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PG&E Letter DCL-16-116

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

10 CFR 50.55a

Docket No. 50-323, OL-DPR-82
Diablo Canyon Power Plant (DCPP) Unit 2
ASME Section XI Inservice Inspection Program Relief Request NDE-SIF-U2 due to Impracticality of Full Examination Volume Coverage Requirements

Dear Commissioners and Staff:

Pursuant to 10 CFR 50.55a(g)(5)(iii), Pacific Gas and Electric Company (PG&E) hereby requests NRC approval of Inservice Inspection (ISI) Relief Request NDE-SIF-U2 for the Diablo Canyon Power Plant Unit 2 ISI interval.

PG&E requests relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code for examination coverage of Class 2 Seal Injection Filter pressure vessel welds. The details of the relief request are enclosed.

PG&E requests NRC approval of Relief Request NDE-SIF-U2 by May 1, 2017.

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this letter.

If you have any questions regarding this relief request, or other ISI program activities, please contact Mr. Hossein Hamzehee at (805) 545-4720.

Sincerely,

James M. Welsch

E1d7/4418/50868991
Enclosure
cc: Diablo Distribution
cc/encl: Kriss M. Kennedy, NRC Region IV Administrator
Christopher W. Newport, NRC Senior Resident Inspector
Balwant K.Singal, NRC Senior Project Manager
State of California, Pressure Vessel Unit

**10 CFR 50.55a Request NDE-SIF-U2**
**Relief Request in Accordance with 10 CFR 50.55a(g)(5)(iii)**

--Inservice Inspection Impracticality--

## 1. ASME Code Component(s) Affected

Diablo Canyon Power Plant (DCPP), Unit 2, American Society of Mechanical Engineers (ASME) Section XI, Code Class 2 seal injection filter pressure vessel welds (two welds):

| Code Cat. | Item No. | Description | Weld Number | Outage Examined |
|---|---|---|---|---|
| C-A | C1.10 | Unit 2 Seal Injection Filter Shell-to-Flange Weld | Item No.1 | 2R19 |
| C-A | C1.20 | Unit 2 Seal Injection Filter Shell-to-Head Weld | Item No.2 | 2R19 |

## 2. Applicable Code Edition and Addenda

The DCPP Unit 2 third interval Inservice Inspection (ISI) Program Plan is based on the ASME Boiler and Pressure Vessel Code, Section XI, 2001 Edition through 2003 Addenda.

## 3. Applicable Code Requirement

ASME Section XI, Table IWC-2500-1, Category C-A, Item No. C1.10 and Item No. C1.20 each require that seal injection filter vessel shell welds be volumetrically examined once during the ISI interval. Essentially 100 percent of the full volume of the weld and adjacent base material is to be examined in accordance with the requirements of Appendix I, I-2210. The applicable examination volume is defined by Figure IWC-2500-1 and the examination is performed per ASME Section XI, Appendix III, as supplemented by Table I-2000-1.

## 4. Impracticality of Compliance

The Unit 2 seal injection filter vessel shell-to-flange and shell-to-head weld configurations are such that essentially 100 percent coverage of the ASME Code required examination volume from the outside diameter is impractical. This was determined during the third interval examinations conducted during the DCPP Unit 2 Nineteenth Refueling Outage (2R19).

Background Information

The DCPP seal injection filter vessel shell is fabricated from SA312 TP 304 material with a nominal shell thickness of 0.940 inches. The head and flange are fabricated from SA240 TP 304, with the head nominal thickness of 1.0 inch and the flange with a nominal 0.940 inch thickness at the weld and having a 3-5/8 inch thick cover bolted to it. The vessel nominal diameter is 10 inches.

The subject welds were examined in 2R19 to the fullest extent practicable using a 45-degree angled shear wave and 60-degree longitudinal waves. For the shell-to-flange weld #1, the 45-degree and 60-degree angles were used for the axial scans from the shell side in order to achieve the maximum possible coverage of the Code specified examination volume; the flange configuration precludes axial examination from the flange side of the weld. For the shell-to-head weld #2, the 45-degree and 60-degree angles were used for the axial scans from the shell side in order to achieve the maximum possible coverage of the Code specified examination volume; the head curvature configuration limits axial examination from the head side of the weld. The 45-degree angle was used for circumferential scan examinations for both welds. No flaws were detected in any of the examinations of the subject welds.

The circumferential length of each weld is limited by various appurtenances. The shell-to-flange weld #1 has a nameplate and a support for the lid davit arm that are welded to the shell. These two items combine to preclude examination for a total of 8 inches of the 33.77-inch circumference of the weld resulting in 76.3 percent of the total length that can be examined. The shell-to-head weld #2 is limited by three support legs and an inlet nozzle. These four items combine to preclude examination for a total of 15.77 inches of the 33.77-inch circumference of the weld resulting in 53.3 percent of the total length that can be examined.

The following table summarizes the exam percent volume coverage attained for each weld in the axial (up direction and down direction) and circumferential (clockwise and counter-clockwise) scan directions, the combined coverage percent, the circumferential examination extent, and the total combined coverage. The sketches at the end of this Enclosure illustrate the coverage for each of the inspection angles and directions used to determine coverage values.

| Weld | Axial Up and Down Volume Coverage[1] | Circumferential CW and CCW Volume Coverage | Combined Coverage[2] | Circumferential Examination Extent | Total Combined Coverage[3] |
|---|---|---|---|---|---|
| #1 shell-to-flange | 64.9% | 100% | 82.4% | 76.3% | 62.8% |
| #2 shell-to-head | 96.1% | 100% | 98.0% | 53.3% | 52.2% |

[1] Combined coverage average for 45-degree and 60-degree angles.
[2] The reported combined coverage value is an equal weighted average of the coverage values from each of the four scan directions.
[3] Combined coverage percentage times circumferential examination extent.

Impracticality

For the shell-to-flange weld #1, the flange transition proximity to the weld constitutes a geometric restriction that precludes full examination volume coverage from the outside surface by preventing axial examination from the flange. In addition, the nameplate and davit support arm are welded to the vessel preventing removal to permit access. For the shell-to-head weld #2, the transition to the curvature of the head results in a loss of contact for the transducer and a change in resultant sound angle that constitutes a geometric restriction that precludes full examination volume coverage from the outside surface by limiting axial examination from the head. Furthermore, the three support legs and inlet nozzle are welded to the vessel preventing removal to provide access. These obstructions make full examination coverage impractical.

## 5. Burden Caused by Compliance

Essentially 100 percent coverage of the exam volume from the outside surface would require redesign of the seal injection filter vessel to move the weld farther back from the flange or head, or eliminate the shell-to-flange weld by integrally incorporating the flange into the shell. Welded supports and inlet nozzle would require relocating these items. Any of these modifications would effectively result in performing major redesign and rework or replacement of the entire seal injection filter vessel to accommodate full coverage of the exam area as specified by Code.

Performing examinations from the inside diameter of the seal injection filter vessel would require accessing the small 10-inch nominal diameter vessel below an external shielding structure and work in a high contamination, high risk foreign material exclusion area. Additionally, an internal filter support structure exists that limits access to the shell-to-head weld.

These efforts required to attain a small incremental increase in coverage would incur increased personnel radiation exposure. The efforts would also increase personnel risk due to work in a difficult to access, highly constrained, and contaminated work environment.

## 6. Proposed Alternative and Basis for Use

PG&E proposes to perform the alternative ultrasonic examinations to the maximum extent practicable from the outside surface. This would provide reasonable assurance that the structural integrity of the subject welds remains intact.

The 2R19 examinations were implemented to the extent practicable using manual scan techniques and an additional 60-degree longitudinal wave search unit in an effort to attain the greatest possible coverage of the required examination volume. The volume examined on both of the subject welds includes the weld and surrounding base material near the inside surface of the weld joint, which are typically the highest stress regions and where degradation would likely manifest should it occur.

The combined ultrasonic coverage values of 62.8 percent for weld #1 and 52.2 percent for weld #2 provide reasonable assurance that the structural integrity of these welds remains intact.

Potential Failure Consequences

A failure of a seal injection filter weld could result in a loss of seal injection water. The worst case consequence would occur if a seal injection filter weld was to suffer 360-degree circumferential cracking. The seal injection filter can be manually isolated with flow going through the second redundant seal injection filter vessel.

System leakage tests in accordance with the pressure test requirements of ASME Boiler and Pressure Vessel Code Section XI, Examination Category C-H have been performed on the seal injection filters with no flaws detected.

Essentially no change to overall plant safety is expected due to implementation of the proposed alternative in lieu of the Code requirement. This assumption is based on the effectiveness of ultrasonic examination; little or no historical occurrence of large service induced planar flaws in this type of weldment, and demonstrated leak tightness during pressure test.

## 7. Duration of Proposed Alternative

Relief is requested for the DCPP Unit 2 third ISI interval. The DCPP Unit 2 third inspection interval end date was dependent on the completion date of the nineteenth refueling outage, in accordance with ASME Section XI, paragraph IWA-2430(d)(1). 2R19 ended on June 2, 2016.

## 8. Precedents

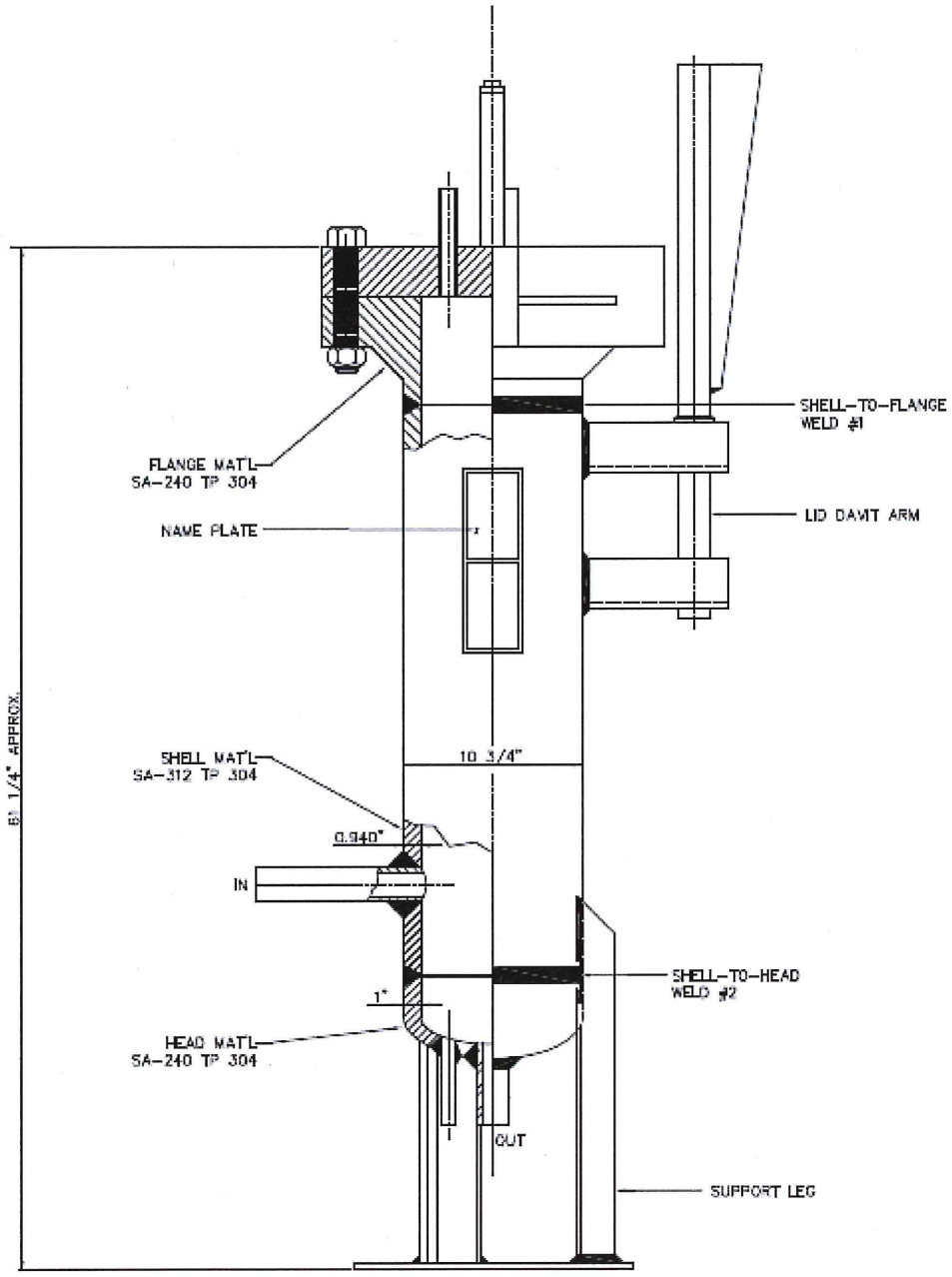
This request is similar to Relief Request NDE-SIF-U1 for DCPP Unit 1 which was submitted on March 31, 2016 (Reference 1). It is also similar to Relief Request S1-13R-114 for Salem Nuclear Generating Station Unit 1 (Reference 2) approved by the NRC in a letter dated April 22, 2013; and Relief Request RR-G-5 for Kewaunee Power Station (Reference 3) approved by the NRC in a letter dated September 20, 2012.

## 9. References

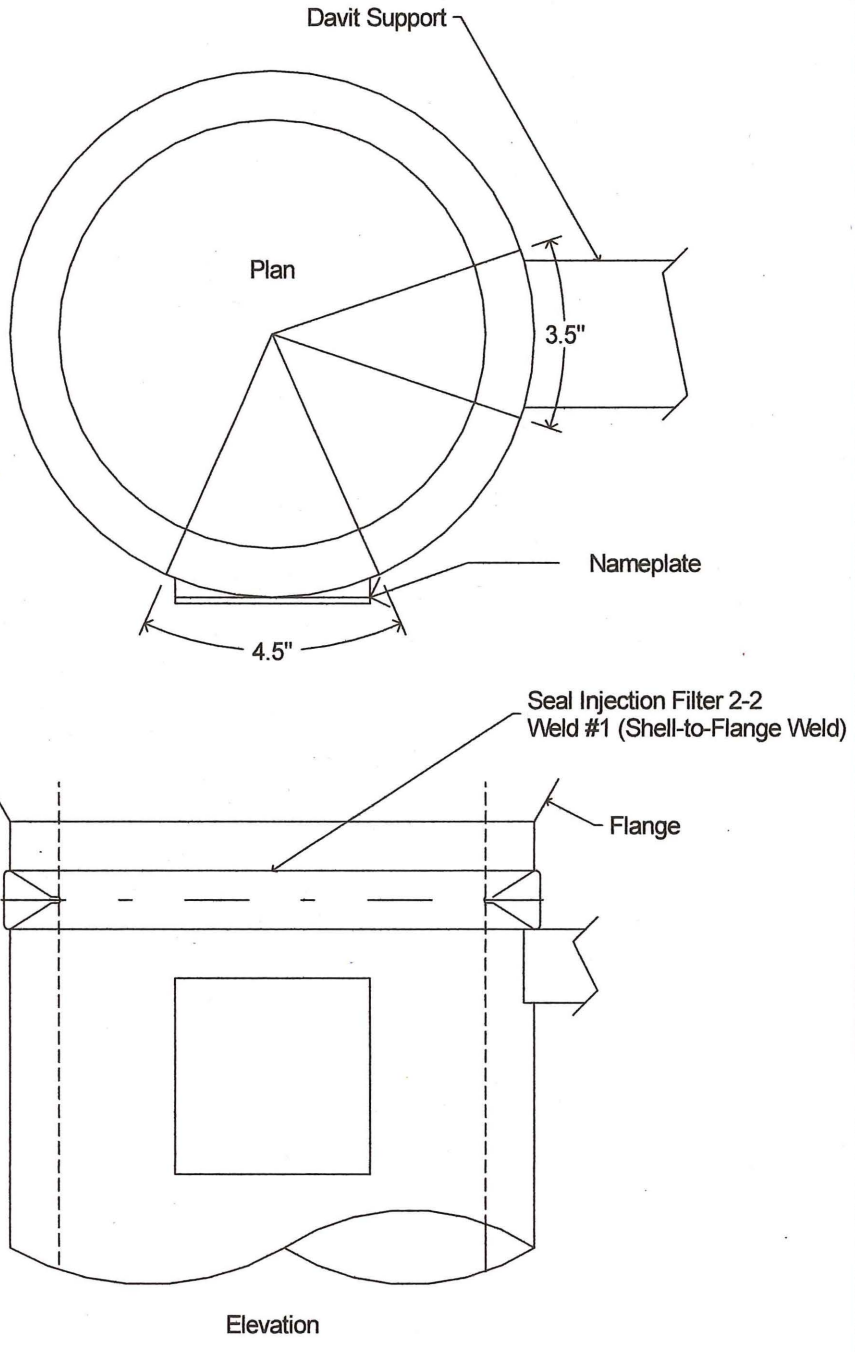
1. PG&E Letter DCL-16-036, "ASME Section XI Inservice Inspection Program Request for Relief NDE-SIF-U1 to Allow Use of Alternate Examination Volume Coverage Requirements," dated March 31, 2016 (ADAMS Accession No. ML16091A238)

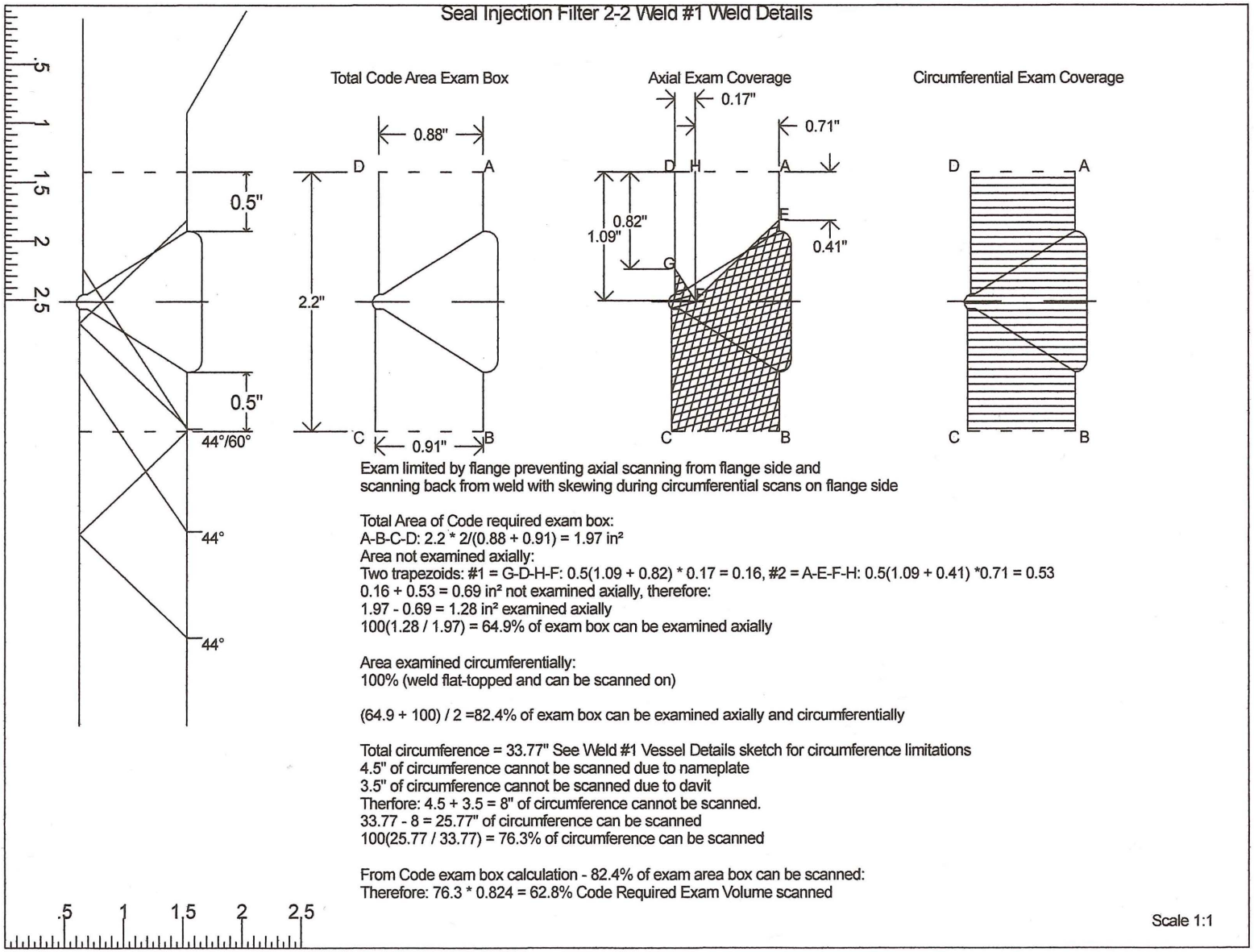
2. NRC Letter from Ms. Meena Khanna to Mr. Thomas Joyce, PSEG Nuclear LLC, "Salem Nuclear Generating Station, Unit No. 1 – Safety Evaluation of Relief Request No. S1-I3R-114 for Third 10-Year Interval Inspection (TAC No. ME8565)," dated April 22, 2013 (ADAMS Accession No. ML13071A215)

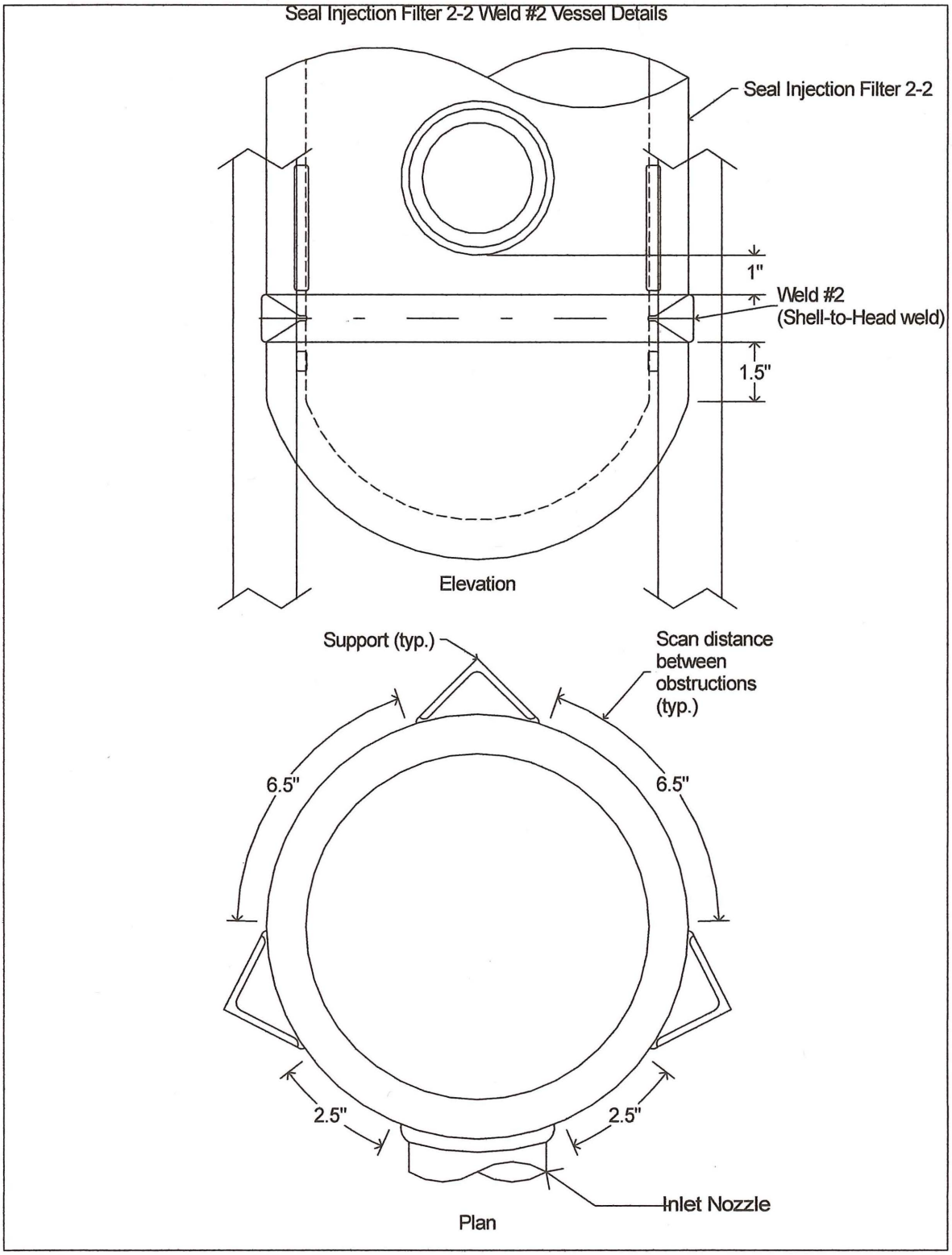
3. NRC Letter from Istvan Frankl to Mr. David A. Heacock, Dominion Energy Kewaunee, "Kewaunee Power Station – Evaluation of Relief Request Number RR-G-5 Regarding Fourth 10-Year Interval Inservice Inspection Program (TAC No. ME7378)," dated September 20, 2012 (ADAMS Accession No. ML12249A441)


SHELL-TO-FLANGE
WELD #1
FLANGE MAT'L
SA-240 TP 304
NAME PLATE
LID DAMT ARM
65 1/4" APPROX.
SHELL MAT'L
SA-312 TP 304
10 3/4"
0.940"
IN
SHELL-TO-HEAD
WELD #2
1"
HEAD MAT'L
SA-240 TP 304
OUT
SUPPORT LEG

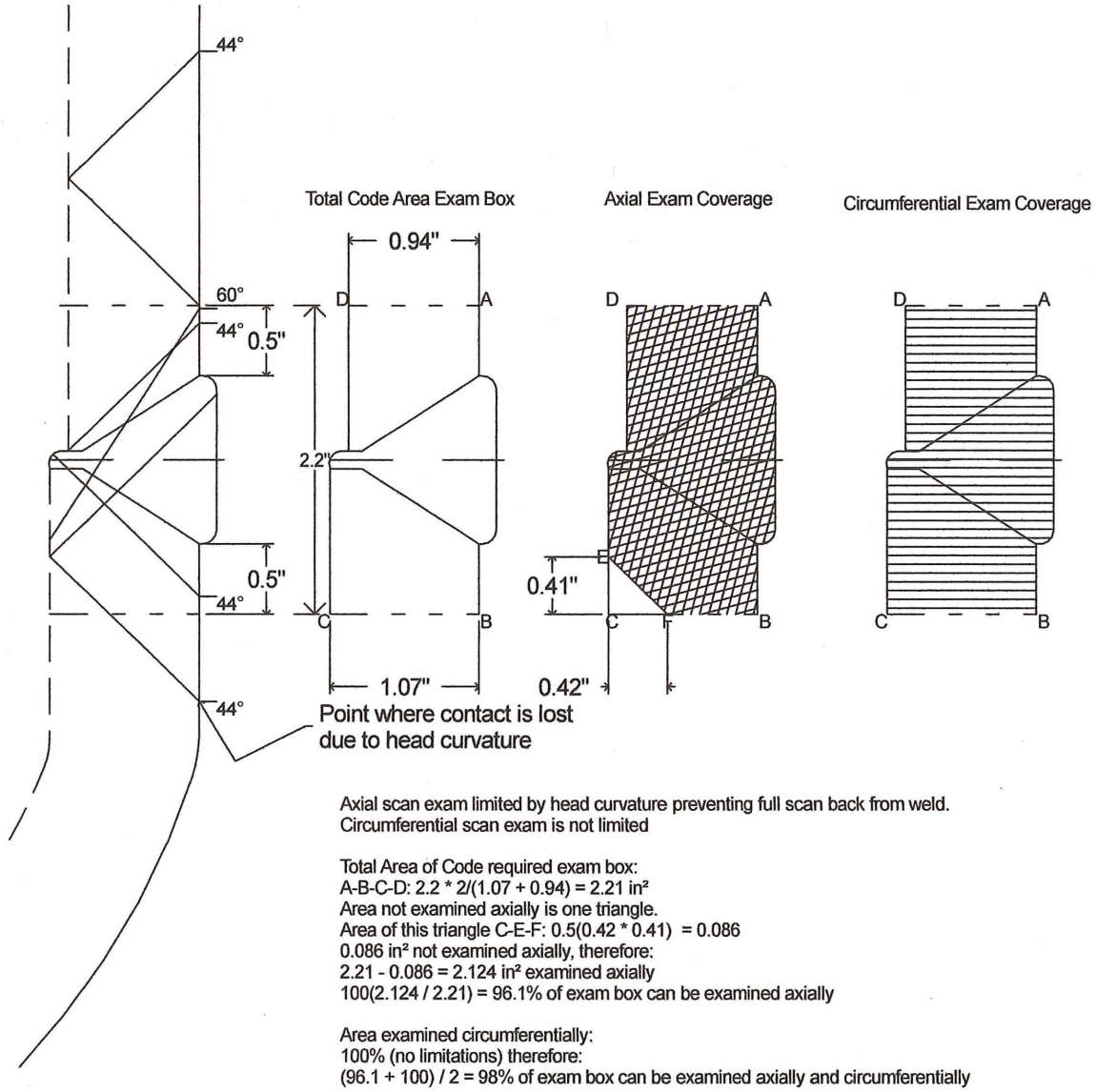
Seal Injection Filter 2-2 Weld #1 Vessel Details




Seal Injection Filter 2-2 Weld #1 Weld Details
Total Code Area Exam Box
Axial Exam Coverage
Circumferential Exam Coverage
0.5"
0.5"
44°/60°
44°
44°
0.88"
0.91"
2.2"
D
A
C
B
0.17"
0.71"
0.82"
1.09"
0.41"
H
E
F
G
Exam limited by flange preventing axial scanning from flange side and
scanning back from weld with skewing during circumferential scans on flange side
Total Area of Code required exam box:
A-B-C-D: 2.2 * 2/(0.88 + 0.91) = 1.97 in²
Area not examined axially:
Two trapezoids: #1 = G-D-H-F: 0.5(1.09 + 0.82) * 0.17 = 0.16, #2 = A-E-F-H: 0.5(1.09 + 0.41) *0.71 = 0.53
0.16 + 0.53 = 0.69 in² not examined axially, therefore:
1.97 - 0.69 = 1.28 in² examined axially
100(1.28 / 1.97) = 64.9% of exam box can be examined axially
Area examined circumferentially:
100% (weld flat-topped and can be scanned on)
(64.9 + 100) / 2 =82.4% of exam box can be examined axially and circumferentially
Total circumference = 33.77" See Weld #1 Vessel Details sketch for circumference limitations
4.5" of circumference cannot be scanned due to nameplate
3.5" of circumference cannot be scanned due to davit
Therfore: 4.5 + 3.5 = 8" of circumference cannot be scanned.
33.77 - 8 = 25.77" of circumference can be scanned
100(25.77 / 33.77) = 76.3% of circumference can be scanned
From Code exam box calculation - 82.4% of exam area box can be scanned:
Therefore: 76.3 * 0.824 = 62.8% Code Required Exam Volume scanned
.5
1
1.5
2
2.5
Scale 1:1


Seal Injection Filter 2-2 Weld #2 Vessel Details
Seal Injection Filter 2-2
1"
Weld #2
(Shell-to-Head weld)
1.5"
Elevation
Support (typ.)
Scan distance
between
obstructions
(typ.)
6.5"
6.5"
2.5"
2.5"
Inlet Nozzle
Plan

Seal Injection Filter 2-2 Weld #2 Weld Details




Axial scan exam limited by head curvature preventing full scan back from weld.
Circumferential scan exam is not limited

Total Area of Code required exam box:
A-B-C-D: 2.2 * 2/(1.07 + 0.94) = 2.21 in²
Area not examined axially is one triangle.
Area of this triangle C-E-F: 0.5(0.42 * 0.41) = 0.086
0.086 in² not examined axially, therefore:
2.21 - 0.086 = 2.124 in² examined axially
100(2.124 / 2.21) = 96.1% of exam box can be examined axially

Area examined circumferentially:
100% (no limitations) therefore:
(96.1 + 100) / 2 = 98% of exam box can be examined axially and circumferentially

Total circumference = 33.77", see Weld #2 Vessel Details sketch for circumference limitations
3 supports and inlet nozzle limit scan length to spaces between these items
Length that can be scanned:
6.5 + 6.5 + 2.5 + 2.5 = 18" of circumference that can be scanned.
100(18 / 33.77) = 53.3% of circumference can be scanned

From Code exam box calculation - 98% of exam area box can be scanned:
Therefore: 53.3 * 0.98 = 52.2% Code Required Exam Volume scanned