Xcel Energy®

Monticello Nuclear Generating Plant
2807 W County Road 75
Monticello, MN 55362

February 28, 2014

L-MT-14-021
10 CFR 50.55a

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket 50-263
Renewed Facility Operating License No. DPR-22

Subject: 10 CFR 50.55a Request RR-008 Associated with the Fifth Ten-Year Inservice Inspection (ISI) Interval

Reference: 1) Letter from Northern States Power Company, a Minnesota corporation (NSPM), d/b/a Xcel Energy to Document Control Desk, "Fifth Ten-Year Inservice Inspection Plan", dated February 28, 2012 (ADAMS Accession No. ML12060A298).

Pursuant to 10 CFR 50.55a(a)(3)(ii), Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, the licensee for the Monticello Nuclear Generating Plant (MNGP), hereby requests NRC authorization of the enclosed 10 CFR 50.55a request associated with the Fifth Ten-Year Inservice Inspection (ISI) Interval for MNGP (Reference 1).

NSPM proposes an alternative to visually inspect all accessible surfaces on both the top and underside of Shroud Support Plate Welds H8 and H9, which have known flaws, for all refueling outages in each of the three periods in the Fifth Ten-Year ISI Interval (2015, 2017, 2019, and 2021) without disassembly of fuel cells or jet pump assemblies. A subset of the flaws on the underside of both welds will be selected and monitored in detail each refueling outage for any visually apparent change to the flaws. Based on the inspection results, NSPM will determine the need for additional evaluations and/or any resulting actions and implement them accordingly. Implementation of the alternative, as described herein, will provide reasonable assurance of structural integrity of the MNGP Reactor Vessel Shroud Support Plate.

Enclosure 1 to this letter entitled, "Proposed Alternative in Accordance with 10 CFR-50.55a(a)(3)(ii), 10 CFR 50.55a Request RR-008", proposes an alternative to the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," (ASME Section XI), 2007 Edition with the 2008 Addenda, IWB-2420(b), as applied to the flaws in Shroud Support Plate Welds H8 and H9. In consideration of the unusual difficulty obtaining access to examine all areas with flaws in the H8 and H9 welds and pursuant to 10 CFR 50.55a(a)(3)(ii), NSPM requests NRC authorization of the proposed alternative provided in the enclosure because complying

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with the requirements of ASME Section XI, IWB-2420(b) would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Enclosure 2 to this letter entitled, "Monticello Shroud Support Structure Flaw Evaluation Review and Support Plate Weld Inspection Recommendations", provides supporting detail and technical justifications.

NSPM requests that the NRC authorize this 10 CFR 50.55a request by March 1, 2015 to support the 1R27 MNGP refueling outage.

If you have any questions or require additional information, please contact Mr. Randy Rippy at 612-330-6911.

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

Karen D. Fili
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company – Minnesota

Enclosures (2)

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC
Minnesota Department of Commerce

ENCLOSURE 1

MONTICELLO NUCLEAR GENERATING PLANT

PROPOSED ALTERNATIVE IN ACCORDANCE WITH 10 CFR 50.55a(a)(3)(ii)
10 CFR 50.55a REQUEST RR-008

(23 pages follow)

Monticello Nuclear Generating Plant
Proposed Alternative In Accordance with 10 CFR 50.55a(a)(3)(ii)
10 CFR 50.55a Request RR-008

1. ASME Code Component(s) Affected

Code Class:	1

Component Numbers:	H8 Weld: Shroud Support Plate to Shroud Weld
	• ISI Component ID's:
	  ▪ C-3E (Shroud Shelf 0-180 deg)
	  ▪ C-3F (Shroud Shelf 180-360 deg)
	
	H9 Weld: Shroud Support Plate to Reactor Vessel Weld
	• ISI Component ID's:
	  ▪ C-3C (Shroud Shelf H9 Weld 0-180 deg)
	  ▪ C-3D (Shroud Shelf H9 Weld 180-360 deg)

Examination Category:	B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessels
Item Number(s):	B13.30 Interior Attachments beyond Beltline Region B13.40 Core Support Structure
Description:	Alternative to ASME Section XI, IWB-2420(b) Successive Inspections

2. Applicable ASME Code Edition and Addenda

The Monticello Nuclear Generating Plant (MNGP) began the Fifth 10-year Inservice Inspection (ISI) Program Interval on September 1, 2012 . The Code of Record for the Fifth Interval is the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," (ASME Section XI), 2007 Edition with the 2008 Addenda.

3. Applicable Code Requirement

ASME Section XI, 2007 Edition with the 2008 Addenda, IWB-2420(b)

The 2007 Edition with the 2008 Addenda IWB-2420(b) states:

> If a component is accepted for continued service in accordance with IWB-3132.3 or IWB-3142.4, the areas containing flaws or relevant conditions shall be reexamined during the next three inspection periods listed in the schedule of the Inspection Program of IWB-2400. Alternatively, acoustic emission may be used to monitor growth of existing flaws in accordance with IWA-2234.

4. Reason for Request

IWB-2420(b)

When a component has been accepted for continued service using analytical evaluation (IWB-3142.4), as written in IWB-2420(b), "the areas containing flaws or relevant conditions shall be reexamined..."

NSPM understands this to mean <u>all</u> the areas containing flaws or relevant conditions shall be reexamined. MNGP has areas of flaws on the underside of the core shroud support in the H8 and H9 weld metal. The core shroud support welds are located in the reactor pressure vessel (RPV) interior, and the flaws have been accepted for continued service by analytical evaluation. However, *all* areas with the relevant condition are not fully accessible for reexamination.

The limited accessibility conditions were recognized following initial flaw identification with visual examination, and were accounted for in the applicable evaluations. The analyses provided reasonable assurance that the components' structural integrity would be maintained during continued operation.

The flaws were reported to the NRC in the ISI Summary Reports for the 2011 and 2013 refueling outages, and the analytical evaluations were also submitted as required by IWB-3144(b). (References 1, 2, and 3)

> IWB-3144(b) Evaluation analyses of examination results as required by IWB-3142.4 shall be submitted to the regulatory authority having jurisdiction at the plant site.

Although IWB-2420(b) allows acoustic emission monitoring as an alternative to reexamination, NSPM does not consider the interior of an operating reactor to be a suitable environment for the application.

Obtaining access to examine all areas with flaws in the H8 and H9 welds would be unusually difficult due to the inherent design and interferences of the RPV interior structures (see Attachments A, B, and C), several of which are described later in this request. Therefore, NSPM is proposing an alternative to the requirements of IWB-2420(b) that will monitor the flawed areas of accessible surfaces and welds for potential changes and provide reasonable assurance that the component's structural integrity will continue to be maintained without examining *all* the areas containing the flaws. The proposed alternative is described later in this request.

Component Description and Configuration
The subject welds, referred to throughout this documentation as H8 and H9, are located in the reactor pressure vessel (RPV) interior and are part of the core shroud assembly; specifically, the shroud support structure (see Attachments D and E).

H8 and H9 are weld identifiers designated by the Boiling Water Reactor Vessel and Internals Project (BWRVIP) in the BWRVIP-38 document, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines," (Reference 4) and are used for their applicability to the ISI Program components for ASME Code Items B13.30 and B13.40 designated as the Shroud Shelf.

The shroud support assembly includes a horizontal ring plate that is welded between the bottom of the core shroud and the upper region of the reactor bottom head, and vertical support legs that are welded between the bottom of the core shroud and the bottom of the bottom head.

The horizontal ring plate is referred to as the shroud support plate (synonymous with baffle plate, or shroud shelf) and is made of Inconel® (ASME SB-168). The H8 weld is the horizontal weld that joins the support plate to the Inconel® core shroud cylinder. The H9 weld is the horizontal weld that joins the support plate to a weld buildup pad on the RPV bottom head. The H8 and H9 weld material is Inconel® 182, and the weld buildup pad on the RPV is Inconel® 82 and 182. The area below the support plate and core shroud is the RPV lower plenum.

The purpose of the shroud support plate in connection with the other reactor internals is to maintain an adequate distribution of coolant flow during normal operations, seismic disturbances and design basis accidents. The shroud support plate specifically is part of the core coolant envelope needed to maintain two thirds core height in the event of a recirculation line break loss of coolant accident (LOCA). In connection with the shroud support legs, the shroud support plate also provides lateral support for the core shroud during normal and accident conditions.

Due to inherent design configuration of the reactor vessel internals with a welded core shroud and support assembly, fuel core and core support components, core instrumentation, sparger piping in the upper vessel regions, and jet pump assemblies in the annulus region (see Attachment A), gaining access to the lower plenum is unusually difficult, and to gain further access would require extensive disassembly of the fuel cells or jet pumps, which, as described below, would create a hardship without a compensating increase in the level of safety or quality.

Access considerations and Inspection Technique

NSPM has successfully inspected MNGP shroud support components in the region below the shroud support plate, on a limited basis, by lowering high quality camera heads and auxiliary lighting into the jet pump inlets, and down through the jet pump to the vessel lower plenum. With this method, which does not require disassembly of jet pump or fuel cell assemblies, the flaws on the underside of the H8 and H9 welds were coincidentally discovered during the MNGP 2011 refueling outage while inspecting the shroud support legs.

When the inspections were performed on the underside of H8 and H9 welds in the lower plenum, the common areas within a jet pump pair were accessible for inspection. Those areas on either side of the access hole covers and the areas between the pairs could not be inspected due to the rigidity of the equipment and the limited maneuverability as it passes through the jet pump and the opening in the shroud support plate. (See Attachments C and E)

In order to gain additional coverage on the underside of the welds, extensive reactor internal disassembly is required. The jet pumps and/or fuel cells would have to be disassembled and removed. As described in BWRVIP-38, the potential problems created by disassembly of fuel cells or jet pumps may outweigh the inspection benefit.

As noted in BWRVIP-41, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines," (Reference 5) flow induced vibration (FIV) caused by leakage between the slip joint of the mixer and diffuser can cause damage to jet pumps. The FIV caused by slip joint leakage does not occur as long as the jet pumps are properly assembled, as designed and originally installed. Disassembly and reassembly for the inspection may alter the alignment and affect the stability of the jet pumps and increase the risk for damage with limited improvement in inspection coverage.

Disassembly and reassembly of the jet pumps would also have refueling outage impacts with regard to additional outage time, costs, and dose. Estimates indicate that disassembly and reassembly of a jet pump pair would take approximately 20 to 24 hours. Applying the estimated time for 10 jet pump pairs results in approximately 200 to 240 additional hours (~8-10 days) over and above the inspection time.

In 2013, general area dose rates were approximately 1 to 3 millirem per hour (mR/hr) on the refuel floor near the refuel cavity. Applying 1 to 3 mR/hr to the lower time estimate of 200 hours for disassembly and reassembly of all 10 pairs, 3 workers per shift, 2 shifts per day, the estimated dose would be 600 to 1800 mR.

Based on 2013 refueling outage costs of approximately $60,000 per day for the refueling and in-vessel vendor, jet pump disassembly and reassembly activities would cost roughly $480,000 - $600,000. This does not factor in other related costs such as inspection, radiation protection support, mobilization and demobilization, etc.

Regarding fuel cell disassembly and reassembly activities, it is Monticello's viewpoint that disassembly of the fuel cells for inspecting the underside of the H8 and H9 welds through the core support plate has slightly less risk than disassembling the jet pumps. Vacating a fuel cell for access to the lower plenum to perform inspections, similar to jet pump disassembly, would have time and dose impacts to a refueling outage. Estimates indicate that the disassembly and reassembly steps for each cell, including fuel moves, would take approximately

16 hours and would likely require replacement of some of the affected components. Additionally, if there is fuel in the vessel during these activities, higher risk conditions may exist for "Operations With A Potential For Draining The Reactor Vessel" (OPDRV) while performing the related under-vessel activities, thereby requiring additional steps extending the time to complete the activities.

Considering that there are 24 peripheral fuel cells to be vacated, the estimated time to complete the work is 384 hours (16 days). Although a portion of that work and related dose may be performed coincidental with some normal refueling activities, there would still be a substantial impact to refueling outage duration, vendor costs, worker dose, and replacement part cost.

Using 2013 dose levels on the refuel floor, at 1 to 3 mR/hr, 3 workers per shift, 2 shifts per day, for 384 hours, estimated dose for the refuel floor workers would be approximately 1150 to 3450 mR. To vacate a fuel cell, a crew of workers is also required under the vessel to perform removal and reinstallation of the Control Rod Drives (CRDs). Using 2013 dose levels for CRD changeouts, the changeout crew received roughly 200 mR combined dose per drive changeout. Therefore, for changeout of 24 drives necessary to disassemble and reassemble the fuel cells, combined dose would be approximately 4800 mR. When added to the refuel floor dose, total dose would be approximately 5950 to 8250 mR.

Based on 2013 combined costs for the refuel floor and under-vessel vendors of $74,000 per day, the cost for 16 days of fuel cell disassembly and reassembly activities would be approximately $1,184,000. This does not factor in other related costs such as inspection, radiation protection support, mobilization/demobilization, etc.

Vacating fuel cells for performing inspections on H8 and H9 under the shroud support plate, although slightly less risky than jet pump disassembly, would still likely result in limited accessibility. Of the two welds, the H9 weld is located where the shroud plate joins the reactor vessel bottom head and would be the more difficult of the two to access for inspection. As shown on Attachments A, B, and C, remote tooling for inspection from a disassembled fuel cell would need to travel from the nearest fuel cell across the width of the annulus to reach the H9 weld. The opening in core support plate for each fuel cell is only 10.875" in diameter. Inspection equipment would have to be maneuvered through the narrow opening and have enough flexibility to maneuver across the shroud support plate from the underside to inspect the H9 weld. Considering the unusually difficult measures to perform an inspection in this manner, and with the likely result of not being able to examine all areas of each weld to satisfy the requirements of IWB-2420(b), there would not be a compensating increase in the level of quality or safety.

The access hole covers are welded to the shroud support plate and function to perform a leak-tight barrier between the annulus and lower plenum. These are not intended to be disassembled.

Disassembly of any reactor internals includes increased risk of generating foreign material into the core or lower plenum, issues with reassembly that may have an unforeseen effect on future operation, and potential need for replacement/repair options for infrequently disassembled parts.

The visual inspection technique deployed through the jet pump inlets for the underside of the H8 and H9 welds is currently viewed by NSPM as the best available technique for inspection of the area even with its limited coverage. With the exception of limited areas at the N1A and N1B recirculation suction nozzles, MNGP does not have access from the outer diameter to interrogate the flaws volumetrically. UT of the RPV base material adjacent to the H9 weld, in limited areas available at the N1A and N1B nozzles, was performed in 2011 and 2013. This will be explained in more detail in the Basis For Use section.

The insulation package design on the exterior surface of the reactor vessel severely limits access to perform a volumetric inspection of the H9 weld from the RPV outside surface. There is no annulus or gap between the insulation and the RPV outside diameter (OD) surface based on MNGP's experience from previous work activities on the vessel OD, as well as past discussions with the outage insulation vendor. In addition, except for removable insulation panels around the vessel nozzles, the insulation package is interlocked with adjoining insulation sections and is held in place with metal banding.

It should also be noted that in the qualitative analysis, as stated in Enclosure 2, the entire underside of both the H8 and H9 welds is assumed to be flawed for evaluation purposes. Any activities to improve visual inspection coverage on the underside of the welds would have no effect on the assumptions or conclusion in the existing analysis.

Because there would still likely be access limitations that preclude the ability to inspect all of the H8 and H9 welds, MNGP could not meet the literal requirements of IWB-2420(b). Therefore all the additional work, time, dose, and replacement part costs required to disassemble and reassemble reactor vessel internal components for inspection, in order to satisfy IWB-2420(b), would result in a hardship or unusual difficulty without a compensating increase in the level of quality or safety.

Flaws requiring reexamination per IWB-2420(b)

As previously described, the flaws on the H8 and H9 welds, visible cracks on the underside surface of the weld metal, were accepted by analytical evaluation under ASME Section XI IWB-3142.4. This Code sub-paragraph requires subsequent examination of all areas containing flaws in the next three inspection periods following initial discovery under IWB-2420(b). The flaws were initially discovered in 2011 which was the last refueling outage in Period 3 of the Fourth 10-Year ISI Interval.

A small subset of flaws on the underside of both the H8 and H9 welds were reexamined in 2013, as well as performing examinations on the topside of the welds. Analytical evaluations were performed again following this inspection to confirm acceptance of the component for continued service.

There are two refueling outages in Period 1 of the Fifth 10-Year Interval, 2013 and 2015. Although a limited scope of inspections was performed at MNGP in 2013, which was in Period 1 of the Fifth 10-Year ISI Interval, these exams were not intended to fulfill the requirements of IWB-2420(b). They were performed to verify the indications observed in 2011 were in fact flaws, by utilizing a newly fabricated cleaning tool to remove surface deposits. Therefore, the first successive inspection applicable to IWB-2420(b) would be scheduled for the second refueling outage in Period 1, which is the 2015 refueling outage (RFO27).

The flaws reinspected in 2013 were initially inspected in their as-found condition with indications being easily visible on a layer of surface deposits on the welds. Following a specialized cleaning process that cleaned the surface to bare metal, the same locations were reexamined. The underlying cracks that produced the linear indications on the surface deposit were readily apparent and were essentially identical to the as-found indications seen prior to cleaning.

It was described that the indications in the surface deposit were very similar to the conditions produced during a liquid dye penetrant examination, where the bleed out from the underlying flaw is highly visible on the background provided by the developer. Although the cleaning provided validation that the indications were relevant and were emanating from cracks in the weld metal, examination with the surface deposit in place was equally effective for identifying the flaws and the extent of cracking. (see Attachments F and G)

The flaws on the H8 and H9 welds were identified on all of the accessible regions inspected on the underside of the welds using access provided through the jet pump inlet and openings into the lower plenum of the vessel. During the inspection in 2011, it was noted that the flaws appeared to continue beyond the regions accessible for inspection on the underside of the welds, as shown in Attachment H. Therefore, for evaluation purposes, it has been assumed that there are similar flaws in all the uninspected regions of both the H8 and H9 welds.

5. Proposed Alternative and Basis for Use

Proposed Alternative:

Pursuant to 10 CFR 50.55a(a)(3)(ii), compliance with the successive inspection requirements under IWB-2420(b) of the 2007 Edition with the 2008 Addenda of the ASME Section XI Code would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

NSPM proposes to visually inspect all accessible areas of the topside and underside of both the H8 and H9 welds during each remaining refueling outage in the three periods of the Fifth ISI Interval (2015, 2017, 2019, 2021). Due to the extensive nature of the flaws, detailed mapping of all flawed areas is not practical. NSPM intends to continue accessing the lower plenum via the jet pump inlets to perform the visual inspections. In addition to inspecting all accessible areas of the H8 and H9 welds for changes in the general condition of the welds, MNGP will select four areas with known, distinct indications on the underside of the shroud support plate in the H8 and H9 welds to monitor for any visually apparent changes in the flaw. The areas selected will include two locations on each weld, and will be located in different quadrants of the vessel.

The selected locations will be mapped (by photo, video, or other effective method) and visually compared to the previous inspection. The flaw locations will be examined for visual evidence of new branching, visual evidence of length changes (e.g. flaws that once only covered a portion of the weld now completely cross the weld, etc.), and visual evidence of any flaws that extend into the reactor vessel low alloy steel or the shroud support plate itself. The accessible topside of the welds will also be inspected to verify no cracking has penetrated through the thickness of the weld (e.g. crack-like indications on the topside that could be connected to cracking on the underside). Based on the inspection results, NSPM will determine the need for additional evaluations or any resulting actions and implement them accordingly.

NSPM and Monticello are members of industry organizations that address issues with reactor vessel internal structures and attachments. These organizations perform research and develop inspection techniques and guidelines to address the issues on behalf of the industry. Involvement in these organizations, as well as contact with other stakeholders and in-vessel inspection service providers will be used at MNGP to further assess the conditions of the shroud support plate welds and develop inspection strategies going forward.

By performing detailed mapping and monitoring of a representative sample of the flaws and investigating more refined inspection techniques, Monticello will continue to monitor the condition of the welds and meet the intent of IWB-2420(b). The proposed alternative to the requirements of IWB-2420(b) will demonstrate, with reasonable assurance, that the structural integrity of the shroud support plate and its welds will be maintained, and that the assumptions used in evaluations remain valid. The alternative can be implemented without imposition of undue hardship or unusual difficulty that would not provide a compensating increase in the level of quality and safety.

Basis for Use:

Since 2011, when the flaws in the H8 and H9 welds were initially discovered, extensive analysis was performed regarding the flaws and how they may affect the structural integrity of the shroud support assembly. These analyses demonstrated that the flaws in the H8 and H9 welds have a negligible effect on the ability of the shroud support assembly to perform its design and safety functions during normal and accident conditions.

One of the evaluations performed for the H8 and H9 welds included the potential for the flaws in the H9 weld to grow into the low alloy steel of the reactor vessel. The probability of flaw growth into the low alloy steel of the reactor vessel is low based on the water chemistry environment in the lower plenum in the MNGP reactor vessel and the low residual stress in the reactor vessel. Note that none of the observed flaws in the visual inspections were found to extend beyond the boundary of the H8 and H9 weld metal.

Monticello has very limited OD access to the reactor vessel for Ultrasonic Testing (UT) due to the design of the RPV insulation package. There are small areas of access near the recirculation suction nozzles (N1A and N1B) where the insulation is designed to be removable, and UT can be performed. In 2011, a single-sided UT inspection was performed from the outer diameter (OD) of the reactor vessel in the N1B recirculation suction nozzle window using a procedure qualified according to the Performance Demonstration Initiative (PDI) for reactor vessel welds. Due to the interference of the permanent insulation, Monticello could only perform axial scans which would identify any potential circumferential flaws in the low alloy steel of the reactor vessel at the H9 weld. No indications were found. In 2013, a similar single-sided UT inspection was performed in the N1A nozzle window, and again no indications were found. A combined total of approximately 129.5 inches of the reactor vessel was scanned in 2011 and 2013. The UT results help demonstrate the conclusion that the probability of flaw growth into the low alloy RPV material is low.

The primary concern related to the H8 and H9 welds is uplift of the plate in the event of a design basis LOCA event. The uplift of the shroud support plate would be driven by the vertical seismic loads and reactor internal pressure differences across the plate. The evaluations done in 2011 and 2013 assume very conservative flaw profiles including complete circumferential cracking of both the

H8 and H9 flaws with cracking in the depth direction of approximately 75% through the weld thickness (through-wall). In the 2013 evaluation, using conservative flaw profiles and consideration of the loading acting upon the shroud support plate in the reactor vessel, only 18% of the total weld surface is required to be free of through-wall indications to overcome the uplift loads acting on the shroud support plate. Considering such extensive flaw profiles, the evaluations demonstrate that the structural integrity of the shroud support plate and its ability to resist uplift remain intact for at least 12 years and maintain the core coolant envelope. See Enclosure 2 for additional details of evaluations performed to date.

Based on flaw tolerance estimates provided in BWRVIP-38, the MNGP shroud support assembly is inherently flaw tolerant by design. In addition to the flaw tolerant design, MNGP implemented hydrogen water chemistry (HWC) in 1989 and recently implemented Online Noble Metal Chemistry (OLNC) in 2013. The environment of the lower plenum is well mitigated against flaw growth and initiation based on the water chemistry controls implemented in accordance with BWRVIP-190 "BWR Water Chemistry Guidelines" (Reference 6) via the MNGP Strategic Chemistry Plan.

All of the evaluations done to demonstrate the structural integrity of the shroud support assembly, including the shroud support plate H8 and H9 welds and the shroud support leg H10 welds, have been summarized and are further described in Enclosure 2, "Monticello Shroud Support Structure Flaw Evaluation Review and Support Plate Weld Inspection Recommendations." The document evaluates whether reduced inspection coverage is technically justifiable in lieu of the implicit requirement to inspect all flawed areas of the H8 and H9 welds as described in IWB-2420(b). The document recommends minimum inspection requirements based on the conservatisms built into the evaluations performed to date, MNGP water chemistry in the lower plenum of the reactor vessel, and crack growth potential of the flaws. The minimum inspection recommendations provided in Enclosure 2 are as follows:

1. At least 15% coverage of the top side of welds H8 and H9 with the objective of identifying at least 13% of the top side weld length to be unflawed.

a. The extent of top side coverage should be increased until at least 13% of the weld length for both H8 and H9 are shown to be unflawed.

2. 5% coverage of the bottom side of welds H8 and H9 in areas with known flaws with the objective of monitoring for unexpected change of flaw appearance.

Note that in 2013, Monticello was able to inspect 32% of the topside of the H8 weld and 35% of the topside of the H9 weld with no relevant indications. Based on a review of previously inspected regions on the underside of the H8 and H9 welds, the areas accessed through the jet pump inlets, will be used to meet the 5% coverage recommendation.

NSPM proposes to visually inspect all accessible areas of the top and underside of the H8 and H9 welds without disassembly of jet pumps or fuel cells. By inspecting all of the accessible areas of H8 and H9 welds for the next three successive periods and performing detailed monitoring and comparisons on a subset of the flaws on the underside of the welds for visually apparent changes, NSPM will meet the intent of the IWB-2420(b). The proposed alternative to the requirements of IWB-2420(b) will demonstrate, with reasonable assurance, that the structural integrity of the shroud support plate and welds will be maintained, and that the assumptions used in evaluations remain valid.

Summary:

In summary, the evaluation provided in Enclosure 2 provides a technical basis to justify a lesser amount of examination of flawed areas than implied by IWB-2420(b).

NSPM proposes an alternative to visually inspect all accessible surfaces on both the top and underside of the H8 and H9 welds for each remaining refueling outage in the three periods of the Fifth 10-Year ISI Interval (2015, 2017, 2019, 2021) without disassembly of fuel cells or jet pump assemblies. A subset of the flaws on the underside of both welds will be selected and monitored in detail for any visually apparent change to the flaws. Based on the inspection results, NSPM will determine the need for additional evaluations or any resulting actions and implement them accordingly. The proposed alternative will provide reasonable assurance that the structural integrity of the reactor vessel shroud support plate will be maintained.

Continued involvement in industry organizations that address issues with reactor vessel internals, as well as contact with other stakeholders and in-vessel inspection service providers will be used at MNGP to further assess the conditions of the shroud support plate welds and develop inspection strategies going forward.

Pursuant to 10 CFR 50.55a(a)(3)(ii), NSPM requests the NRC to authorize use of the proposed alternative to ASME Section XI, IWB-2420(b). Complying with IWB-2420(b) at MNGP for flaws or relevant conditions on the underside of the H8 and H9 welds of the RPV Core Shroud Support Plate would result in hardship or unusual difficulty for NSPM without a compensating increase in the level of quality and safety.

6. Duration of Proposed Alternative

The proposed alternative will be used for the Fifth 10-Year Inservice Inspection Interval of the ASME Section XI Inservice Inspection Program for the MNGP that is expected to end on May 31, 2022.

7. Precedents

None identified

8. References

1. NSPM Letter L-MT-11-046 to NRC, "Cycle 25 Inservice Inspection Summary Report," dated August 23, 2011, ADAMS Accession No. ML112351222.

2. NSPM Letter L-MT-13-102 to NRC, "Cycle 26 Inservice Inspection and In-Vessel Visual Inspection Summary Reports," dated October 11, 2013, ADAMS Accession No. ML13308B206.

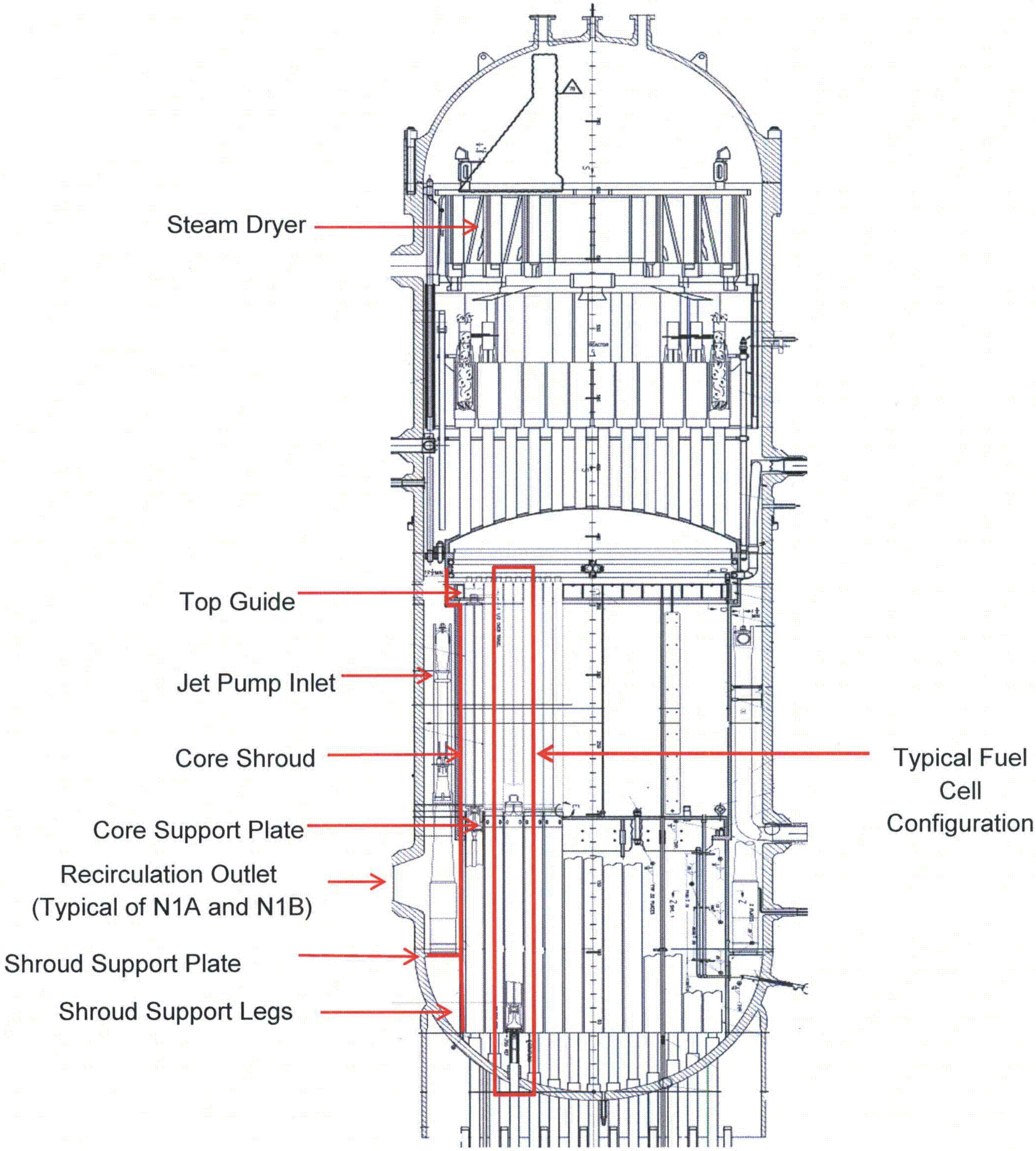
3. NSPM Letter L-MT-13-040 to NRC, "Supplemental Information Regarding Cycle 25 Inservice Inspection Summary Report – Core Shroud Support Flaw Evaluation," dated July 2, 2013, ADAMS Accession No. ML13191A766.

4. Boiling Water Reactor Vessel and Internals Project, "BWR Shroud Support Inspection and Flaw Evaluation Guidelines" (BWRVIP-38), Rev. 0, September 1997.

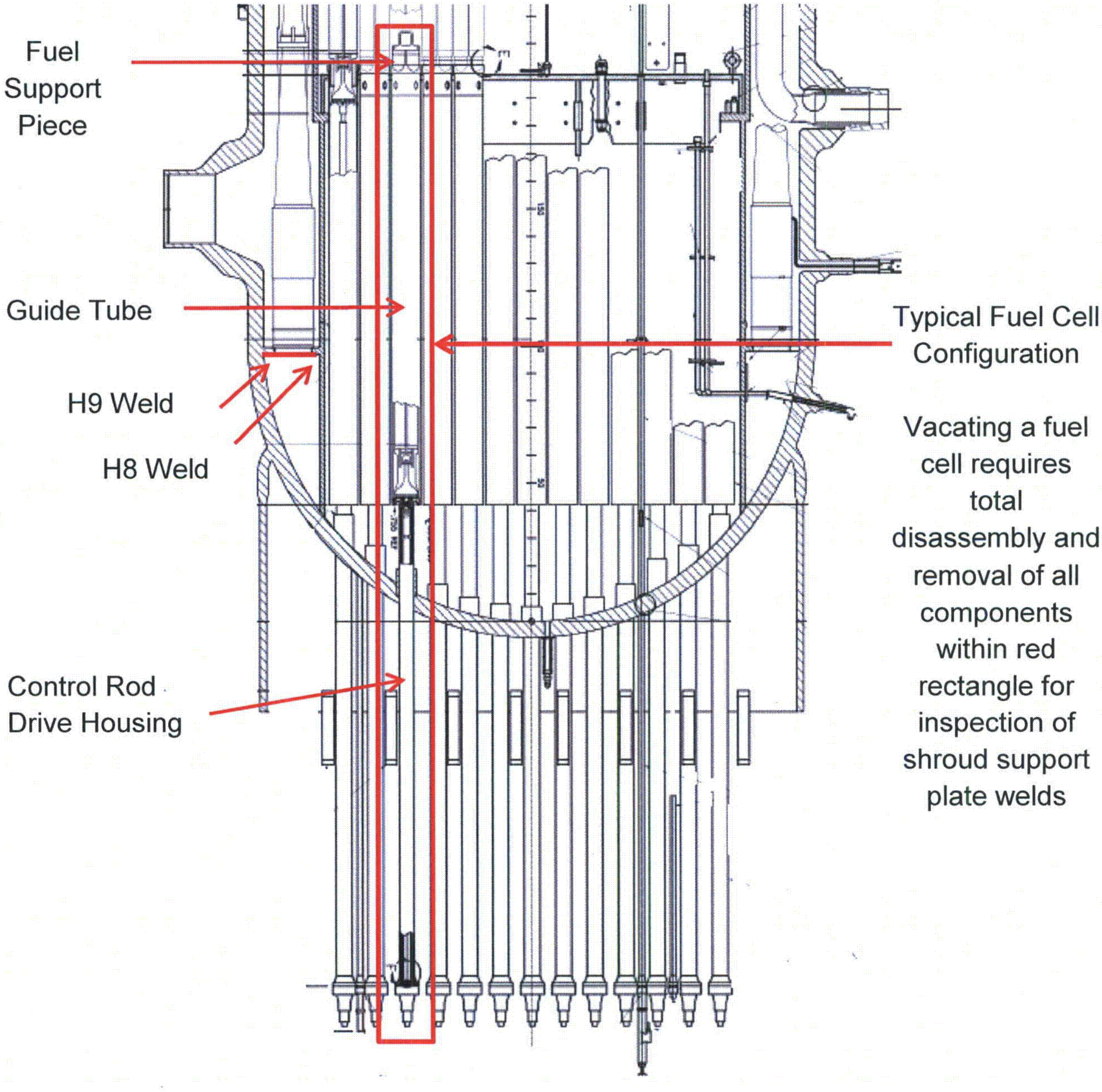
5. Boiling Water Reactor Vessel and Internals Project, "BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines," (BWRVIP-41), Rev. 3, September 2010.

6. Boiling Water Reactor Vessel and Internals Project, "BWR Water Chemistry Guidelines – 2008 revision" (BWRVIP-190), 2008 Revision, October 2008.

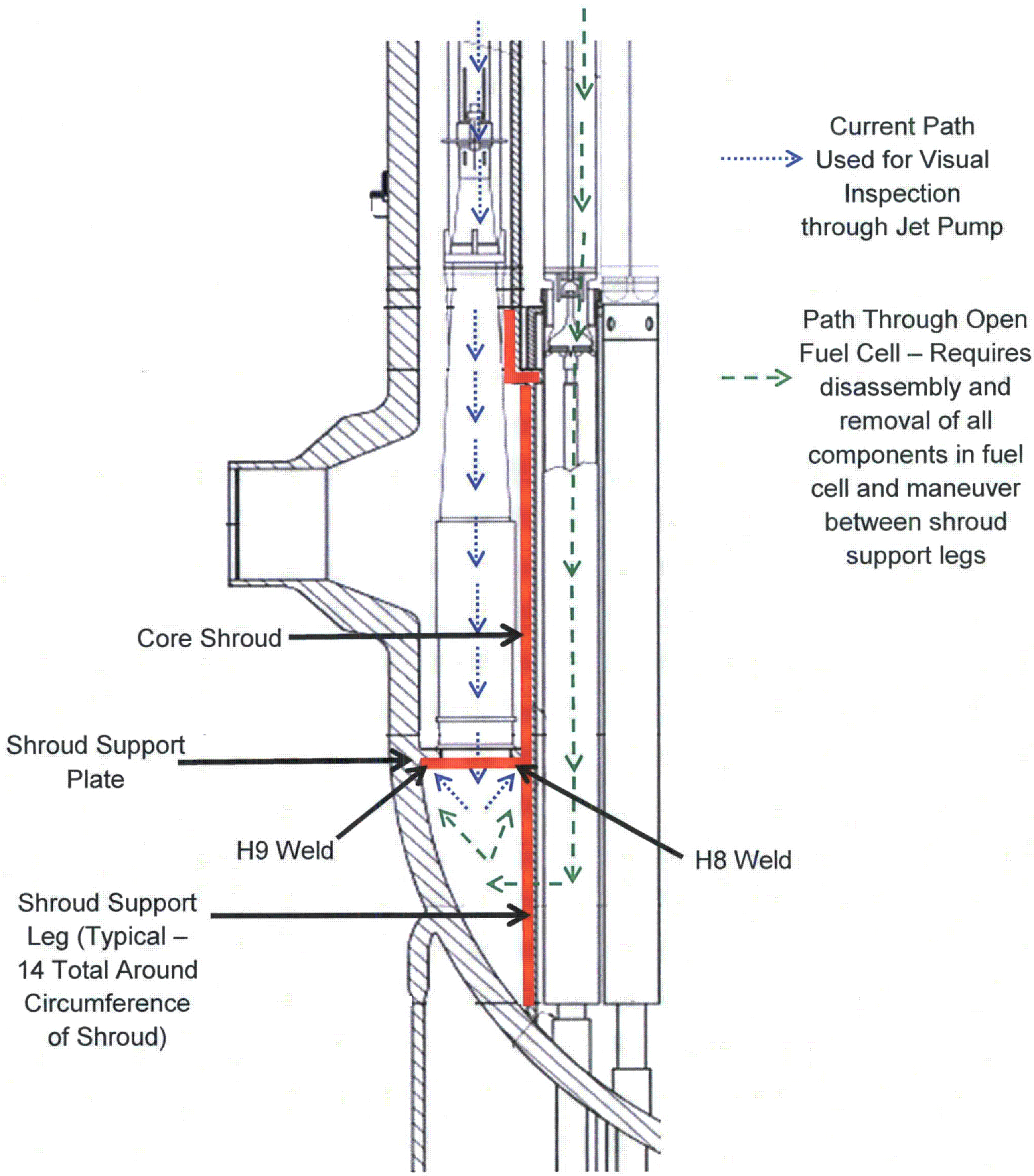
Attachment A – Reactor Vessel and Internals Overview



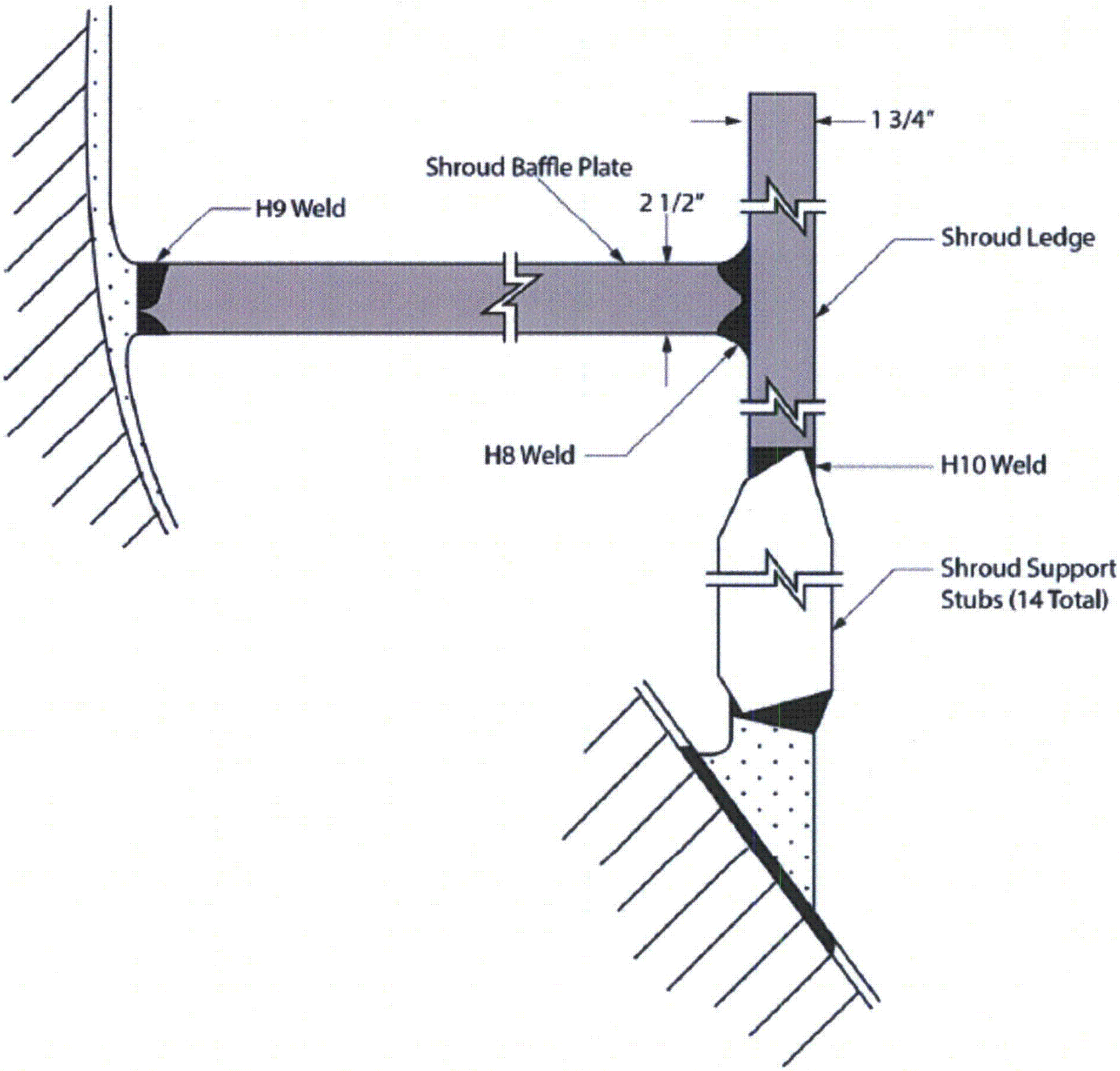
Attachment B – Area Below Top Guide



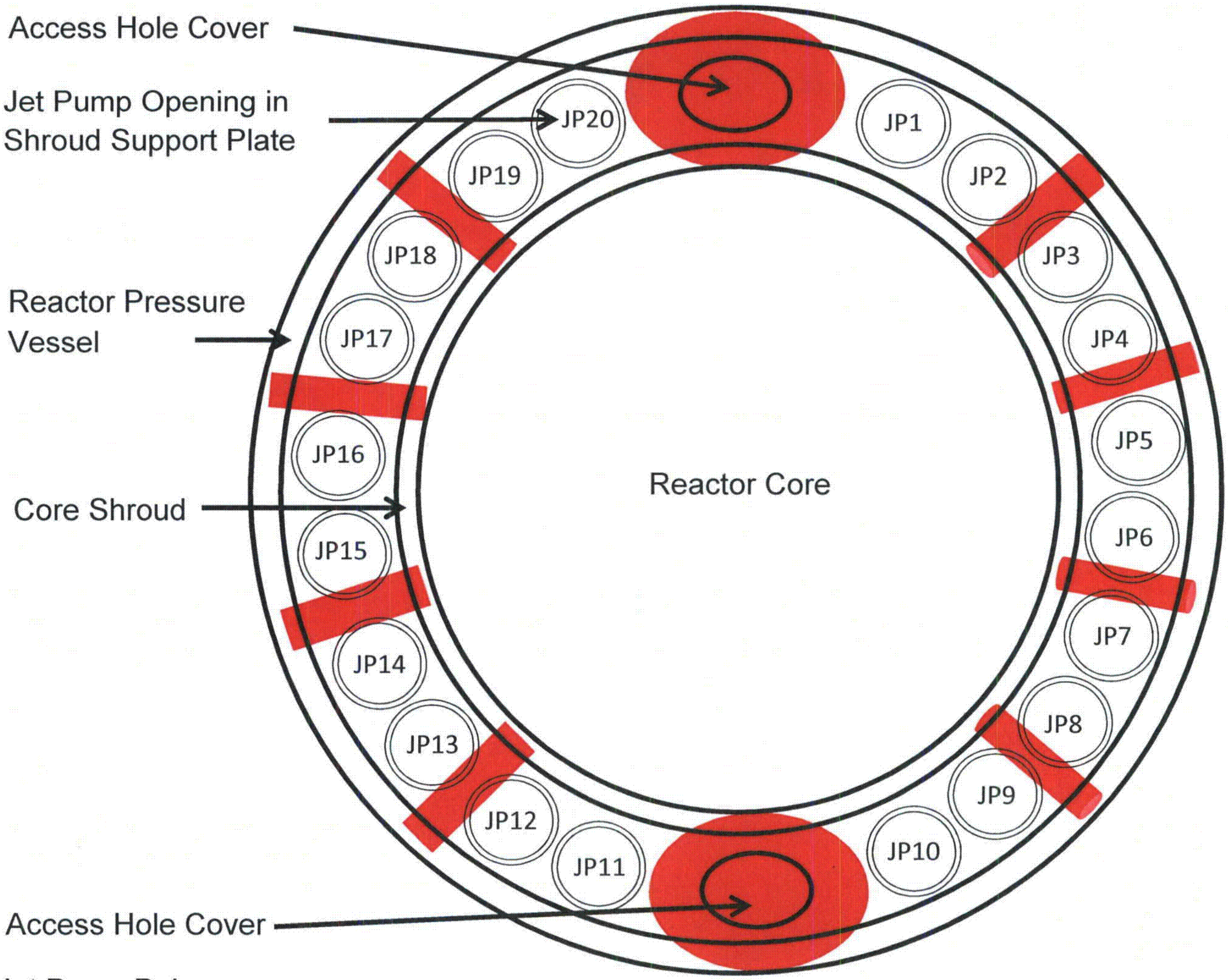
Attachment C – Tooling Insertion Paths



Attachment D – Monticello Shroud Support Structure Illustration



Attachment E – Monticello Shroud Support Plate Underside Illustration
(Shroud Support Legs Not Illustrated)



Jet Pump Pairs

JP1 / JP2
JP3 / JP4
JP5 / JP6
JP7 / JP8
JP9 / JP10
JP11 / JP12
JP13 / JP14
JP15 / JP16
JP17 / JP18
JP19 / JP20

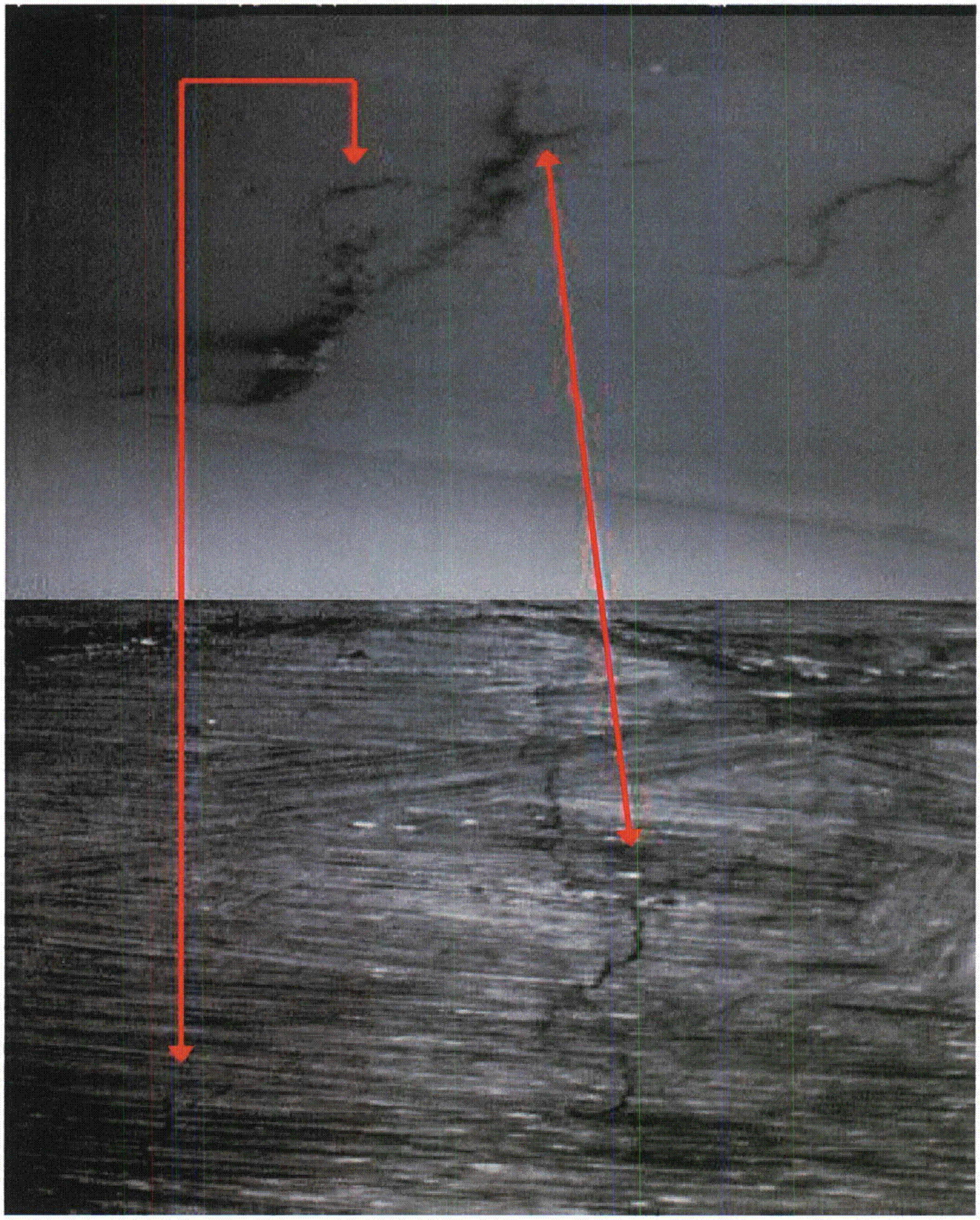
Areas indicated in red are inaccessible for inspection due to the rigid nature of the inspection equipment and limited maneuverability within the jet pumps.

Attachment F – Indications at 68° Before and After Cleaning of H8 Weld (2013)

Note that the indication is clearly visible prior to cleaning. The red arrows show the branching pattern indicating that the before and after photos are the same flaw

Before Cleaning

After Cleaning

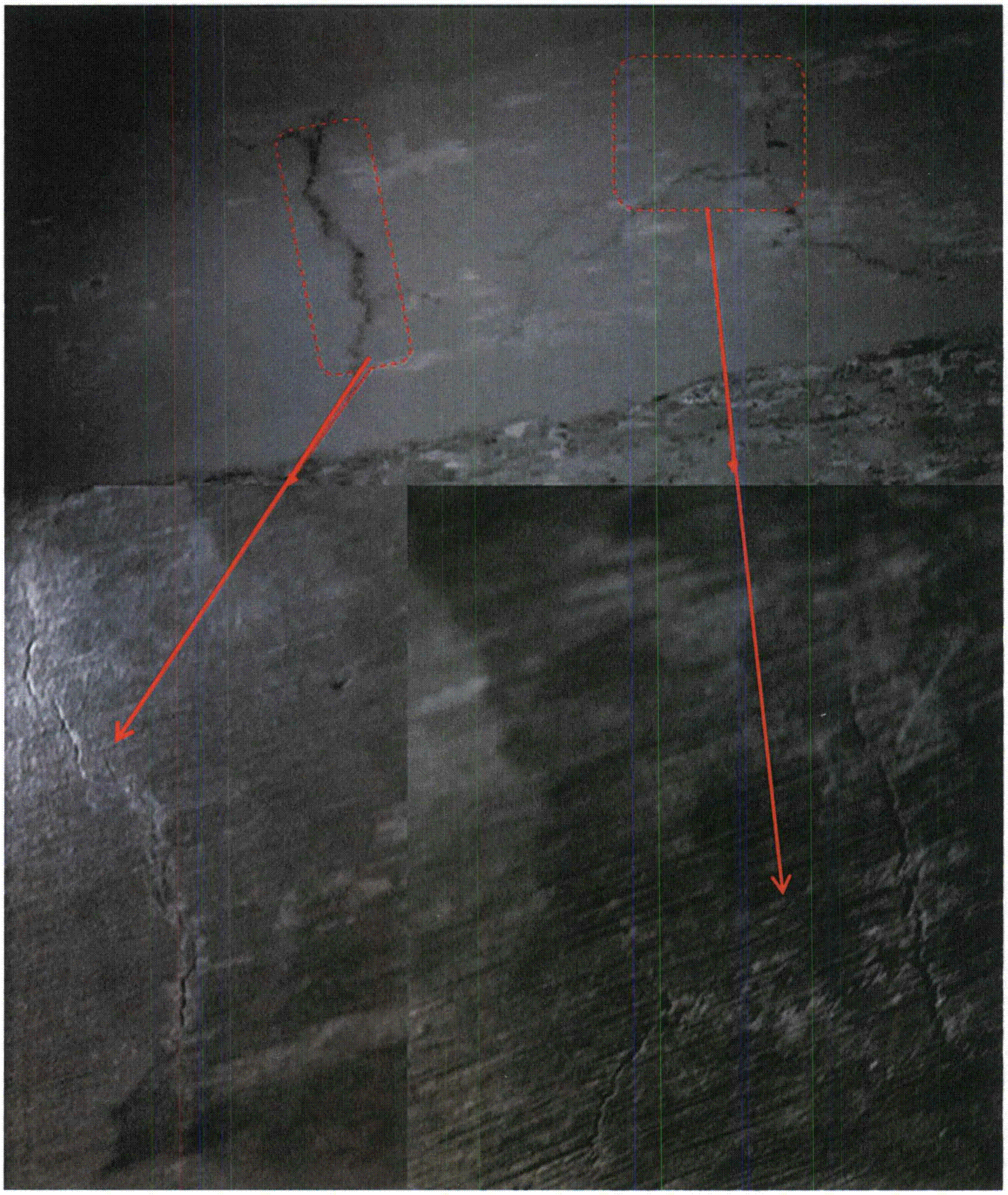


Attachment G – Indications at 292° Before and After Cleaning of H9 Weld (2013)

Note that the indication is clearly visible prior to cleaning. The red arrows show the branching pattern indicating that the before and after photos are the same flaw.

Before Cleaning

After Cleaning



Attachment H – H8 and H9 Weld Showing Indications Past Field of View of Camera (2011)

H8 Weld
Indication at 70°
- Note Indication appears to continue past field of view of the camera

H9 Weld
Indication at 300°
- Note Indication appears to continue past field of view of the camera