ISSUED BY
RPP-WTP PDC

☐ Yes ☒ No THIS DOCUMENT CONTAINS EXPORT CONTROLLED INFORMATION, SEE BASE DOCUMENT FOR FULL LABEL AND RESTRICTIONS

# Supplier Deviation Disposition Request



**PROJECT: Hanford Tank Waste Treatment and Immobilization Plant (WTP Project)** **JOB No.: 24590**

| FOR WTP USE | | |
|---|---|---|
| WTP SDDR No. | Rev. | DATE RECEIVED |
| 24590-WTP-SDDR-MS-17-00118 | N/A | 10/24/2017 |

| FOR SUPPLIER USE | |
|---|---|
| SUPPLIER SDDR No. | DATE SUBMITTED |
| 500005.001-SDDR-03 | 10/23/17 |

| 1. Supplier Name | Address | City & State | Zip |
|---|---|---|---|
| Greenberry Industrial LLC | 600 SE Maritime Ave Ste. 190 | Vancouver, Wa | 98661 |

| 2. Supplier's Order No. | 3. WTP P.O. or SC |
|---|---|
| 500005.001 | 24590-CM-POA-MVSC-00005 10/25/17 JWS Rev 0 ~~2~~ |

**4. Deviation Description** (Attach extra sheets, photographs, sketches, etc. as necessary and identify quantity and serial numbers as applicable)

1. Greenberry Industrial LLC takes exception to the second sentence in section 4.2.2 of the Engineering Specification 24590-BOF-3PS-MVSC-T0002,.
2. Greenberry Industrial LLC takes exception to sections 3.4.2,10.2.9.4 of the Engineering Specification 24590-BOF-3PS-MVSC-T0002,.

**4a. Supplier's NCR:** (See instructions for applicability) Number: N/A

**5. Supplier's Proposed Disposition:** ☐ Use As-Is ☐ Repair ☒ Modify WTP Requirement

| 6. Supplier's Estimated Cost Impact: N/A | 7. Supplier's Estimated Schedule Impact: N/A |
|---|---|

**8. Proposed Disposition and Technical Justification (plus Cost/Schedule if applicable):** (Attach extra sheets, sketches, etc., as necessary.)

1. Per conversations with the Project group the second sentence in section 4.2.2 is not required. Internal vessel components ( spray nozzles, piping, agitators and eductors) are considered wear parts and will be maintained throughout the service life of the vessels.
2. Since the Eductors will utilize a threaded connection a threadlocker will be used to prevent crevice corrosion, loctite 2432 or equivalent.
3. Per 3.4.2 and 10.2.9.4 of 24590-BOF-3PS-MVSC-T0002, Greenberry Industrial LLC will not provide design life analysis or calculations. GBI will provide standard operation and maintence manuals for the spray nozzles, agitator/ motor and eductors that include replacement part lists so the equipment can be maintained for the service life of the vessel.
4. Greenberry Industrial LLC assumes design life analysis requirements for the vessel will be met by applying the corrosion/ erosion allowance specified in the vessel MDS's.

| 9. Supplier's Authorized Representative Name Neil Halver | Signature |
|---|---|

**NOTES:** 10/25/17 JWS

1. Complete instructions provided at end of form.
2. Items 1 through 9 and ~~15~~ 14 to be completed by Supplier
3. Items 10 through ~~14~~ 13 and ~~16~~ 15 to be completed by WTP
4. Non applicable items to be marked "N/A"
5. Attach additional information whenever necessary
6. WTP must be notified within 5 days after detection of deviation
7. Selects "Yes", if the SDDR contains or references ECI documents.

# Supplier Deviation Disposition Request
# Engineering Disposition



PROJECT: Hanford Tank Waste Treatment and Immobilization Plant (WTP Project) JOB NO.: 24590 SDDR: 24590-WTP-SDDR-MS-17-00118 Rev. N/A

| Title PM | Date 10/23/17 |
|---|---|

**10. WTP Engineering Action** ☒ Approved ☐ Disapproved ☒ See Below

**Distribution:** Procurement & Subcontracts; Construction

Please note that source, special nuclear, and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA) are regulated at the U. S. Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts that pursuant to AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

10/25/17 JWS

**NOTES:**
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2. Items 1 through 9 and ~~15~~ 14 to be completed by Supplier
3. Items 10 through ~~14~~ 13 and ~~16~~ 15 to be completed by WTP
4. Non applicable items to be marked "N/A"
5. Attach additional information whenever necessary
6. WTP must be notified within 5 days after detection of deviation
7. Selects "Yes", if the SDDR contains or references ECI documents.

# Supplier Deviation Disposition Request
# Engineering Disposition



**PROJECT: Hanford Tank Waste Treatment and Immobilization Plant (WTP Project)** **JOB NO.: 24590** **SDDR:** 24590-WTP-SDDR-MS-17-00118 **Rev.** N/A

**Title of SDDR:** EMF Process Vessels - Applying Corrosion/Erosion Allowance to Internal Vessel Components and Design Life Analysis Exception

**11. WTP Procurement & Subcontracts Action:** Commercial Terms Impact:

☐ Yes *This SDDR grants relief from requirements or changes the requirements and; check each (consideration) item that applies:*

- ☐ Modifications to governing terms are required and/or;
- ☐ An increase in price is requested by Seller and/or;
- ☐ A price credit from the Supplier is due and/or;
- ☐ An increase/decrease in the Seller promise delivery date is required.
- ☐ Cost impact, if any is subject to a separate approval process as required by the changes clause.

☒ No *This SDDR grants relief from requirements or changes the requirements and all of the following apply:*

- No commercial impact (No modification of governing commercial terms is required) and;
- No increase in price is requested by Seller and;
- No decrease in price is anticipated or required by Buyer and;
- No extension of promised shipment is required

**12. WTP Disposition Statement** (Attach extra sheets, sketches, etc., as necessary).

1. WTP approves the Supplier waiving the second sentence in Section 4.2.2 of the engineering specification (24590-BOF-3PS-MVSC-T0002). The Supplier shall provide internal piping with thickness that matches with the nozzle schedule specified in the vessel Design Proposal Drawings. After incorporating the disposition of this SDDR, the following section of Engineering Specification (24590-BOF-3PS-MVSC-T0002) will be added as follows;
   a. Add Section 1.3.10 – Corrosion allowance evaluation for vessel internal components (e.g. eductor, spray nozzle, agitator, etc.)
   b. Modify Section 5.1.8 – Eductor connections in the piping system shall be threaded with Loctite 2432.

   The Supplier shall submit a Material Safety Data Sheet (MSDS) on the proposed Loctite 2432 (or equivalent) as a supplier submittal.

2. WTP approves the Supplier requesting to waive DCN 8.0, Design Life Analysis, on the G-321-E form in the MR. This waiver applies to all equipment in this order. After incorporating the disposition of this SDDR, the following sections of Engineering Specification (24590-BOF-3PS-MVSC-T0002) will be modified as follows;
   a. Modify Section 3.4.2. – Deleted.
   b. Modify Section 10.2.9.4 – Design Life Analysis: This submittal requirement is waived.

There are no affected supplier submittals associated with this SDDR. All changes in this SDDR are to be incorporated by the Supplier into equipment design for all items on the purchase order.

**NOTES:**
1. Complete instructions provided at end of form.
2. Items 1 through 9 and 14 to be completed by Supplier.
3. Items 10 through 13 and 15 to be completed by WTP.
4. Non-applicable items to be marked "N/A."
5. Attach additional information whenever necessary.
6. WTP must be notified within 5 days after detection of deviation.
7. Select “Yes” if the SDDR contains or references ECI documents.

# Supplier Deviation Disposition Request
# Engineering Disposition



**PROJECT:** River Protection Project Waste Treatment Plant **JOB NO.:** 24590 **SDDR:** 24590-WTP-SDDR-MS-17-00118 **Rev.** N/A

**Title of SDDR:** EMF Process Vessels - Applying Corrosion/Erosion Allowance to Internal Vessel Components and Design Life Analysis Exception

**WTP Justification** (Attach extra sheets, sketches, etc., as necessary).

**Does SDDR request an exception/deviation from a code or standard Identified in the WTP Code of Record (24590-WTP-COR-MGT-15-00001)** ☐ Yes ☒ No

**WTP Justification** (Attach extra sheets, sketches, etc., as necessary).

Is the change associated with a Q SSC? ☐ Yes ☒ No

1. The agitator (DEP-AGT-00001), which is located inside of DEP-VSL-00001, is considered a wear part (replacable standard items that are purchased from component manufacturer) that will be maintained throughout the service life of the vessels per standard operation and maintenance manuals that include replacement parts list. The agitator will be installed and removed through N07 of DEP-VSL-00001, which is detailed in 24590-BOF-MV-DEP-00001001, Rev. 1.

   The 316L Stainless Steel spray nozzles are located at the top of the vessels, and therefore, not exposed to the process fluid. The spray nozzles are capable of providing 40 years of service, as corrosion allowance of 0.04" is not applicable.

   The Supplier shall provide internal piping with thickness that matches with the nozzle schedule specified in the vessel Design Proposal Drawings. Nozzle Detail (24590-WTP-MV-M59T-00016001, Detail 2 and 24590-WTP-MV-M59T-00017, Detail 2) shows the nozzle (fully penetrated) is exposed to process liquid both internally and externally.

   AL-6XN eductors are operating at maximum of 5 ft/s (see attachment 1) with solids contents of less than 2wt% for DEP-VSL-00002 and maximum of 3.4wt% for DEP-VSL-00003A/B/C. The design corrosion allowance of 0.04" (specified in the MDS's) includes 0.024" corrosion allowance and 0.016" erosion allowance. According to Wear Allowances for WTP Waste Slurry Systems (24590-WTP-M0C-50-00005, Rev. E), this erosion allowance is applicable to 304L and 316L stainless steel components with solids content greater than 2 wt% at velocities below 12 ft/s, which is considered conservative since the bounding conditions are solid content of 3.4 wt% at 5ft/s. Since AL-6XN is stronger and harder than the austenitic stainless steels, the erosion wear allowance is conservative. Threfore, the AL-6XN eductors are capable of providing 40 years of service, considering 0.04" of erosion/corrosion allowance (see attachment 2). The Supplier shall provide a MSDS on the proposed threadlocker (Loctitie 2432 or equivalent) for BNI review and acceptance via supplier submittal process.

2. Document Category 8.0, Design Life Analysis, as described in this SDDR is not required. The corrosion/erosion allowance specified in the vessel MDS's accounts for the design life of the vessel. The Supplier is providing the vessels, with thickness that accounts for the corrosion/erosion allowance, as defined by the MDS's.

REQUIREMENTS REVIEW

| | | | |
|---|---|---|---|
| Client Approval Required* | ☐ Yes ☒ No | Interface Resolution Required* | ☐ Yes ☒ No |

*Address these "yes" answers in the WTP Disposition Statement (above).

**Affected WTP Documents:**

**NOTES:**
1. Complete instructions provided at end of form.
2. Items 1 through 9 and 14 to be completed by Supplier.
3. Items 10 through 13 and 15 to be completed by WTP.
4. Non-applicable items to be marked "N/A."
5. Attach additional information whenever necessary.
6. WTP must be notified within 5 days after detection of deviation.
7. Select "Yes" if the SDDR contains or references ECI documents.

# Supplier Deviation Disposition Request
# Engineering Disposition



**PROJECT: Hanford Tank Waste Treatment and Immobilization Plant (WTP Project)** **JOB NO.: 24590** **SDDR:** 24590-WTP-SDDR-MS-17-00118 **Rev.** N/A

**Title of SDDR:** EMF Process Vessels - Applying Corrosion/Erosion Allowance to Internal Vessel Components and Design Life Analysis Exception

| Document Number | Rev | Remarks | Specification Retroactive? Yes | Specification Retroactive? No | Incorporation by Design Change | Incorporation by Reference |
|---|---|---|---|---|---|---|
| 24590-BOF-3PS-MVSC-T0002 | 2 | Sections 4.2.2, 3.4.2, 5.1.8 and 10.2.9.4 | ☒ | ☐ | ☒ | ☐ |
| 24590-BOF-MVD-DEP-00002 | 2 | | ☐ | ☐ | ☐ | ☒ |
| 24590-BOF-MVD-DEP-00003 | 1 | | ☐ | ☐ | ☐ | ☒ |
| 24590-BOF-MVD-DEP-00004 | 1 | | ☐ | ☐ | ☐ | ☒ |

**Affected Supplier Submittals:**

| Document Number | Rev | Document Number | Rev |
|---|---|---|---|
| N/A | | | |

**Reference Documents:**

| Document Number | Rev | Document Number | Rev |
|---|---|---|---|
| 24590-BOF-MV-DEP-00001001 | 1 | 24590-BOF-MV-DEP-00002001 | 1 |
| 24590-BOF-MV-DEP-00003001 | 1 | 24590-BOF-MV-DEP-00004001 | 1 |
| 24590-BOF-MV-DEP-00005001 | 1 | 24590-WTP-MV-M59T-00017 | 1 |
| 24590-WTP-MV-M59T-00016001 | 3 | | |

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# Supplier Deviation Disposition Request
# Engineering Disposition



**PROJECT:** Hanford Tank Waste Treatment and Immobilization Plant (WTP Project) **JOB NO.:** 24590 **SDDR:** 24590-WTP-SDDR-MS-17-00118 **Rev.** N/A

**Title of SDDR:** EMF Process Vessels - Applying Corrosion/Erosion Allowance to Internal Vessel Components and Design Life Analysis Exception

**Reference Documents:**

| Document Number | Rev | Document Number | Rev |
|---|---|---|---|
| 24590-BOF-MV-DEP-00001001 | 1 | 24590-BOF-MV-DEP-00002001 | 1 |
| 24590-BOF-MV-DEP-00003001 | 1 | 24590-BOF-MV-DEP-00004001 | 1 |
| 24590-BOF-MV-DEP-00005001 | 1 | 24590-WTP-MV-M59T-00017 | 1 |
| 24590-WTP-MV-M59T-00016001 | 3 | | |

**13. WTP Disposition Approval:**

| | Print/Type Name | Signature | Date |
|---|---|---|---|
| RE/Originator: | Jung Shin | Originator By: Jung Shin - jwshin1 Org Name: Bechtel National, Inc. Placed: Oct 26, 2017 | |
| Checker: | Bryant Leung | Checked By: Bryant Leung - bleung1 Org Name: Placed: Oct 26, 2017 | |
| Procurement & Subcontracts Representative: | Paul Brackney | | 10-26-17 |
| ~~Approver(s)~~: Reviewer | MET | Reviewed No Comments By: Debbie Adler - dladler Org Name: MET Placed: Nov 01, 2017 | |
| ~~Approver(s)~~: Reviewer | ES&H | Reviewed No Comments By: Serena Gmager - sgmager Org Name: ES&H Placed: Oct 30, 2017 | |
| Approver(s): | Bharat Makadia | Approved By: - bmakadia Org Name: Vessel Analysis Group Placed: Oct 28, 2017 | |
| Approver(s): | Tracy Hawkins | Reviewed No Comments By: Tracy Hawkins - mthawkin Org Name: Engineering Placed: Nov 01, 2017 | |
| Approver(s): | Youssef Mohammad-Zadeh | Approved By: Youssef Mohammad-Zadeh - ymohamma Org Name: NSE Placed: Nov 02, 2017 | |
| Approver(s): | Radiological Engineering | Approved By: De Wesley Wu - dwwu1 Org Name: Bechtel NS&E Placed: Nov 08, 2017 | |
| Approver(s): | Allen Kunkle | Approved By: Allen Kunkle - akunkle Org Name: Bechtel Placed: Dec 12, 2017 | |
| Approver(s): | Stan Crow | JR Crow | 12/12/17 |

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7. Select "Yes" if the SDDR contains or references ECI documents.

# Supplier Deviation Disposition Request
# Engineering Disposition



**PROJECT: Hanford Tank Waste Treatment and Immobilization Plant (WTP Project)** **JOB NO.: 24590** **SDDR:** 24590-WTP-SDDR-MS-17-00118 **Rev.** N/A

**Title of SDDR:** EMF Process Vessels - Applying Corrosion/Erosion Allowance to Internal Vessel Components and Design Life Analysis Exception

## Supplier Acknowledgement:

The Supplier accepts the WTP's disposition herein and agrees to implement the WTP's disposition accordingly. Return the signed SDDR to the WTP Project Document Control (PDC).

| **14. Supplier** | | | |
|---|---|---|---|
| | *Print/Type Supplier Representative Name and Position* | *Signature* | *Date* |

## WTP Supplier Quality Representative Release for Shipment:

The SQR confirms through reviewing, observing, or monitoring that the SDDR has been incorporated or implemented for the applicable material or equipment for shipment.

| **15. SQR** | | | |
|---|---|---|---|
| | *Print/Type Supplier Quality Representative Name and Position* | *Signature* | *Date* |

**NOTES:**

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7. Select "Yes" if the SDDR contains or references ECI documents.

## Shin, Jung

**From:** Halver, Neil <Neil.Halver@greenberry.com>
**Sent:** Monday, December 04, 2017 12:51 PM
**To:** Crow, Stanley R; Rickenbach, Ryan; Shin, Jung
**Cc:** Watson, Linda; Dela Vega, Clarence
**Subject:** FW: 24590-CM-POA-MVSC-00005 EMF Process Vessels 500005.001 Eductor Analysis 3A [*EXTERNAL*]

**Follow Up Flag:** Follow up
**Flag Status:** Completed

Stan, Ryan,

Here are the max velocities at the eductors as requested.

I asked Clarence if they had any test data regarding erosion/ corrosion of this style of eductor to verify the performance with .1" of erosion / corrosion but he said clark-reliance / Jacoby as not performed any of this testing. His opinion was that the unit would perform just fine.

He said that usually the eductor material is specified so that it doesn't corrode in its environment and then erosion is such a case by case basis per process its really just a trial and maintenance scenario. I know this doesn't work in your application but you can also see why it wouldn't work for the vendor to be much help in specifying design life.

We can schedule a call if you guys would like to discuss with Clarence but this was the take away from our conversation.

Thanks,

Neil

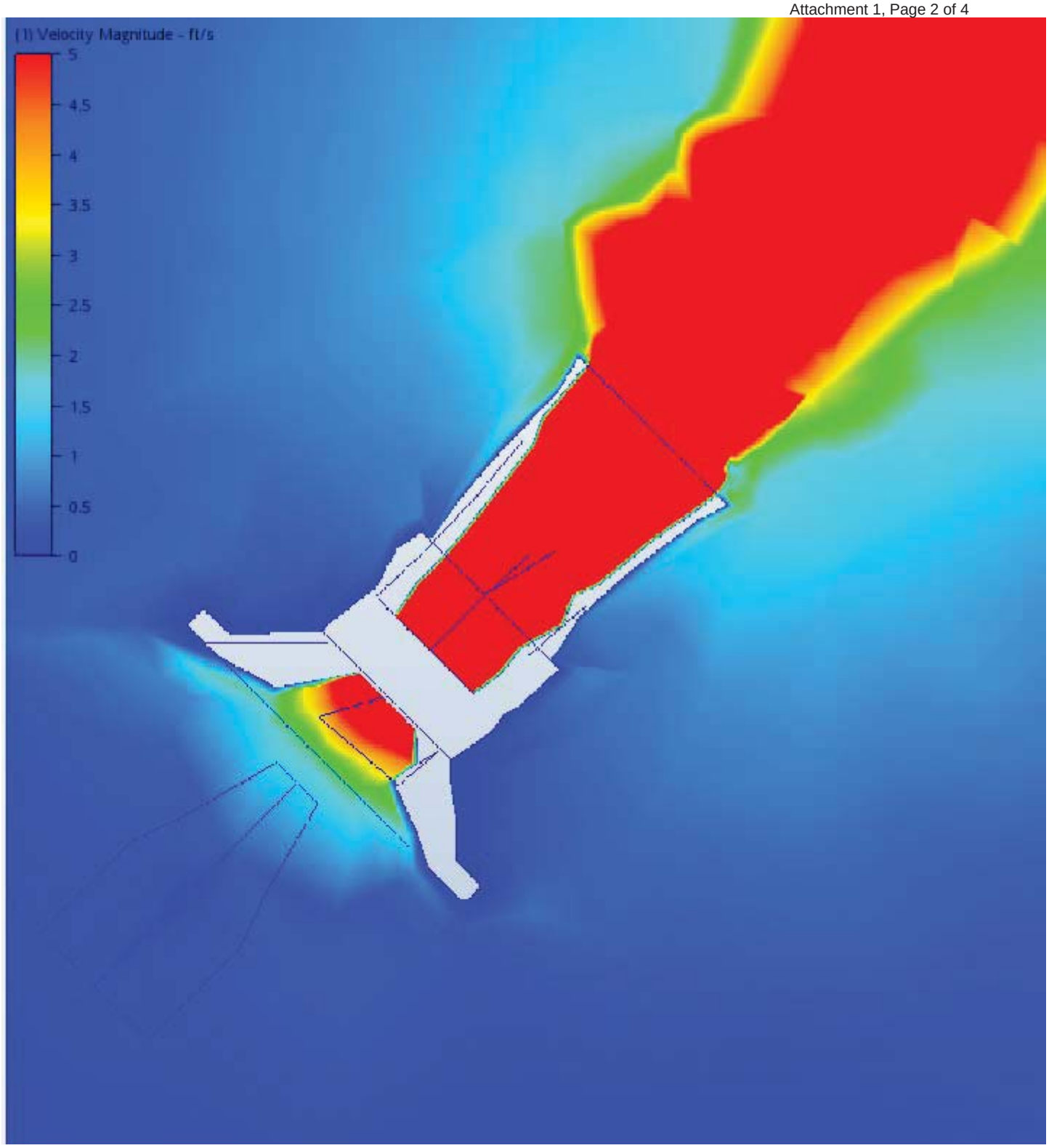
---

**From:** Dela Vega, Clarence [mailto:cdelavega@clark-reliance.com]
**Sent:** Friday, December 01, 2017 8:00 AM
**To:** Halver, Neil <Neil.Halver@greenberry.com>
**Subject:** RE: 24590-CM-POA-MVSC-00005 EMF Process Vessels 500005.001 Eductor Analysis 3A

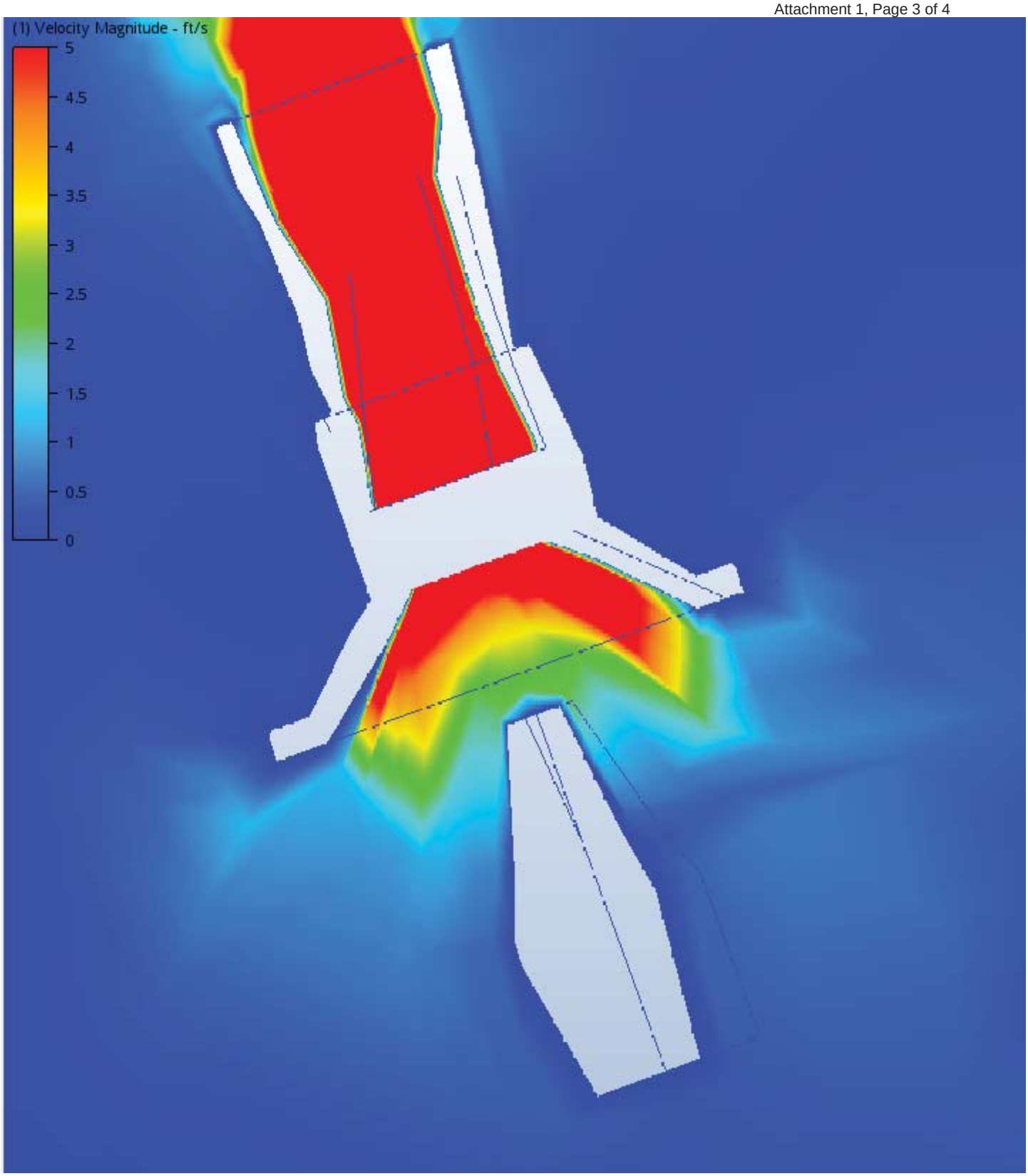
Hello Neil,

Per your request below are the max velocities at the TLA.

DP-VSL-0003: max velocity at nozzle = 5 ft/s




DP-VSL-0002: max velocity at nozzle = 5 ft/s




Attached are the updated CFD analyses. I believe we met all their requests.

Best regards,

*Clarence Dela Vega*

**Eductor Sales Specialist**

**Clark-Reliance** | 16633 Foltz Parkway | Strongsville | Ohio | 44149 USA
Telephone: 440-572-1500 | Fax: 440-238-8828
cdelavega@clark-reliance.com

## Shin, Jung

**From:** Halver, Neil <Neil.Halver@greenberry.com>
**Sent:** Sunday, November 19, 2017 11:54 PM
**To:** Shin, Jung
**Cc:** Soltani, Mehdi; Watson, Linda; Rickenbach, Ryan; Crow, Stanley R
**Subject:** RE: SDDR-03 Clarification Request [*EXTERNAL*]

Jung,

See Clarence's response to the questions, I agree with him we don't have all the information and even if we did this isn't something Clark-Reliance specializes in determining nor GBI.

As for questions 2.
We could oversize the eductor shell nozzle large enough that the eductor pipe assembly could be slide out through the nozzle. However I think it would have to go from 4" to probably 10" or 12" to be large enough to accomplish this.

Hello Neil,

To answer your questions:

1. There's no way of knowing what the expected design life is for the unit from their application. It will vary depending on the metal compatibility with the liquid and the frequency/cycles of use and I would imagine not all the liquid/contents is the same batch to batch or day to day.
3. I don't have any information on the radioactive water to know the compatibility range with other materials.
4. Yes the eductors will function still considering the 0.04 inch for erosion/corrosion.

Best regards,

*Clarence Dela Vega*

**Eductor Sales Specialist**

**Clark-Reliance** | 16633 Foltz Parkway | Strongsville | Ohio | 44149 USA
Telephone: 440-572-1500 | Fax: 440-238-8828
cdelavega@clark-reliance.com

**From:** Shin, Jung [mailto:jwshin1@Bechtel.com]
**Sent:** Thursday, November 09, 2017 10:38 AM
**To:** Halver, Neil <Neil.Halver@greenberry.com>
**Cc:** Soltani, Mehdi <msoltani@Bechtel.com>; Watson, Linda <lmwatson@bechtel.com>
**Subject:** SDDR-03 Clarification Request
**Importance:** High

Neil,

Can you provide your input on the following questions? The questions have come up during the final approval stage of SDDR-03. The main concern is to avoid sending personnel inside the vessels, considering the process fluid the vessels are storing.

1. How long is the design life (maintenance cycle) of the currently proposed eductors (requiring maintenance per O&M manual)?
2. Is there a way for the eductors to be pulled out from the inlet nozzle?
3. Is there an alternative material for the eductors that would wear better than the one specified in the MDS? If so, what is the design life/maintenance frequency?
4. Will the eductors function as intended (without degraded performance) considering 0.04 inch for erosion and/or corrosion?

We will probably need to have Clarence involved as some of the questions are hard to quantify.
Let me know if you have any questions.
Thanks,

Jung