ATTACHMENT 1

PALISADES LEAD CASK INSPECTION REPORT

(52 PAGES TOTAL)

VSC-24 Lead Cask Inspection Report
VSC-24 CoC Renewal Project

Revision 1

February 10, 2013

Prepared by B Van Wagner **Date** 2/12/2013

Concurrence P E Deeds **Date** 2/12/2013

VSC-24 Lead Cask Inspection-Palisades
May 21-24, 2012

I. Executive Summary

Between the dates of May 21 – May 24, 2012, lead cask inspections were prepared for and performed on Palisades' ventilated storage cask and multi-assembly sealed basket assembly, VSC-24 #15 in accordance with Attachment 1 of this report, VSC-24 Lead Cask Inspection Plan, VSC-24 CoC Renewal Project.

Personnel performing the visual examination of the concrete surfaces were qualified in accordance with the requirements of ASME B&PV Code, Section XI, IWL-2310. Personnel performing the general visual examinations of the coated steel surfaces of the VCC and MSB assemblies were qualified in accordance with the requirements of ASME B&PV Code, ASME Section XI, IWE-2330.

The purpose of the inspections performed was to demonstrate that the components which make up the VSC-24 Ventilated Storage Cask System have not undergone unanticipated degradation during their initial licensing period. This information (inspection results) is intended to support the CoC Renewal Application for the VSC-24 system.

Overall, inspection results demonstrated the VSC-24 #15 system to be in very good condition with respect to coatings and material condition of all components. Only minor areas of coating disturbance were noted with the affected base material in very good condition. In each case, the areas were cleaned and recoated in accordance with manufacturer's instructions. Specific areas inspected and results for each area are included within the body of this report.

II. Inspection Scope/Results

Specific inspection areas were as follows:

VCC Exterior Concrete Surface
VCC Bottom Surface
MSB Shell, VCC Line and VCC Air Ducts
VCC Cask Lid and MSB Closure Weld

A. VCC Exterior Concrete Surface

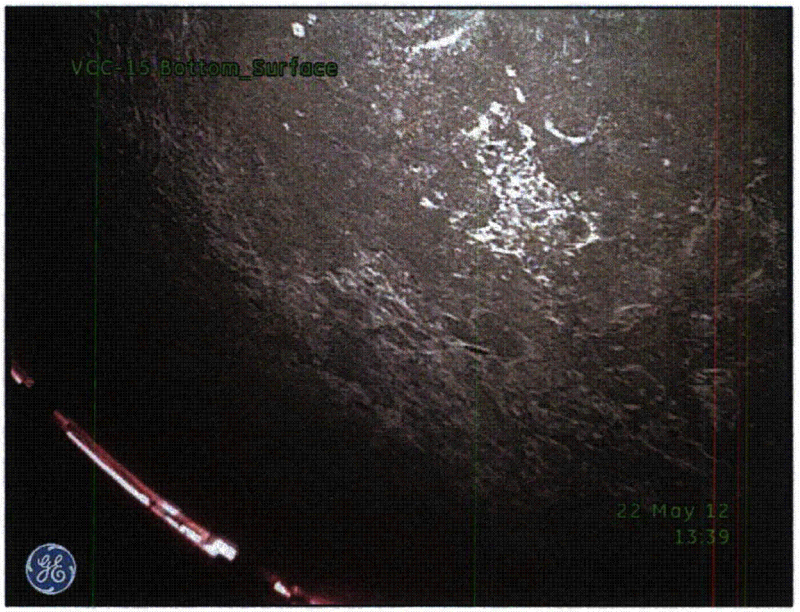
Direct visual inspection was performed for evidence of concrete aging such as scaling, cracking, spalling, increased porosity, pattern cracking and any other potential degradation of the concrete surfaces. Inspections were performed in accordance with the VSC-24 Lead Cask Inspection Plan (Attachment 1) and documented in Palisades's surveillance procedure AT-9 "Inspection of Ventilated Storage Cask Exterior" (Attachment 2).

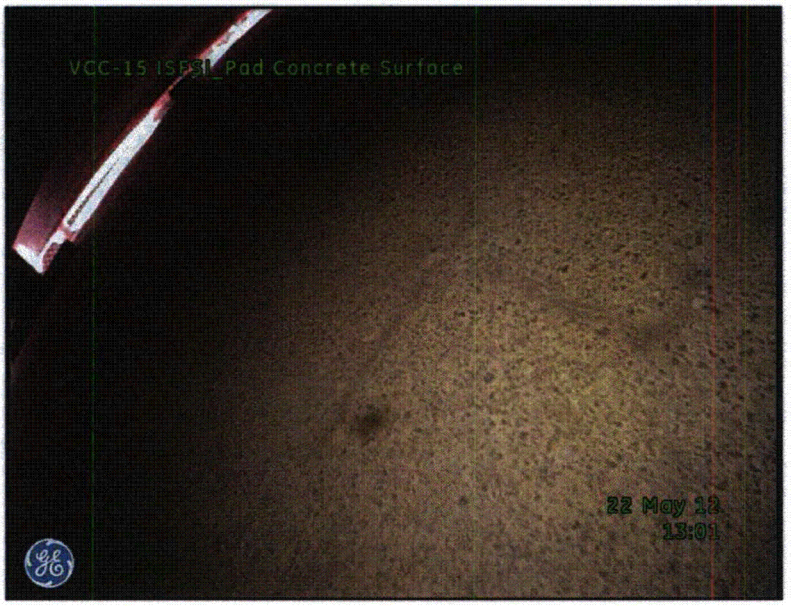
Inspection results revealed six "bug holes" which exceeded the established acceptance criteria and required grout repair. See Attachment 2 for location and size of the noted indications.

In addition, a small area (approximately 3ft long by 3/8 inch wide by 3/8 inch deep) or void in the concrete was identified at the interface between the VCC bottom plate and the vertical VCC concrete wall. This area was observed during re-setting of the VCC on the pad and no flexing or change in the small gap was noted. This condition does not affect the function of the VCC or VSC-24 system and is cosmetic only and is limited to the area of the concrete and bottom plate outer edge interface only. No other degradation mechanisms were identified as the overall condition of the VCC concrete exterior was found to be in good condition.

B. VCC Bottom Surface

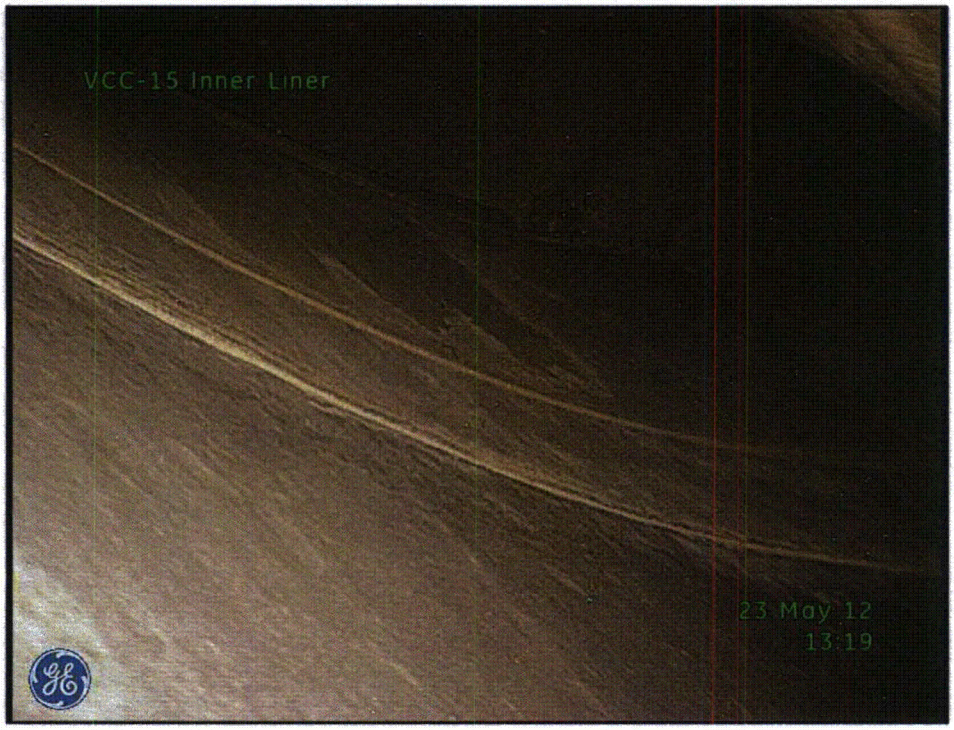
Visual inspection of the bottom surface of the VCC and the surface underneath the VCC (Concrete pad) was performed for evidence of coating degradation, corrosion and concrete degradation. In all cases, the inspections of the surfaces demonstrated the coatings and concrete to be in very good condition with no degradation mechanisms identified. Only minor dust, bugs etc were noted during the inspection. All acceptance criteria were satisfied.

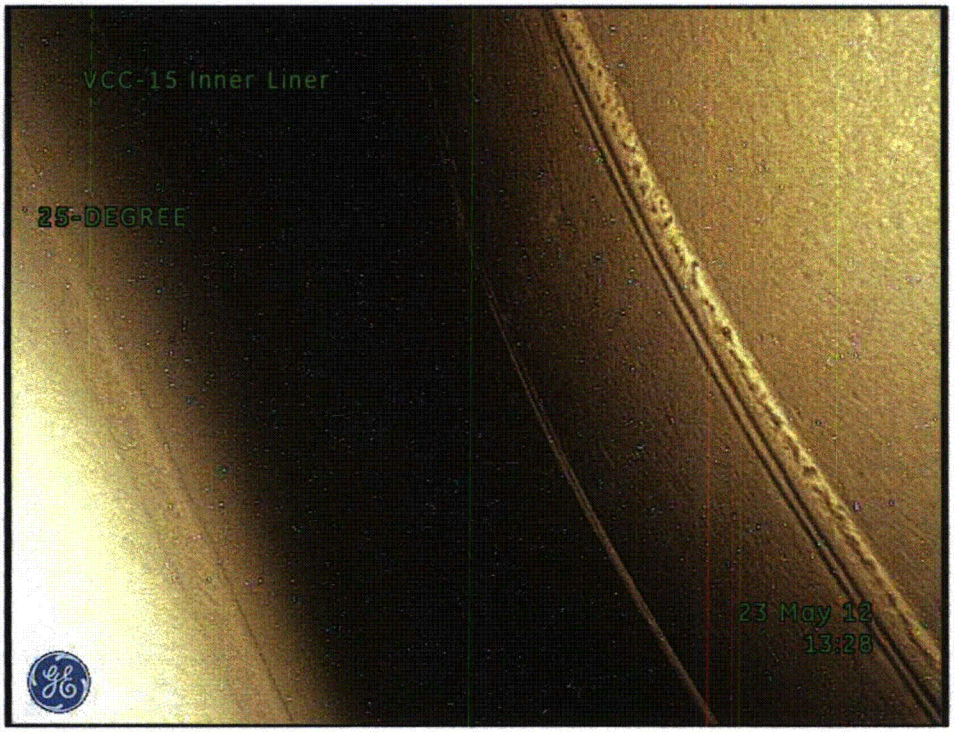




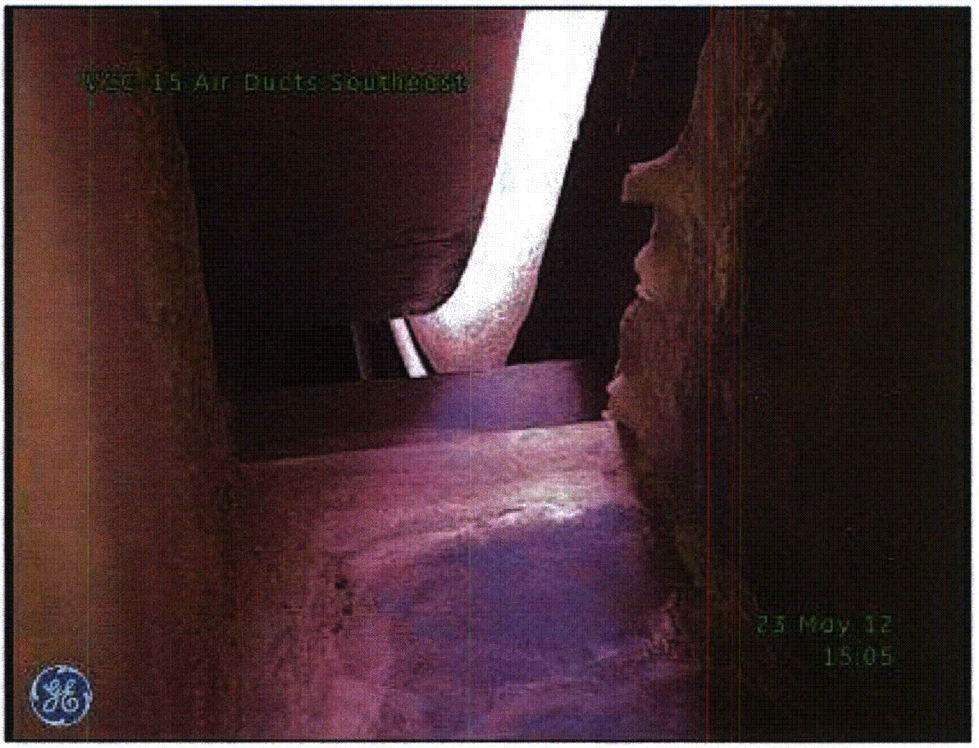
C. MSB Shell, VCC Liner and VCC Air Ducts

The readily accessible surfaces of the MSB Shell, VCC Liner (Interior) and VCC Air Ducts were visually inspected utilizing boroscopic equipment with video recording. Additional visual inspections were performed of the air ducts/channels from beneath the VCC using remote camera equipment. All acceptance criteria was satisfied with only minor debris (leave, bugs, mineral deposits) and dust/dirt noted. Coatings were noted to be in good condition with no corrosion noted. In all cases the air ducts were clear and capable of performing their intended functions with absolutely no challenge to the acceptance criteria of 10% blockage or less.


VCC-15 Inner Liner
23 May 12
13:19

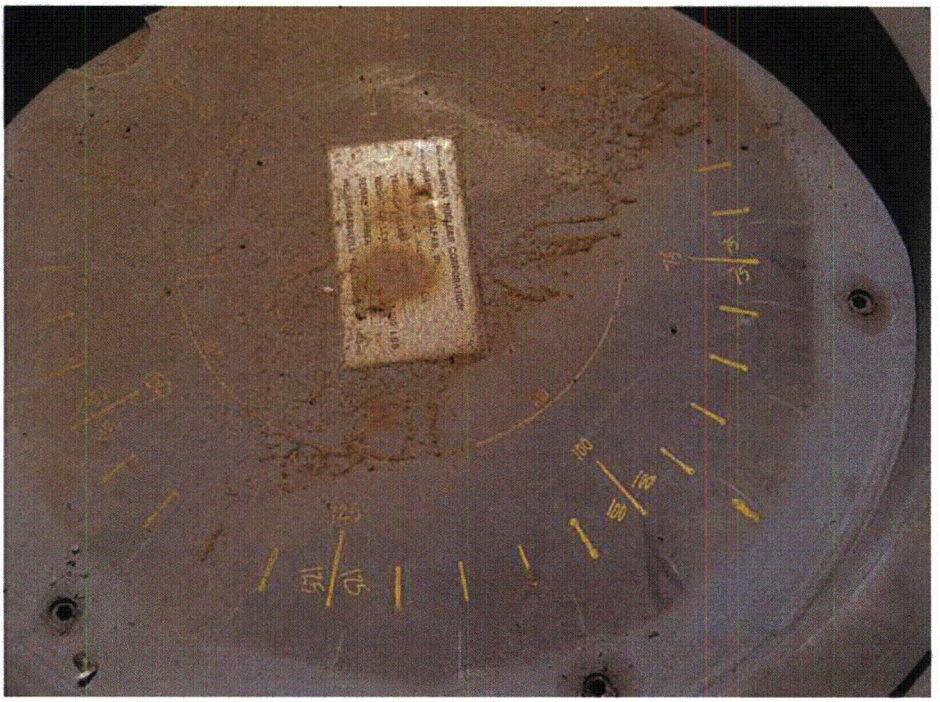

VCC-15 Inner Liner
25-DEGREE
23 May 12
13:28

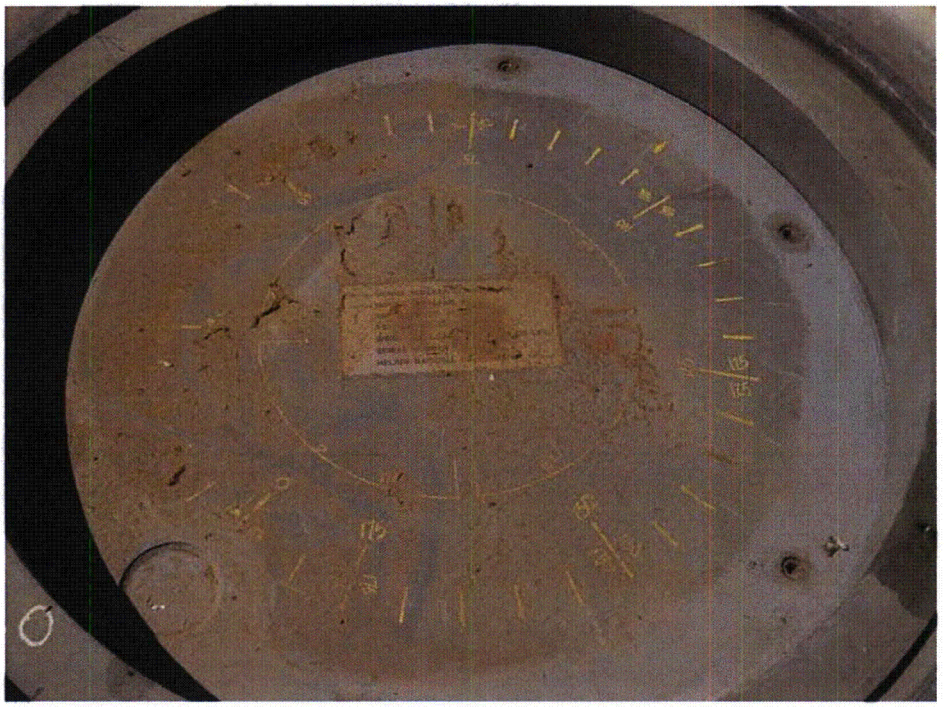

23 May 12
13:27

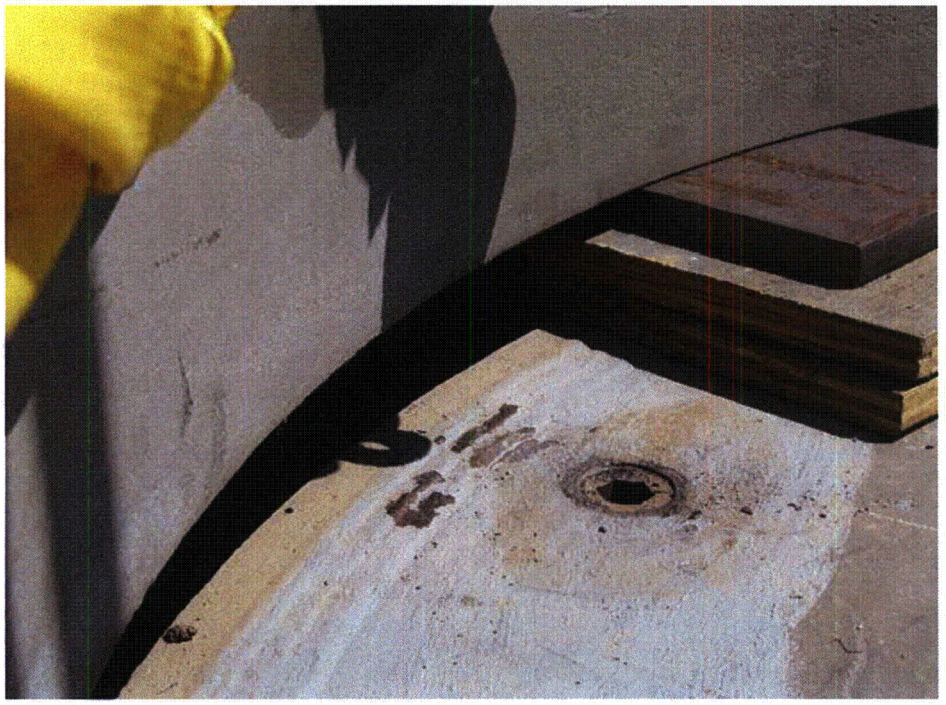

23 May 12
15:05

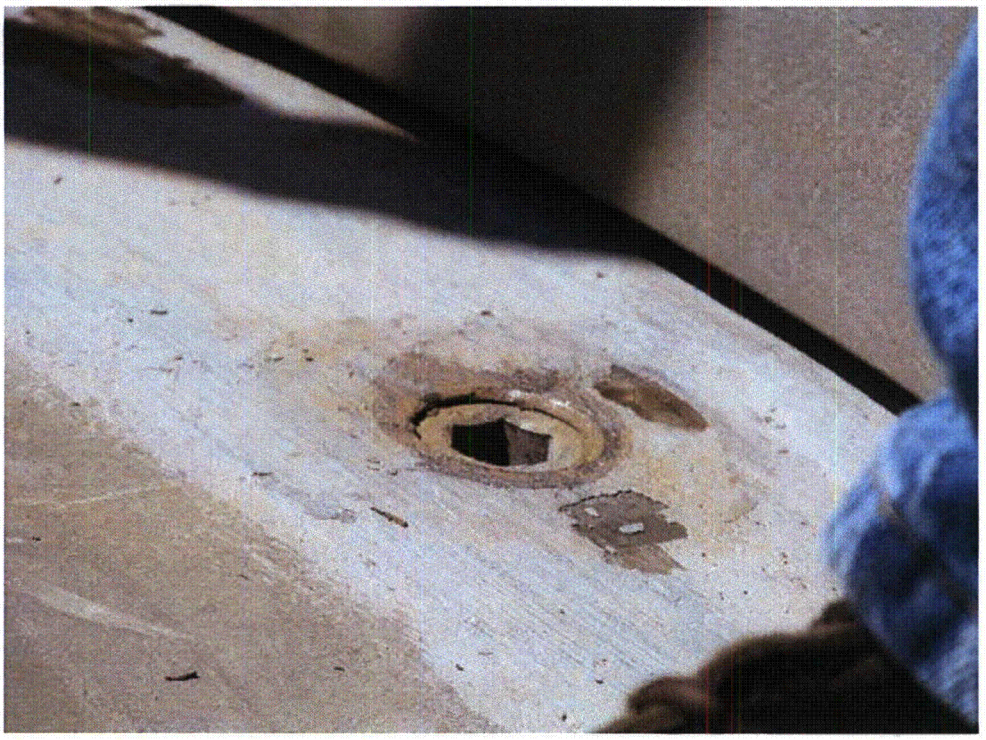
D. VCC Cask Lid and MSB Structural Lid and Closure Weld

The VCC Lid was removed with the bolting noted as acceptable but corroded. In addition the gasket was noted to be in good condition as well. Minor dust/dirt was noted on the top of the MSB structural lid and the area was fully vacuumed and cleaned. With the shield ring lifted to reveal the MSB structural lid weld and provide access to the annulus between the MSB and the VCC interior liner, the weld itself was noted to be in good condition.. Direct visual inspection of all readily accessible surfaces was performed. In general, coatings were found to be in good condition with the exception of two areas where the coating was bubbled yet still intact. Consequently, when shielding utilized during the lifting of the shield ring was removed, some coating material was inadvertently scrapped off the area adjacent to the closure weld. Additionally, an area around one of the plugs threaded into the structural lid required cleaning and repair due to the bubbled coating. In both cases, the base material beneath the coating was found to be in very good or pristine condition. The subject areas were cleaned and recoated in accordance with manufacturer's recommendations. No corrosion was noted on the structural lid or the MSB itself.









III. Additional Data

A. Temperature Data – Temperature readings were taken for information purposes of the VCC Lid and the MSB structural Lid. Temperatures taken on the VCC lid ranged from 85°F - 87°F. Temperatures taken on the MSB structural lid ranged from 128°F - 134°F.

B. Radiation Surveys- Radiation surveys taken with the VCC lid removed and the shield ring raised 2 inches were 45mrem gamma and 10mrem neutron maximum.

IV. Actions Taken

As a result of the inspections performed, the following actions were taken to address conditions noted.

- Structural lid was vacuumed to remove dust/dirt noted during visual inspection
- Areas noted in Section II.D were cleaned and recoated returning them to original condition.
- VCC Lid gasket was replaced with new gasket upon final closure. It should be noted that the original gasket was found to be in good condition with no evidence of leakage due to weather conditions.
- Corroded bolting removed from the VCC lid was replaced.
- Initiated CR-PLP-2012-04114 and CR-PLP-2012-04116 documenting conditions noted above.

V. Conclusion

Based on the inspection results discussed above, there was no unanticipated degradation of the Ventilated Concrete Cask assembly or the Multi-assembly Sealed Basket. Overall inspections demonstrated the components to be in very good condition including coatings. No evidence of abnormal or significant degradation was noted.

VI. Attachments

Attachment 1 – VSC-24 Lead Cask Inspection Plan

Attachment 2 – Palisades' Procedure No AT-9

ENERGYSOLUTIONS

VSC-24 Lead Cask Inspection Plan

VSC-24 CoC Renewal Project

Prepared for: **VSC-24 General Licensees**

Prepared by: **Energy*Solutions***

Prepared by: 05/09/12

Checked by: James E. Hoff 5/9/12

Approved by: 05/09/12
Engineering Manager

REVISION CONTROL SHEET

Issue Date	Revision	Change Page(s)	Description
4/6/12	0	N/A	Initial issue.
5/7/12	1	5, 6.	Revised requirements for visual examination for concrete and steel surfaces. (ECN No. VSC-04-ECN-008, Rev. 0)

Table of Contents

Page

1. PURPOSE 4
2. REFERENCES 5
3. PREREQUISITES 6
4. PRECAUTIONS AND LIMITATIONS 7
5. SELECTION OF LEAD CASK 8
6. INSPECTION PLAN 10
   - 6.1 VCC Exterior Concrete Surface 10
   - 6.2 VCC Bottom Surface 11
   - 6.3 MSB Shell, VCC Liner and VCC Air Ducts 12
   - 6.4 VCC Cask Lid and MSB Structural Lid and Closure Weld 15
7. RECORDS 17

1. PURPOSE

This plan establishes the general requirements for the VSC-24 Ventilated Storage Cask System (hereafter referred to as VSC-24) lead cask inspection, which is intended to satisfy the guidance provided in Appendix E of NUREG-1927 (Ref. 2.1). The purpose of the lead cask inspection is to demonstrate that the Ventilated Concrete Cask (VCC) assembly and Multi-assembly Sealed Basket (MSB) assembly have not undergone unanticipated degradation during the initial license period. The lead cask inspection results are intended to be included in the Certificate of Compliance (CoC) renewal application and may become part of the basis for the license renewal. The General Licensee (GL) that will perform the lead cask inspection will develop work procedures in accordance with this plan and the applicable requirements for the site.

2. REFERENCES

2.1 U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, NUREG-1927, Final Report, "Standard Review Plan for Renewal of Spent Fuel Dry Cask Storage System Licenses and Certificates of Compliance," March 2011.

2.2 U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, NRC Information Notice 2011-20, "Concrete Degradation by Alkali-Silica Reaction," November 18, 2011.

2.3 U.S. Nuclear Regulatory Commission, Certificate of Compliance for Spent Fuel Storage Casks, Model No.: Ventilated Storage Cask (VSC-24), Certificate No. 1007, Docket No. 72-1007, Amendment No. 6, June 27, 2006.

2.4 EnergySolutions Spent Fuel Division, Inc., "Final Safety Analysis Report for the VSC-24 Ventilated Storage Cask System," Docket No. 72-1007, Revision 8, April 2009.

2.5 ACI 221.1R-98, "State-of-the-Art Report on Alkali-Aggregate Reactivity."

2.6 EnergySolutions Spent Fuel Division, Inc., Calculation No. VSC-04.3200, Revision 1, "MSB-24 Corrosion Analysis."

2.7 American Society of Mechanical Engineers, ASME Boiler & Pressure Vessel Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, Subsection IWL, *Requirements for Class CC Concrete Components of Light-Water Cooled Plants*, 2004 Edition.

2.8 American Society of Mechanical Engineers, ASME Boiler & Pressure Vessel Code, Section XI, *Rules for Inservice Inspection of Nuclear Power Plant Components*, Subsection IWE, *Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants*, 2004 Edition.

3. PREREQUISITES

3.1 The general visual examinations of the of the VCC concrete and Independent Spent Fuel Storage Installation (ISFSI) pad concrete surfaces described in this plan shall be performed in accordance with the applicable requirements of ASME Code, Section XI, Subsection IWL (Ref. 2.7). Personnel performing the visual examination of the concrete surfaces shall be qualified in accordance with the requirements of IWL-2310. Acceptance standards for the concrete surface examination are in accordance with IWL-3210 and the acceptance criteria provided in Section 6.1.

3.2 General visual examinations of the coated steel surfaces of the VCC and MSB assemblies described in this plan shall be performed in accordance with the applicable requirements of ASME Code, Section XI, Subsection IWE (Ref. 2.8). Personnel performing the general visual examinations shall be qualified to perform general visual examination in accordance with the requirements of IWE-2330. Acceptance standards for the coated steel surface examination are in accordance with the applicable requirements of IWE-3000 and the acceptance criteria provided in Section 6.1.

3.3 The following tools and equipment are required to perform the lead cask inspection:

- Scaffolding, ladder, or man-lift to perform inspection activities at or near the top end of the VCC.
- Tools (e.g., wrench and/or screwdriver) to remove and install the hardware that secures the inlet screens (Ref. 2.4, Dwg. VCC-24-001, Item 13), outlet screens (Ref. 2.4, Dwg. VCC-24-004, Item 8) and the cask lid (Ref. 2.4, Dwg. VCC-24-002, Item 5).
- Tools (e.g., knife) to remove silicon calking from inlet and outlet screens.
- Borescope with minimum 20-foot long cord and video recorder.
- Long-handled tools to reach underneath the lifted VCC for inspection and cleaning activities.
- Temporary shielding (e.g., lead blankets).

3.4 The following replacement parts will be required to restore the lead cask following the inspection:

- Gasket for cask lid (Ref. 2.4, Dwg. VCC-24-002, Item 6).
- Locking wire with lead seal (Ref. 2.4, Dwg. VCC-24-001, Item 14)
- Plant-approved caulking to seal around the inlet and outlet screens, if required.

ENERGYSOLUTIONS

4. PRECAUTIONS AND LIMITATIONS

4.1 Personnel performing the lead cask inspection should minimize staying time around the VSC-24 casks to maintain doses As Low As Reasonably Achievable (ALARA).

4.2 Inspection personnel should never place any parts of their bodies underneath the lifted VCC at any time.

5. SELECTION OF LEAD CASK

To date, a total of fifty eight (58) VSC-24 casks are loaded and stored at three different ISFSIs; eighteen (18) casks at the Palisades nuclear power plant in Michigan, sixteen (16) casks at the Point Beach nuclear power plant in Wisconsin, and twenty four (24) casks at the Arkansas Nuclear One (ANO) nuclear power plant in Arkansas. Palisades Cask Number VSC-15 has been selected as the lead cask for the VSC-24 CoC renewal based upon a number of parameters that contribute to degradation, such as design configuration, environmental conditions, time in service, and total heat load of the spent fuel stored in the MSB.

Design Configurations: The VSC-24 Ventilated Storage Cask System is designed to accommodate up to twenty-four (24) intact[1], unconsolidated, zircaloy clad Pressurized Water Reactor (PWR) fuel assemblies in each cask. The VSC-24 storage system components are provided in three different configurations (i.e., standard, long, and short) to accommodate the range of PWR fuel assembly lengths. The lengths of the different VSC-24 configurations are summarized in Table 1. The configuration length is not anticipated to significantly contribute to the degradation. The surface area of the MSB and VCC varies with the configuration length. However, the variation in surface area is not expected to influence the types of degradation that are expected to occur over the service life. Other than the difference in length, there are no significant differences in the three different VSC-24 configurations. All configurations are constructed of the same materials using the same fabrication processes. Therefore, the lead cask in not selected based on differences in design configuration.

Table 1 - VSC-24 Design Configurations

Configuration	Site	Overall Length (inches)	
		MSB	VCC
Short	Palisades	164.2	196.7
Standard	Point Beach	180.3	213.0
Long	ANO	125.25	225.1

Environmental Conditions: All three VSC-24 ISFSIs are located on bodies of fresh water; none are in a marine environment. Palisades and Point Beach are both located on the shores of Lake Michigan; Palisades on the East Shore and Point Beach on the West Shore. ANO, located in Arkansas, is in the Southern interior region of the United States. The environmental conditions at Palisades and Point Beach are very similar in most respects due to the moderating effects of Lake Michigan. The annual monthly temperature range at both these sites ranges from about 20°F in the coldest winter months to around 70°F in the hottest summer months. In comparison, the average daily

[1] Fuel with no known or suspected gross cladding failures.

temperatures at ANO range from approximately 30°F to 93°F. This comparison shows that the temperature extremes at Palisades and Point Beach are colder than those at ANO and therefore, the casks at Palisades and Point Beach would be expected to experience more freeze-thaw cycles than those at ANO. Therefore, in terms of environmental conditions, there are not significant differences between the three sites, but the colder environment at Palisades and Point Beach would be expected to have a greater contribution to cask degradation.

Time in Service: All 58 VSC-24 casks at the three ISFSIs were loaded and stored between May 1993 and June 2003. The first VSC-24 cask (Palisades Cask Number VSC-01) was loaded on May 7, 1993, on the same day that the VSC-24 CoC was issued. Therefore, in terms of time in service, Palisades Cask Number VSC-01 would be the best candidate for the lead cask inspection. However, on 5-year intervals, the Interior VCC Surface Inspections (TS 1.3.3) are performed for the first casks stored at each of the three sites, including Palisades Cask Number VSC-01. In addition, the Exterior VCC Surface Inspection (TS 1.3.2) is performed annually on all casks in service. Therefore, since the casks with the longest time in service have already undergone much of the same surveillance that is to be performed for the lead cask inspection, other parameters that contribute to degradation are given greater consideration in the selection of the lead cask.

Heat Load: The maximum initial heat load for all 58 loaded VSC-24 is 14.7 kW (Palisades Cask Number VSC-15). This cask was loaded on June 8, 1999. Several other casks were loaded at the three sites after Palisades Cask Number VSC-15 having initial heat loads that are slightly lower than 14.7 kW. Therefore, Palisades Cask Number VSC-15 has the highest initial heat load with the longest time in service for casks with similar heat loads. Therefore, the lead cask inspection will be performed using Palisades Cask Number VSC-15.

6. INSPECTION PLAN

The VSC-24 lead cask inspection activities include surveillances of the following:

- VCC Exterior Concrete Surface
- VCC Bottom Surface
- MSB Shell, VCC Liner, and VCC Air Ducts
- VCC Cask Lid and MSB Structural Lid and Closure Weld

The following sections describe the general requirements for each surveillance, the basis, required actions, and acceptance criteria.

6.1 VCC Exterior Concrete Surface

Surveillance: The exposed concrete surfaces (Ref. 2.4, Dwg. VCC-24-001, Item 8) on the sides and top of the VCC lead cask shall be visually examined for evidence of concrete aging effects. This surveillance requirement is per Section 1.3.2 of the VSC-24 Technical Specifications (Ref. 2.3). Specific aging effects that should be considered in the inspection include; scaling, cracking, or spalling (may result from freeze-thaw); increased porosity (may be caused by leaching of Calcium Hydroxide or aggressive chemical attack); map or pattern cracking (more or less uniform spacing of cracks over the entire concrete surface), which may indicate alkali-silica reaction (ASR) induced concrete degradation (Ref. 2.2); and any other unanticipated concrete degradation.

Bases: The periodic surveillance and repair of the exposed concrete surfaces of the VCC maintains the surface conditions of the concrete which prevents degradation (i.e., corrosion) of the reinforcing steel and avoids adverse impact on the VCC shielding performance. Performance monitoring, such as crack measurements and crack mapping, performed at regular intervals (i.e., annually), provides a non-destructive means to assess the degradation of the VCC. Grout repair of cracks and surface defects in the concrete reduces the amount of water and chlorides reaching the reinforcement and prevents significant corrosion that could diminish the structural capacity of the VCC.

Potential ASR-induced degradation of concrete can be identified by map or pattern cracking (more or less uniform spacing of cracks over the entire concrete surface) and the presence of alkali-silica gel on the concrete surface, as discussed in Reference 2.5. ASR-induced degradation may adversely impact the mechanical properties of concrete and could diminish the structural capacity of the VCC. Therefore, if visual indications of ASR-induced degradation are identified during the surveillance, then additional actions may be required to evaluate and monitor the condition, as discussed below.

Action(s): Document all cracks (not including hairline cracks), surface voids, or spalling, identified during the visual inspection using appropriate means (i.e., photographs, crack mapping, and/or written descriptions.) The documentation shall include the location, size (length and width), and depth of the defects noted. If any cracks or defects on the

exterior of the concrete exceed the size acceptance criteria (provided below), then they shall be repaired using grout in accordance with the applicable site procedures.

If visual indications of ASR-induced degradation are identified during the surveillance, then the GL shall document the condition using appropriate means (i.e., photographs, crack mapping, and/or written descriptions) in accordance with their Corrective Action Program. Corrective actions should consider, at a minimum: (1) Confirming the presence of ASR using test procedures for in-situ hardened concrete, (2) If ASR is confirmed, then perform additional testing of concrete samples to determine if the ASR distress is structural or non-structural, and (3) Based upon the results of the additional testing, VCC concrete with structural distress due to ASR shall be evaluated for continued storage. Non-structural distress that is cosmetic in nature shall be repaired using grout in accordance with the applicable site procedures.

Acceptance Criteria: Voids on the concrete surface (typically resulting from expulsion of aggregate or bug holes[2]) or cracks on the exterior of the VCC concrete that exceed ½-inch diameter (or width) and ¼-inch deep shall be repaired using grout in accordance with the applicable site procedures.

Visual indications of ASR, including map or pattern cracking (typically occurs in a polygonal pattern, with discoloration often bordering the cracks in the ASR-affected concrete, and may include deposits of alkali-silica gel onto the concrete surface) require further evaluation to confirm the presence of ASR. ASR-induced degradation of the VCC is considered to be non-structural provided that: (1) The results of concrete core testing demonstrate that the concrete compressive strength is not less than 4,000 psi, and (2) There is no excessive distortion of the concrete, such as swelling resulting in spalling of cover concrete. The additional corrective actions and evaluations required to confirm the presence of ASR and the nature of the ASR-induced degradation will be planned and performed outside the scope of the lead cask inspection.

6.2 VCC Bottom Surface

Surveillance: The bottom surface of the VCC assembly (Ref. 2.4, Dwg. VCC-24-001, Item 5), which is normally inaccessible during storage, shall be visually examined for evidence of coating degradation and corrosion. Also, the surface of the ISFSI pad underneath the VCC assembly shall be visually examined for evidence of concrete degradation. In order to perform the inspection of the VCC bottom surface and ISFSI pad surface, the VCC must be lifted. The VCC can be lifted using hydraulic jacks placed inside the inlet channels or by the optional VCC lift lugs using a cask transporter. The VCC should only be lifted as high as necessary to perform the inspections, but no higher than 6 inches above the surface of the ISFSI pad. The visual inspection of the VCC

[2] Bug holes are small regular or irregular cavities, resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation.

bottom surface and ISFSI pad surface shall be performed using long-handled tools and/or remote visual equipment (e.g., borescope/camera).

Bases: The bottom surface of the VCC is covered by the Bottom Plate Assembly (Ref. 2.4, Dwg. VCC-24-001, Item 5), which is a weldment consisting of ¼-inch thick carbon steel plate that is secured to the VCC using Nelson stud anchors. The VCC Bottom Plate Assembly serves as cast-in-place formwork that forms the VCC air inlet ducts. The VCC Bottom Plate Assembly also helps prevent loss of material (i.e., spalling of bottom concrete) in the event of a postulated bottom drop accident. Although the bottom surface of the VCC Bottom Plate Assembly is coated during fabrication, degradation of the coating and corrosion of the VCC Bottom Plate Assembly is expected to occur during the initial storage period and is acceptable, provided that the steel plates lining the air inlet ducts do not displace and result in blockage of the air flow.

Although the ISFSI pad is not an in-scope component for the CoC renewal, it is prudent to perform a visual inspection of ISFSI pad surface that is normally inaccessible, given the opportunity. The General Licensee shall examine the ISFSI pad surface for evidence of concrete degradation.

Action(s): Document any degradation of the VCC bottom plate and ISFSI pad surface identified during the visual inspection using appropriate means (i.e., photographs, video recording, and/or written descriptions.) Any debris or foreign material that has collected on the surfaces to be visually examined, and will impair the ability to perform the visual examination, shall be removed prior to performing the visual examination.

Acceptance Criteria: Coating degradation and general corrosion occurring on the bottom surface of the VCC Bottom Plate Assembly (excluding the air inlet ducts) will not prevent the VCC from fulfilling its intended safety functions, and need not be repaired. However, any coating degradation and general corrosion identified on the bottom surface of the VCC Bottom Plate Assembly (excluding the air inlet ducts) shall be documented using appropriate means (i.e., photographs, crack mapping, and/or written descriptions.). Documentation shall include the area(s) over which coating degradation and corrosion are observed.

6.3 MSB Shell, VCC Liner and VCC Air Ducts

Surveillance: The readily accessible surfaces of all VCC air inlet and outlet ducts (Ref. 2.4, Dwg. VCC-24-001, Items 4 and 6), VCC liner (Ref. 2.4, Dwg. VCC-24-002, Item 1), VCC bottom plate (Ref. 2.4, Dwg. VCC-24-002, Item 2), and MSB shell (Ref. 2.4, Dwg. MSB-24-002, Item 1) shall be visually examined for evidence of coating degradation and corrosion. The procedure for performing this surveillance will be similar to that used to perform the Interior VCC Surface Inspection (i.e., the 5-year surveillance.) The screens that cover the VCC air inlet and outlet ducts must be removed to perform this surveillance. A visual examination of each air duct and the VCC annular region (top to bottom) will be performed using remote visual equipment (e.g., borescope and video recorder) to identify potential air flow blockage and coating degradation and/or corrosion.

Bases: The VSC-24 storage system relies primarily on passive convective air circulation to transfer heat from the spent fuel inside the MSB to the environment. Wire mesh screens cover the air inlet and outlet ducts to prevent larger animals (e.g., birds or rodents) from entering and blocking the air circulation path. Visual examination of the wire mesh screens is performed daily to assure that they remain free of blockage. The visual surveillance of the lead cask air vents and annulus is performed to indentify degradation that could cause potential blockage that could prevent the VCC from performing its intended heat transfer function.

Blockage of any individual segment of the air inlet or outlet vents that is less than 10% of the cross-sectional flow area of the segment (i.e., blockage less than 10 in^2) is not considered to be significant. This conclusion is based on the results of the off-normal condition evaluated in Section 11.1.2 of the VSC-24 FSAR (Ref. 2.4), which postulates complete blockage of one-half of the air inlet ducts (i.e., 2 of 4 ducts, or 50% of the flow area.) The analysis of this condition shows that, although it increases the overall flow pressure loss (i.e., $\Sigma k/A^2$) for the entrance by 400%, it results in only a small increase in the system temperatures. Per Table 4.1-1 of the VSC-24 FSAR (Ref. 2.4), the maximum fuel cladding temperature for the ½ inlets blocked case is only 23°F higher (i.e., 707°F versus 684°F) than that during normal long-term storage. Blockage of 10% in all four air inlet ducts would equate to less than a 25% increase in the overall flow pressure loss for the entrance, or $1/8^{th}$ of the increase in flow pressure loss resulting from the ½ inlets blocked case. Based on this comparison, it is clear that 10% blockage of any flow segment will not significantly affect the thermal performance of the system.

The steel plates that line the VCC air inlet and outlet ducts serve as cast-in-place formwork. These plates also help prevent loss of material (i.e., concrete spalling) in the event of a postulated bottom drop accident. Although the exposed surfaces of these steel plates are coated, degradation of the coating and corrosion is expected to occur during the initial storage period. If significant corrosion is observed on the steel plates that line the VCC air inlet and outlet ducts, then the GL shall document the condition in accordance with their Corrective Action Program. The corrective actions shall include, at a minimum, evaluation of the VCC assembly for continued storage. Significant corrosion on the steel plates that line the VCC air inlet and outlet ducts is considered to be corrosion that results in loss of material, such as pitting or scaling, that has an adverse affect on the shielding safety function of the VCC assembly. Corrosion that results only in discoloration of the surface, such as rust blooms, will not result in the loss of any of the VCC assembly's intended functions.

The VCC liner and bottom plate also serves as cast-in-place formwork. The safety functions of the VCC liner and bottom plate include structural support, shielding, and heat transfer. The safety analyses of the VCC assembly do not include a corrosion allowance on the VCC liner and bottom plate. Although the exposed surfaces of the VCC liner and bottom plate are coated, degradation of the coating and general surface corrosion of the VCC liner and bottom plate may occur during the initial storage period. If significant corrosion is observed on the VCC liner and bottom plate, then the GL shall document the condition in accordance with their Corrective Action Program. The

corrective actions shall include, at a minimum, evaluation of the VCC assembly for continued storage. Significant corrosion on the VCC liner and bottom plate is considered to be corrosion that results in loss of material, such as pitting or scaling, that has an adverse affect on the shielding safety function of the VCC assembly. Corrosion that results only in discoloration of the VCC liner and bottom plate surfaces, such as rust blooms, will not result in the loss of any of the VCC liner or bottom plate intended functions.

The safety functions of the MSB shell include confinement, structural support, shielding, and heat transfer. Although the exterior surfaces of the MSB are coated, a corrosion allowance of 0.003 inches per year is conservatively assumed for the MSB shell and bottom plate (Ref. 2.6). This corrosion rate is based on uncoated carbon steel in a marine environment. Some degradation of the coating and corrosion on the exterior surfaces of the MSB shell and bottom plate is expected to occur during the initial storage period and is acceptable. The visual examination condition exterior surface of the MSB shell provides qualitative confirmation that there is not any unanticipated degradation (i.e., excessive corrosion) of the MSB shell that could prevent the MSB from performing its intended safety functions.

Action(s): Document any degradation of the readily accessible surfaces of all VCC air inlet and outlet ducts, VCC liner, VCC bottom plate, and MSB shell that is identified during the visual inspection using appropriate means (i.e., photographs, video recording, and/or written descriptions.) If significant obstruction of the air vents/annulus is observed (see acceptance criteria), or if significant corrosion is observed on the VCC air inlet and outlet ducts, VCC liner, or VCC bottom plate (see acceptance criteria), then the GL shall document the condition in accordance with the site's Corrective Action Program. The corrective actions shall consider, at a minimum; removal of any unacceptable blockage from the ventilation path; repair of any unacceptable corrosion on the VCC air inlet and outlet ducts, VCC liner, VCC bottom plate; evaluation of the VCC assembly for continued storage, and; evaluation of the extent of condition. Any blockage in the VCC air inlet and outlet ducts that is easily accessible, regardless of the size, should be removed prior to re-securing the screens that cover the VCC air inlet and outlet ducts.

Acceptance Criteria: The operating condition of the lead cask is acceptable if the air inlet and outlet ducts and the cask annulus are free of significant blockage and there is no significant corrosion on these surfaces. As discussed above under bases, blockage of the air vents is considered to be significant if it exceeds 10% (approximately 10 in^2) of any one segment of the air inlet or outlet ducts. Also discussed in the bases, corrosion of the VCC air inlet and outlet ducts, VCC liner, and VCC bottom plate is considered to be significant if it results in loss of material (e.g., pitting or scaling) that will adversely affect the shielding safety function of the VCC assembly. Degradation of the coating on the VCC air inlet and outlet ducts, VCC liner, VCC bottom plate, and MSB shell is acceptable since it is not relied upon for corrosion protection. Corrosion that results only in discoloration of the VCC air inlet and outlet ducts, VCC liner, and VCC bottom plate

surfaces, such as rust blooms, is not considered to be significant since it will not result in the loss of any of the VCC assembly intended functions.

6.4 VCC Cask Lid and MSB Structural Lid and Closure Weld

Surveillance: All readily accessible surfaces of the VCC cask lid (Ref. 2.4, Dwg. VCC-24-002, Item 6), VCC liner flange (Ref. 2.4, Dwg. VCC-24-002, Item 3), VCC shield rings (Ref. 2.4, Dwg. VCC-24-001, Item 10 and VCC-24-002, Items 9 and 10), and MSB structural lid (Ref. 2.4, Dwg. MSB-24-001, Item 5) and MSB closure weld (Ref. 2.4, Dwg. MSB-24-001, weld connecting Items 1 and 5) shall be visually examined for evidence of coating degradation and corrosion. Also, the VCC cask lid gasket (Ref. 2.4, Dwg. VCC-24-002, Item 8) and the top end of the VCC cavity shall be visually examined for evidence of water intrusion.

In order to perform this surveillance, the cask lid must be removed. The cask lid may be moved to a low-dose area for visual inspection. Visual inspection of the VCC liner flange, VCC shield rings, MSB structural lid, and MSB closure weld may be performed using long-handled tools and/or remote visual equipment (e.g., borescope/camera). If required, the VCC shielding ring (Ref. 2.4, Dwg. VCC-24-001, Item 10) may be lifted slightly (no more than 2") to expose the MSB closure weld for visual examination. Dose rates around the MSB closure weld shall be monitored and temporary shielding may be used to minimize occupational exposure. Following the surveillance, the VCC cask lid gasket and the locking wire must be replaced.

Bases: The VCC cask lid provides radiation shielding and structural support safety functions. In addition, the cask lid and lid gasket serve to protect the MSB assembly from the exposed external environment. Corrosion of the cask lid or cask flange could diminish their structural and shielding capacities. Also, degradation of the cask lid, cask flange, or lid gasket could allow water to leak into the top of the VCC, which could potentially lead to unanticipated degradation of the MSB structural lid and closure weld and the steel components inside VCC. The VCC shield rings provide only a shielding safety function. Coating degradation and general surface corrosion of the VCC shield rings is permitted as it will not significantly diminish their shielding capacity.

The safety functions of the MSB structural lid and closure weld include confinement, structural support, shielding, and heat transfer. Significant corrosion of the MSB structural lid and closure weld (i.e., corrosion resulting in loss of material, such as scaling) could diminish their ability to perform the intended safety functions. However, corrosion that results only in discoloration of the steel surfaces, such as rust blooms, is not considered to be significant since it will not result in the loss of intended functions. Safety analyses of the MSB structural lid and closure weld are based on nominal dimensions and do not include a corrosion allowance.

Action(s): Document any coating degradation (e.g., blistering, cracking, peeling, or loss of adhesion with the underlying metal surface) or corrosion observed on the VCC cask lid, VCC liner flange, VCC shield rings, and MSB structural lid and closure weld that are

identified during the visual inspection using appropriate means (i.e., photographs, video recording, and/or written descriptions.) Document the condition of the lid gasket and any indications of water leakage into the top of the VCC. Any coating degradation observed on the VCC cask lid, MSB structural lid, or MSB closure weld coating shall be removed, if necessary, for further examination of the underlying metal surface to determine if any significant loss of material has occurred. If coating degradation is observed or it is determined that corrosion of the MSB structural lid and/or closure weld has caused significant loss of material, such as pitting or scaling (as opposed to surface discoloration,) then the GL shall document the condition in accordance with the site's Corrective Action Program. The corrective actions shall consider, at a minimum; repair of any coating on the VCC cask lid, MSB structural lid, or MSB closure weld that is degraded or has been removed for inspection; evaluation of the MSB assembly for continued storage, and; evaluation of the extent of condition. Following the completion of the surveillance activities, replace the VCC cask lid gasket, secure the VCC cask lid, and replace the locking wire.

Acceptance Criteria: Coatings on the readily accessible surfaces of the VCC cask lid, VCC liner flange, and MSB structural lid and closure weld that are blistered, cracked, peeling, or have lost adhesion with the underlying metal surface are considered degraded. Corrosion of the VCC cask lid, VCC liner flange, and MSB structural lid and closure weld is considered to be significant if it results in loss of material (e.g., pitting or scaling) that will adversely affect the structural or shielding safety functions of the components. Corrosion that results only in discoloration of the VCC cask lid, VCC liner flange, and MSB structural lid and closure weld surfaces, such as rust blooms, is not considered to be significant since it will not result in the loss of intended functions. Coating degradation and general surface corrosion of the VCC shield rings is permitted as it will not significantly diminish their shielding capacity.

7. RECORDS

The results of the VSC-24 lead cask inspection will be documented by the GL in a report. The report shall include documentation, evaluation, and findings for each of the inspections performed. The lead cask inspection results and findings will be summarized in VSC-24 CoC renewal application, and may become part of the basis for the license renewal.

Procedure No AT-9
Revision 3
Effective Date 7/30/08

PALISADES NUCLEAR PLANT
TECHNICAL SPECIFICATION SURVEILLANCE PROCEDURE

VSC-24-15
5/23/2012

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

Approved: SLLeblang / 7/28/08
Procedure Sponsor **Date**

Process Applicability Exclusion ☐

New Procedure/Revision Summary:

Editorial Correction to Revision 3

Specific Changes

DRN 08-01033
Editorial to Revision 3
Section 6.1a - Change "OR" to "AND"
Change references to the Corrective Action Process & Procedures to Entergy standards
Change references to Radiation Protection Procedures to Entergy Procedures

PALISADES NUCLEAR PLANT
TECHNICAL SPECIFICATION SURVEILLANCE
AND SPECIAL TEST PROCEDURE
ISSUE AND ROUTING SHEET

Proc No AT-9
Revision 3

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

ISSUED TO Reactor Engineering FREQUENCY Annually

SPECIAL REQUIREMENTS

EQUIPMENT	EQUIPMENT	EQUIPMENT	EQUIPMENT	EQUIPMENT
VSC				

SPECIAL INST

ROUTE AFTER COMPLETION (ORDER NO IN BOX)

1	1st LINE SUPV			
*2	SS/SE			
3	TSST SCHED			
4	RX ENG SUPV			
5	TSST SCHED			
6	ERC			

* Required only if inoperable equipment.

PALISADES NUCLEAR PLANT
TECHNICAL SPECIFICATION SURVEILLANCE PROCEDURE
ACCEPTANCE CRITERIA AND OPERABILITY SHEET

Proc No AT-9
Revision 3
Page 1 of 2

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

1. Is Section 6.0 acceptance criteria met? ☐ YES ☐ NO

   If "NO," then provide explanation on page 2.

   _____ / / _____
   First Line Supervisor Date Time

2. If Item 1 "NO," Recommend tested equipment remain operable? ☐ YES ☐ NO

   If "YES," then provide explanation on page 2.

   _____ / _____
   First Line Supervisor Date

3. If Item 1 "NO," Identify corrective action document(s).

   AR: ☐ YES ☐ NO # _____
   WR/WO: ☐ YES ☐ NO # _____

4. If Item 1 "NO," notify SS/CRS/SE.

   _____ / _____
   First Line Supervisor Date

5. If Item 1 "NO," Are applicable Safety Limits, LCO Required Actions, Surveillance Requirements, or Program Requirements required by Technical Specifications met?

   Section 2 SL(s) _____
   Section 3 LCO(s) _____
   Section 3 SR(s) _____
   Section 5 ADMIN(s) _____
   ORM and/or ODCM Requirement(s) _____

   ☐ YES ☐ NO

   If "NO," then provide explanation and justification for continued Plant operation on page 2.

   _____ / _____
   SS/CRS/SE Date

6. Technical Review Acceptable: ☐ YES ☐ NO

   Retest Required: ☐ YES ☐ NO Change Frequency To: _____

   If Technical Review not acceptable, then identify corrective action document(s):

   AR: # _____ WR/WO: # _____

   _____ / _____
   Signature Date

PALISADES NUCLEAR PLANT
TECHNICAL SPECIFICATION SURVEILLANCE PROCEDURE
ACCEPTANCE CRITERIA AND OPERABILITY SHEET

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

1. Acceptance Criteria

2. Equipment Operability

5. Technical Specification Requirements

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

Table of Contents

1.0 PURPOSE 1
2.0 REFERENCES 1
2.1 SOURCE DOCUMENTS 1
2.2 REFERENCE DOCUMENTS 2
3.0 PREREQUISITES 2
3.1 AUTHORIZATION 2
3.2 SPECIAL NOTIFICATIONS 2
3.3 PLANT CONDITIONS 2
3.4 SYSTEM CONDITIONS 2
3.5 MINIMUM PERSONNEL SKILL LEVEL 3
3.5.1 Performance 3
3.5.2 Verification 3
3.6 SPECIAL TOOLS/EQUIPMENT 3
3.6.1 Calibrated Equipment 3
3.6.2 Noncalibrated Equipment 3
3.7 SPECIAL RADIATION PROTECTION REQUIREMENTS 3
4.0 PRECAUTIONS AND LIMITATIONS 4
4.1 OUT OF TOLERANCE DATA 4
4.2 PERSONNEL SAFETY 4
4.3 EQUIPMENT/PLANT SAFETY OR LIMITS 4
4.4 LIMITING CONDITIONS OF OPERATION ENTERED DURING PERFORMANCE OF THIS PROCEDURE 4
5.0 PROCEDURE 5
6.0 ACCEPTANCE CRITERIA 6
7.0 ATTACHMENTS AND RECORDS 6
7.1 ATTACHMENTS 6
7.2 RECORDS 6
8.0 SPECIAL REVIEWS 6

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

Table of Contents

ATTACHMENTS

Attachment 1, "Data Sheet"
Attachment 2, "Sample Defect Documentation Data Sheet"

PALISADES NUCLEAR PLANT
TECHNICAL SPECIFICATION SURVEILLANCE PROCEDURE

Proc No AT-9
Revision 3
Page 1 of 6

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

CONTINUOUS USE
• **Procedure SHALL be at the work location.**
• **Read each step prior to performing.**
• **Mark off steps as they are completed.**

1.0 PURPOSE

To verify the structural integrity of the Ventilated Storage Cask (VSC) by performing a visual inspection of the VSC exterior.

2.0 REFERENCES

2.1 SOURCE DOCUMENTS

2.1.1 Certificate of Compliance for the Ventilated Storage Cask (VSC-24) for Irradiated Fuel, Conditions for Cask System Use, Section 1.3.2

2.1.2 Pacific Sierra Nuclear Associates, "Safety Analysis Report for the Ventilated Storage Cask System," Rev 0

2.1.3 Safety Evaluation Report on "Safety Analysis Report for the Ventilated Storage Cask System," Rev 0

2.1.4 Consumers Energy Drawing VEN-C-136B, "Ventilated Concrete Cask (VCC) Assembly (VSC 1-8)," Sheets 1&2

2.1.5 Consumers Energy Drawing VEN-C-136N, "Ventilated Concrete Cask (VCC) Assembly (VSC 9-14)," Sheets 1&2

2.1.6 Consumers Energy Drawing VEN-C-136S, "Ventilated Concrete Cask (VCC) Assembly (VSC 15-21)," Sheets 1&2

2.1.7 C-PAL-97-1287, "Dry Fuel Storage VCC Surface Cracks," Dated 09/16/97

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

2.2 REFERENCE DOCUMENTS

2.2.1 Entergy Procedure EN-RP-105, "Radiation Work Permits"

2.2.2 Entergy Procedure EN-RP-101, "Access Control for Radiologically Controlled Areas"

2.2.3 Entergy Procedure EN-LI-102, "Corrective Action Process"

2.2.4 Entergy Procedure EN-AD-103, "Document Control and Records Management Programs"

3.0 PREREQUISITES

3.1 AUTHORIZATION

The Dry Fuel Storage Project Manager is the responsible supervisor for the performance of this surveillance. The Dry Fuel Storage Project Manager's (or designee's) permission shall be obtained to perform this surveillance. The Dry Fuel Storage Project Manager (or designee) shall read and understand Sections 1.0 through 4.0 of the procedure prior to granting permission.

Bob VanWagner 1/23/2012
Dry Fuel Storage Project Manager (or designee) Date

3.2 SPECIAL NOTIFICATIONS

None

3.3 PLANT CONDITIONS

No special considerations.

3.4 SYSTEM CONDITIONS

No special considerations.

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

3.5 MINIMUM PERSONNEL SKILL LEVEL

3.5.1 Performance

Dry Fuel Storage Project Manager, Civil Engineer, and/or Environmental and Technical Services.

3.5.2 Verification

None

3.6 SPECIAL TOOLS/EQUIPMENT

3.6.1 Calibrated Equipment

None

3.6.2 Noncalibrated Equipment

a. ✓ 20 ft ladder

b. ✓ Flashlight (as deemed necessary by the inspector) f 6" Scale

c. Construction Technology Laboratories Crack Comparator f PIT Gauge

d. ✓ 6 foot tape measure

e. ✓ Camera (as deemed necessary by the inspector)

3.7 SPECIAL RADIATION PROTECTION REQUIREMENTS

3.7.1 Work in Radiation Controlled Areas shall be performed in accordance with Entergy Procedure EN-RP-101, "Access Control for Radiologically Controlled Areas," and with the appropriated Radiation Work Permit (RWP).

3.7.2 The RWP shall be submitted to the Radiation Safety Group in accordance with Entergy Procedure EN-RP-105, "Radiation Work Permits."

RWP Number: 2012-0257 Task 02

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

4.0 PRECAUTIONS AND LIMITATIONS

4.1 OUT OF TOLERANCE DATA

All out of tolerance data shall meet the following conditions:

a. Circled in red by person recording data.

b. Reported immediately to the Dry Fuel Storage (DFS) System Engineer by the person performing the surveillance.

c. Documented on a Corrective Action in accordance with Entergy Procedure EN-LI-102, "Corrective Action Process."

4.2 PERSONNEL SAFETY

4.2.1 Standard plant safety practices shall be observed.

4.2.2 The entire area around the cask is a radiation zone. Therefore, the amount of time spent in the Independent Spent Fuel Storage Installation (ISFSI) should be minimized. The ISFSI is the northeast portion of the protected area where the Ventilated Storage Casks are stored.

4.2.3 The areas around the VSC inlets and outlets and the cask top area are radiation areas (slightly higher than the cask surface) and the amount of time directly in front of these locations should be minimized.

4.3 EQUIPMENT/PLANT SAFETY OR LIMITS

This procedure is considered safety-related.

4.4 LIMITING CONDITIONS OF OPERATION ENTERED DURING PERFORMANCE OF THIS PROCEDURE

None

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

5.0 PROCEDURE

CONTINUOUS USE
• **Procedure SHALL be at the work location.**
• **Read each step prior to performing.**
• **Mark off steps as they are completed.**

5.1 Inspect the complete concrete surface of the sides and top of each VSC in service. Inspections shall be sufficiently close(consider ladders or a lift for the top) so that any defect in area (scabbing, spalling, cracking, etc) larger than 1/2" in diameter (or width) and deeper than 1/4" can be identified.

5.2 Document inspection results on Attachment 1, or other form deemed acceptable by the DFS System Engineer. All defects larger than 1/2" in diameter (or width) and deeper than 1/4" shall be documented. Any smaller defects should be documented as well, if deemed significant by the inspector.

5.3 Photographs should be considered for all defects recorded. If photographs are taken, include the cask number, date inspected, and defect number from Attachment 1 (or other form deemed acceptable by the DFS System Engineer) on each photograph. If doubt as to whether or not photographs should be taken exists, contact the DFS System Engineer for additional guidance.

5.4 Inspect the screens on all inlet and outlet vents on each VSC for signs of wear, tear, and debris. Remove any external debris (eg, leaves, etc) and document inspection results on Attachment 1 (or other form deemed acceptable by the DFS System Engineer).

TITLE: INSPECTION OF VENTILATED STORAGE CASK EXTERIOR

6.0 ACCEPTANCE CRITERIA

6.1 PR ✓ Complete the Acceptance Criteria and Operability Sheet verifying the following:

a. No 6 Locations No defects noted larger than 1/2" in diameter (or width) and deeper than 1/4" on the concrete surface.

b. ✓ No damage to any vent screen.

c. ✓ No significant internal debris fouling any vent screen.

6.2 PR **IF** any of the criteria above are not met, **THEN** generate an Action Request in accordance with Entergy Procedure EN-LI-102, "Corrective Action Process."

7.0 ATTACHMENTS AND RECORDS

CR-PLP-2012-04116

7.1 ATTACHMENTS

7.1.1 Attachment 1, "Data Sheet"

7.1.2 Attachment 2, "Sample Defect Documentation Data Sheet"

7.2 RECORDS

Records generated by this procedure shall be filed in accordance with Entergy Procedure EN-AD-103, "Document Control and Records Management Programs."

8.0 SPECIAL REVIEWS

None

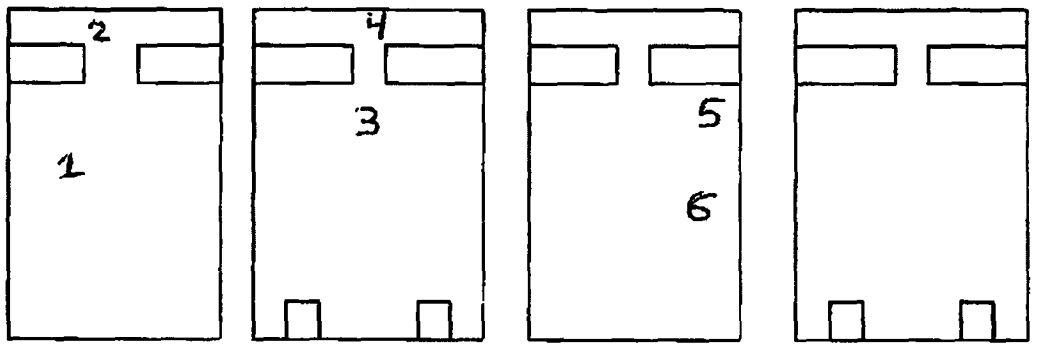
DATA SHEET

DATA COLLECTION:

EQUIPMENT NUMBER: VSC: 24-15 Date: 5/23/12

DEFECT DOCUMENTATION:

Number each defect to be recorded in its general location on the cask and provide estimate of width, length, and depth below.



DEFECT LIST:

1. Bug Hole Approx 1.0"L x .25"D
2 Bug Hole Approx .6"L x .5"D
3 Bug Hole Approx .5L x .4 D
4 Bug Hole Approx .75L x .4 D
5 Bug Hole Approx 1.1" x .5 D
6 Bug Hole Approx 1.2" x .3"D

See Attached Photographs

DATA SHEET

EQUIPMENT NUMBER: VSC: 24-15 Date: 5/23/12

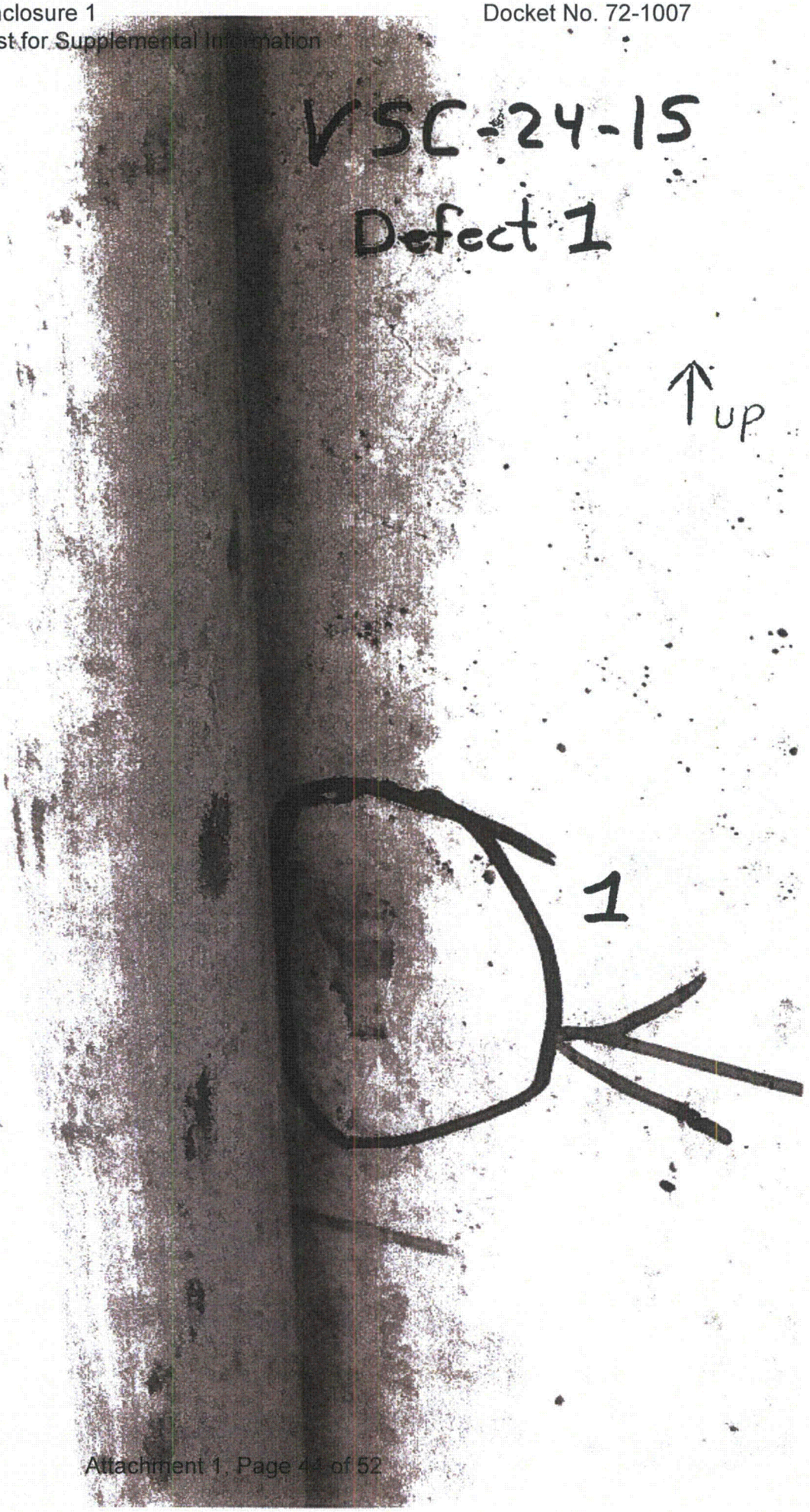
CONDITIONS OF SCREENS: (Write SAT or describe damage)

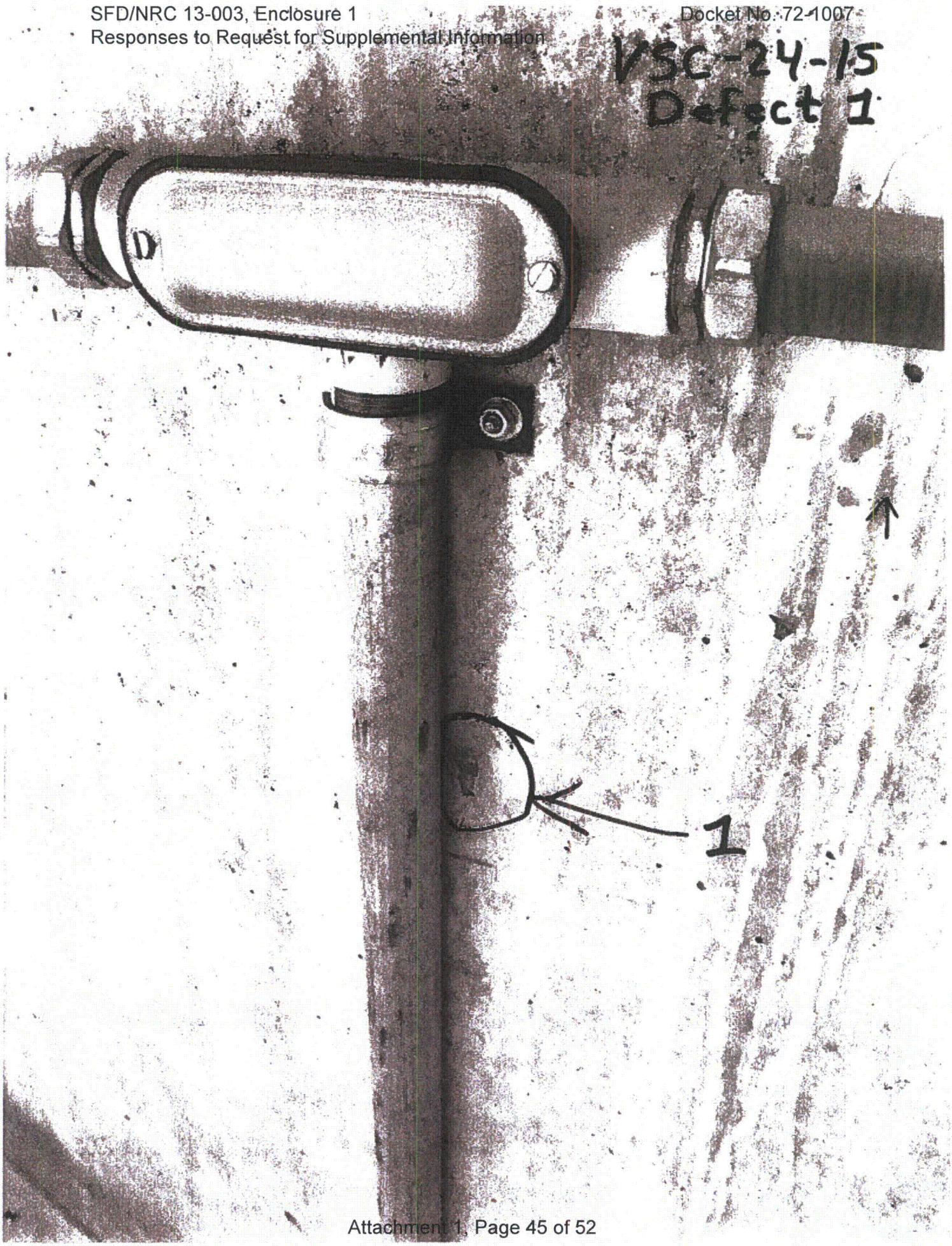
Inlets	Left North	SAT
	Right North	SAT
	Left South	SAT
	Right South	SAT
Outlets	North	SAT
	South	SAT
	East	SAT
	West	SAT

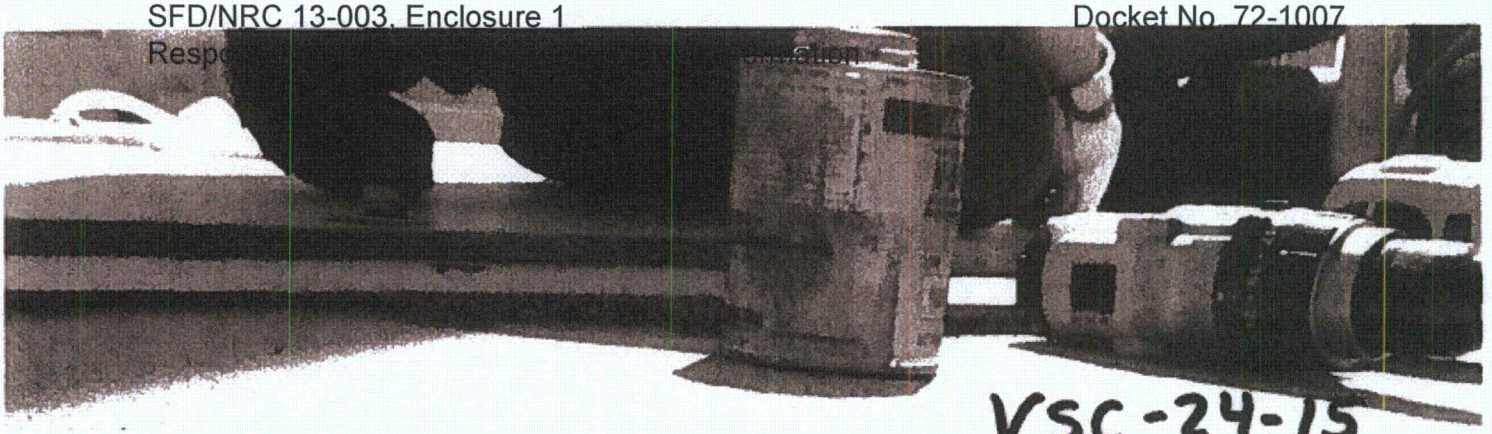
DESCRIBE ANY DEBRIS:

None - Top & Botton Screens were removed for Video Examination. See WO 0310855 for Video examination Activity of intend structure.

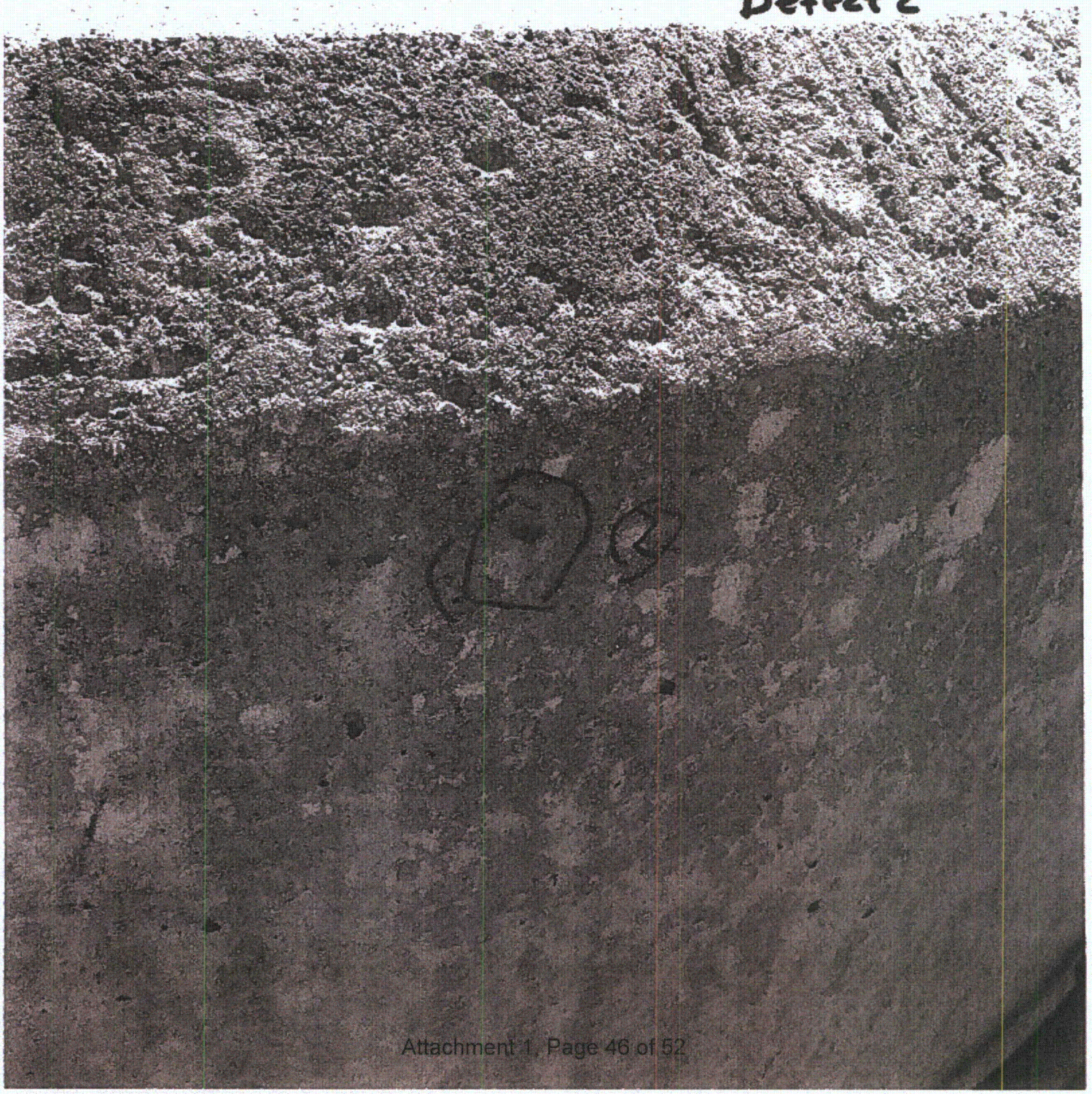
PEWJ / 5/23/12
Performed By LvIII Date

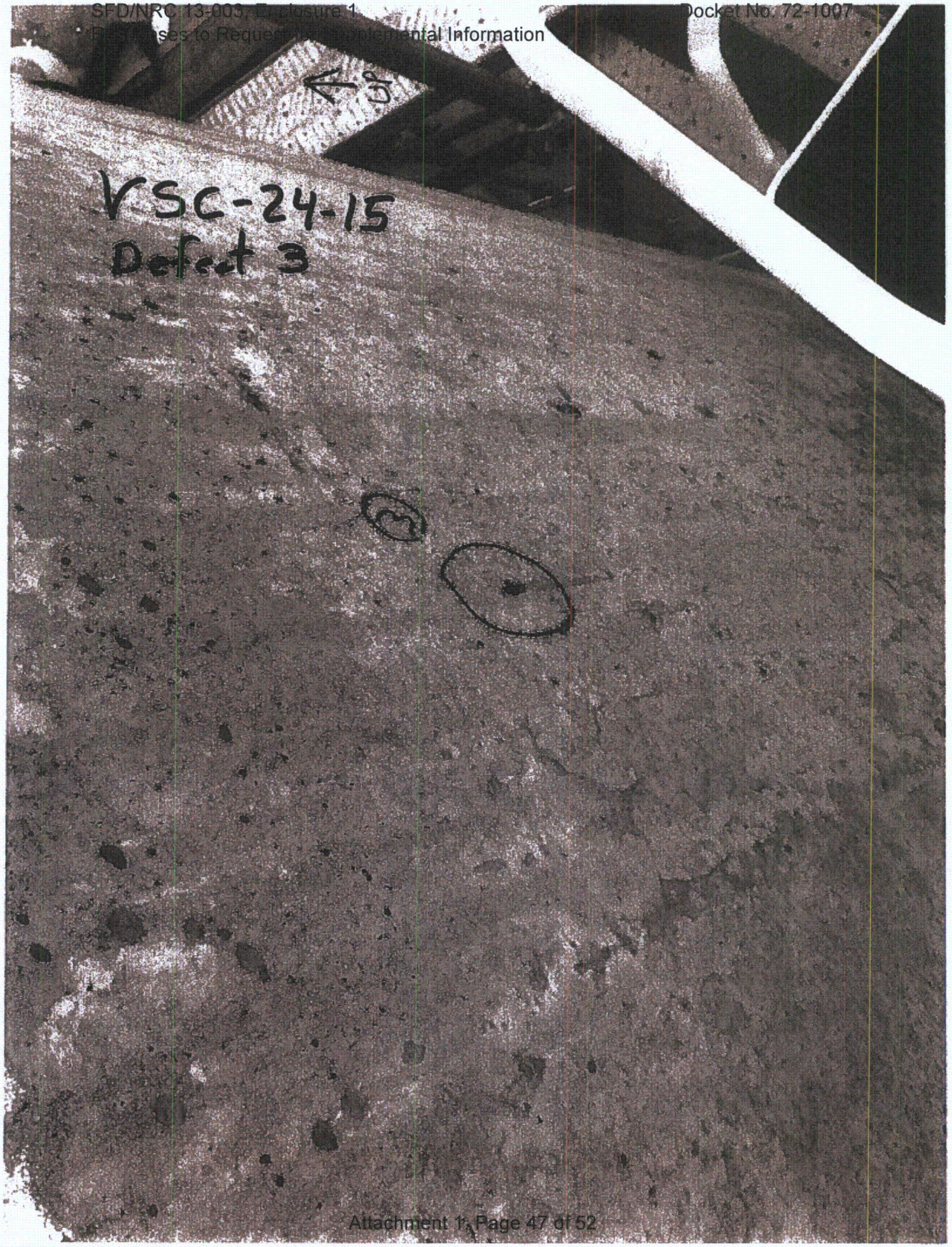

VSC-24-15
Defect 1
UP
1

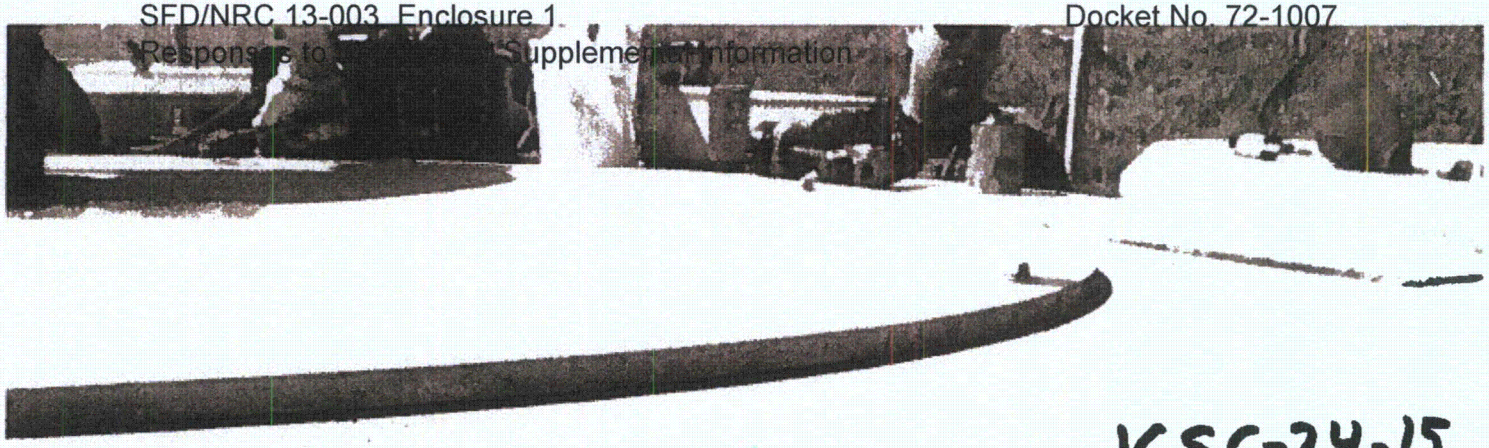

VSC-24-15
Defect 1
1



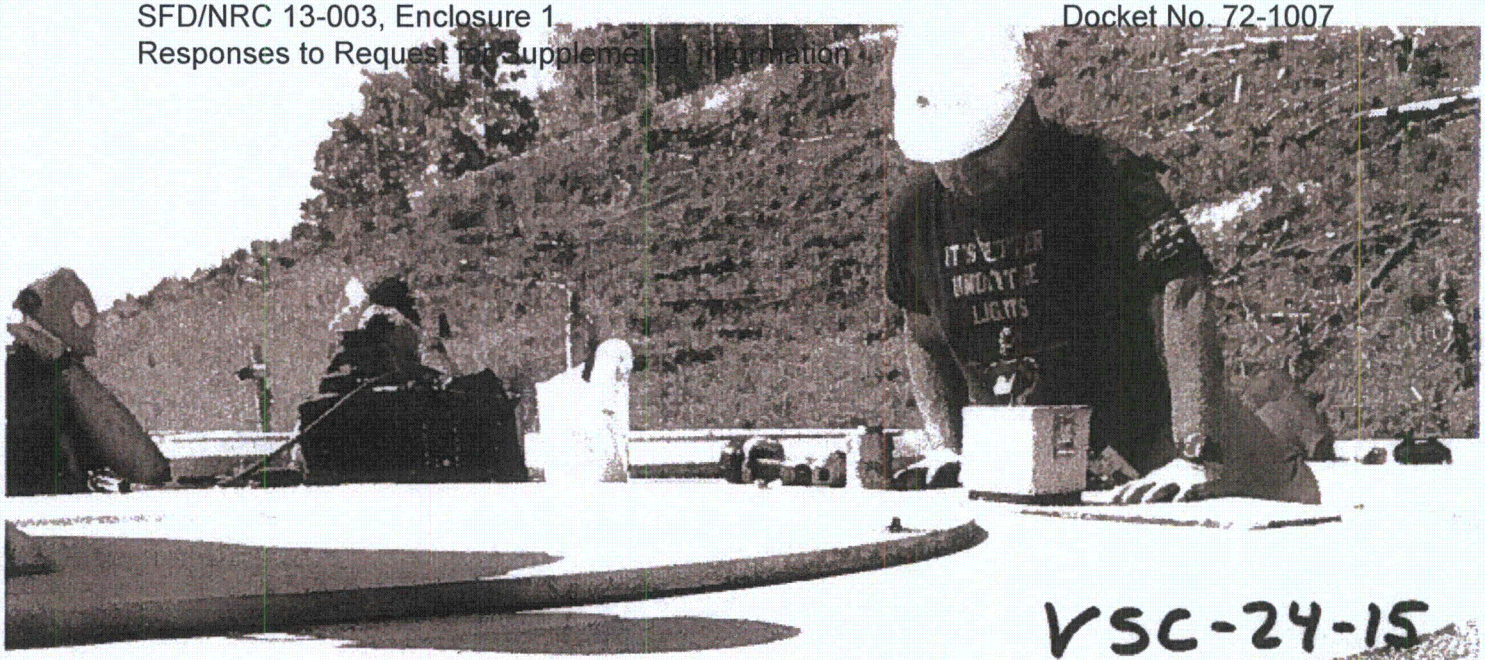
VSC-24-15
Defect 2



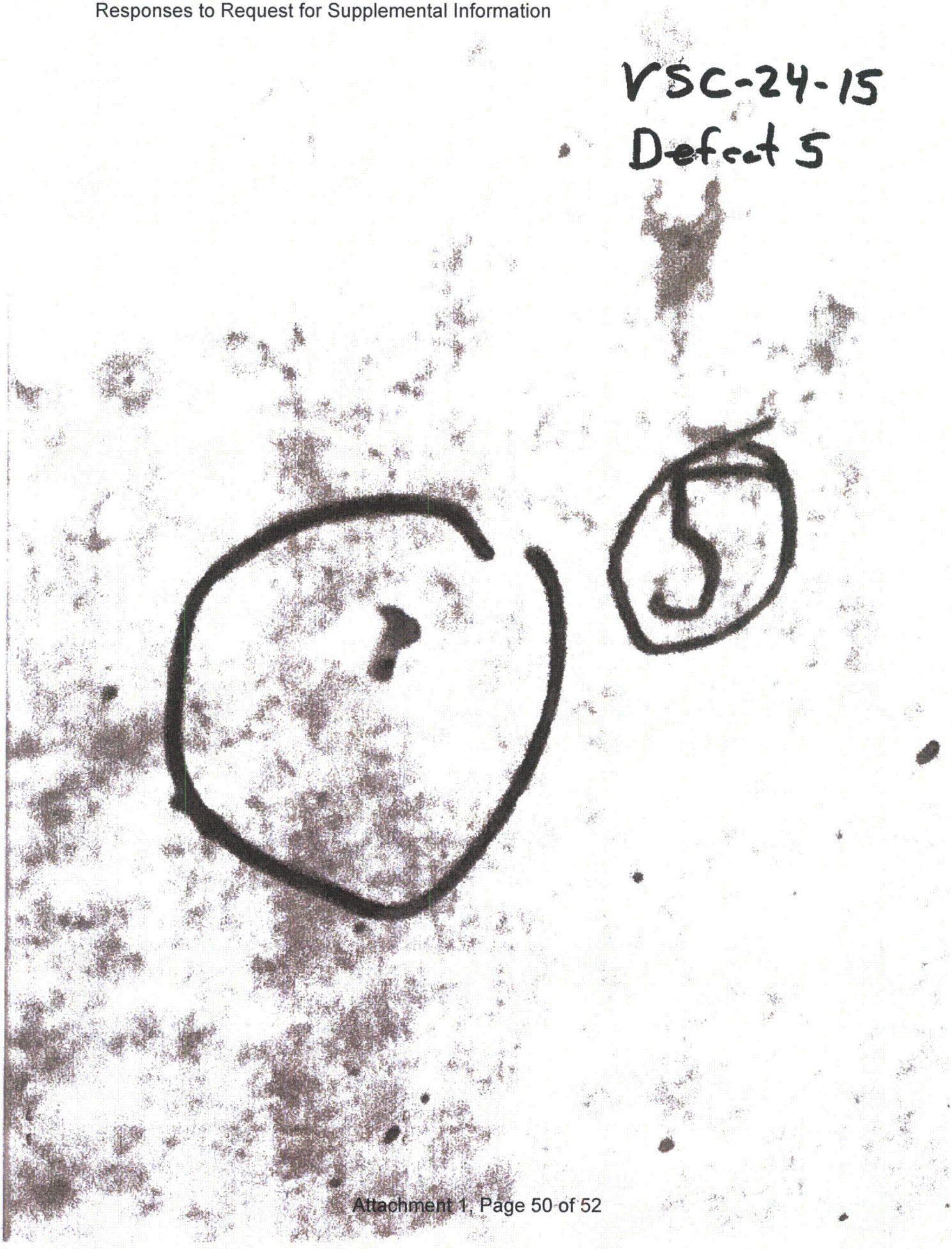

VSC-24-15
Defect 3



VSC-24-15
Defect 4



VSC-24-15
Defects 3 & 4


VSC-24-15
Defect 5
5

VSC-24 #15
Defect
5


VSC-24-15
Defect 6
6