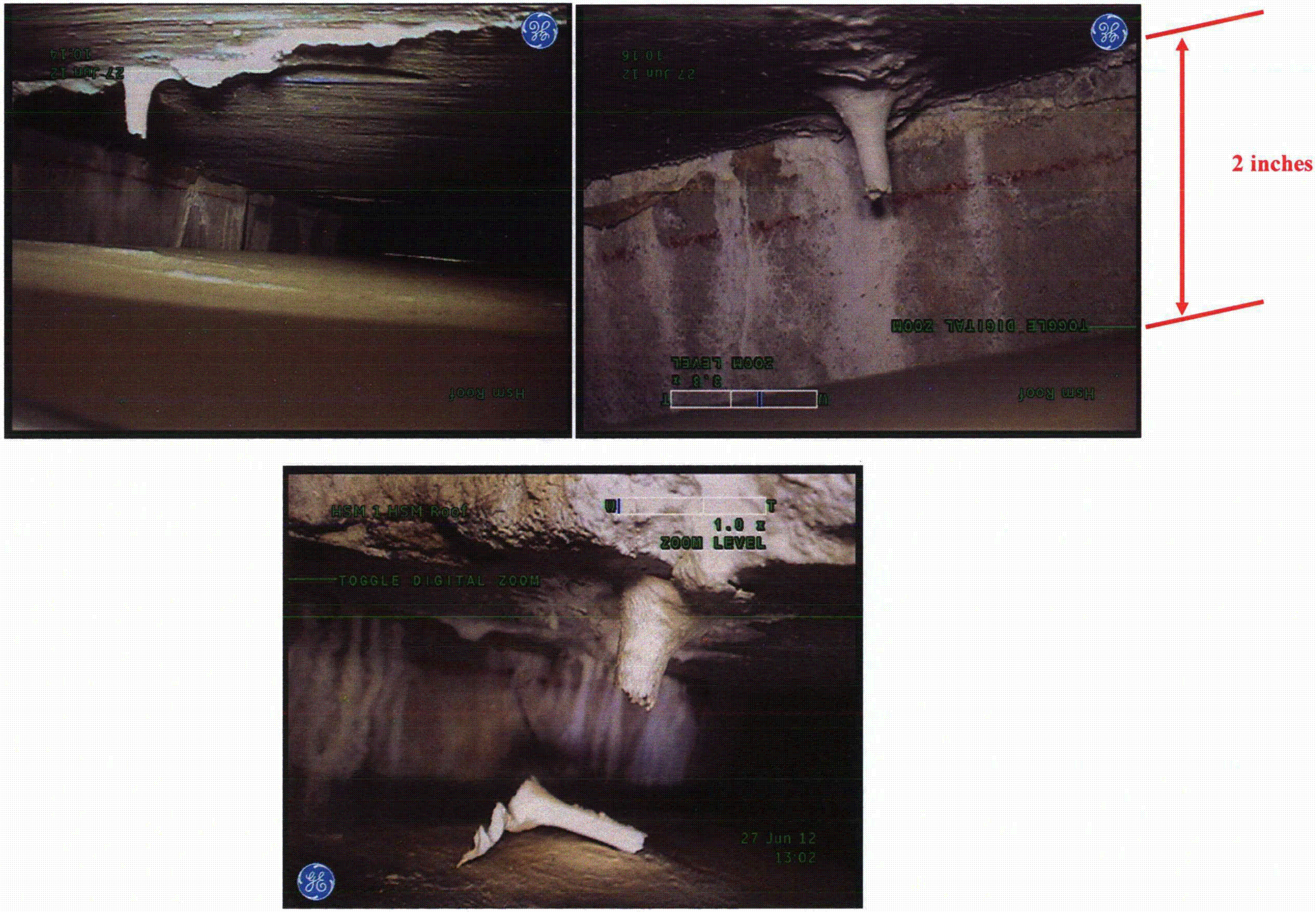
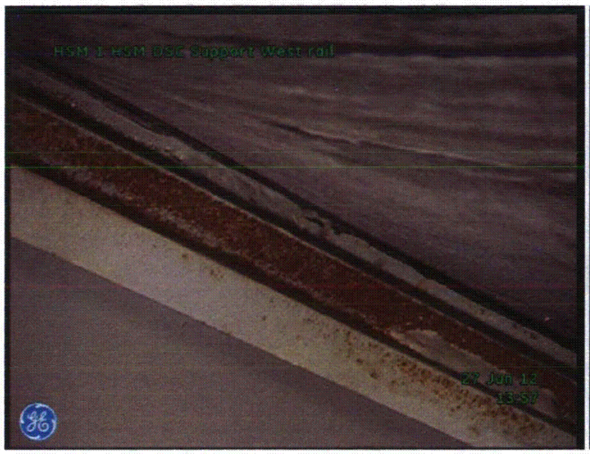


Figure 7 – Views of ceiling in HSM-15 (above) and HSM-1 (below) showing concrete stalactites

HSM-15 East Back Beam Embedment Weld

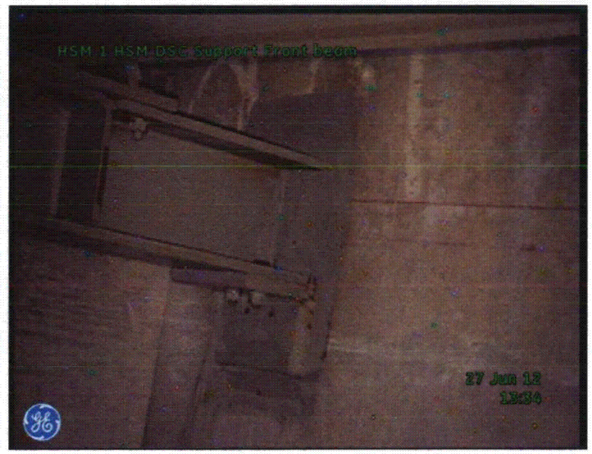
HSM-15 East Front Beam

HSM-15 West Front Beam



HSM-1 West Rail Base Plate ~8" Section Near Back

HSM-1 West Front Beam



HSM-1 East Front Beam

Figure 8 – Views of the DSC Support Structure in HSM-15 and HSM-1 showing locations of coating failure