DEPARTMENT OF THE ARMY
U.S. ARMY CHEMICAL MATERIALS ACTIVITY
PUEBLO CHEMICAL DEPOT, BUILDING 1
45825 HIGHWAY 96 EAST
PUEBLO, COLORADO 81006-9330

Chron20-02248

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division
Attention: Mr. Kevin Mackey
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

RE: Permit Modification Request B001, *Spent Decontamination System (B05) – Long Term*

Dear Mr. Mackey:

The Permittees at Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) are submitting the enclosed Class 2 Permit Modification Request B001, *Spent Decontamination System (B05) – Long Term*. This request requires prior Colorado Department of Public Health and Environment (CDPHE) approval and addresses the installation and use of an alternate configuration that will divert some spent decontamination waste streams (decon) from the collection sumps to the Munitions Washout System (MWS) Wash Water Collection Tanks and the Agent Water Separators. Under this new configuration, the spent decon collected in the Spent Decontamination System Tanks will be transferred to the MWS Wash Water Collection Tanks, instead of directly to the Agent Hydrolyzers.

The Permittees propose to implement the modifications in multiple phases to allow continued operation of PCAPP safety systems during Spent Decontamination System installation. A request for temporary authorization is being transmitted in accordance with 6 CCR 1007-3 § 100.63(e) in a separate letter (Chron20-02249). The associated document change notices, 24852-RD-M6N-B05-M0047, 24852-RD-E1N-B05-E0001, 24852-RD-M6N-B04-M0120, and 24852-RD-3JN-B04-J0016 are considered Export Controlled Information (ECI) and are also being submitted separately as Chron20-02250.

For all technical matters, please contact Mr. Michael Saupe, Bechtel Pueblo Team Environmental Manager, at (719) 549-5455. For all matters related to the request, please contact Dr. Patrick Sullivan with the Assembled Chemical Weapons Alternatives staff at (719) 549-4523.

Sincerely,

COBB.MICHAEL.WAYNE.1128565953 Digitally signed by COBB.MICHAEL.WAYNE.1128565953 Date: 2020.09.11 19:36:26 -06'00'

Michael W. Cobb * Date
Colonel, U.S. Army
Commanding

Williams, Dan Digitally signed by Williams, Dan DN: c=US, st=Virginia, l=Herndon, o=Bechtel Global Corporation, cn=Williams, Dan Date: 2020.09.10 14:44:50 -04'00'

Daniel S. Williams for K.E. Harrawood * Date
Project Manager, Bechtel National, Inc.
Bechtel Pueblo Team Project Manager

LEVI.WALTON.WAYNE.1231431558 Digitally signed by LEVI.WALTON.WAYNE.1231431558 Date: 2020.09.11 07:43:07 -06'00'

Walton W. Levi * Date
PCAPP Site Project Manager
Pueblo Chemical Agent-Destruction Pilot Plant

Enclosure

CC:
Ms. Gail Wallingford-Ingo, Pueblo County Planning/Development, 229 West 12th Street, Pueblo, CO 81003-2810
Mr. Jesse Newland, US EPA Region 8, 1595 Wynkoop Street, Denver, CO 80202-1129
Mr. Walton W. Levi, PCAPP, 45825 Highway 96 East, Pueblo, CO 81006-9330
PCAPP Document Control Center, 45825 Highway 96 East, Pueblo, CO 81006-9330
Mr. Angus MacKelvey, Pueblo Chemical Depot, 45825 Highway 96 East, Pueblo, CO 81006-9330
Mr. Trevor Klotz, Sentinel, 650 South Cherry Street, Ste 1140, Denver, CO 80246

*In accordance with 6 CCR 1007-3 Sections 100.12 and 100.42(k), I certify under penalty of law that, except as specifically noted, this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person(s) who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PCAPP Permit Modification Request

Hazardous Waste Permit Number: CO-20-09-02-01

Permit Modification Request Title: Spent Decontamination System (B05) – Long Term (Modification B001)

Classification: Class 2 Permit Modification Request

Description of Changes:
The Permittees request approval of this Class 2 permit modification request to modify the design and operation of the Spent Decontamination System (SDS) in the Agent Processing Building (APB) in accordance with the following:

- Document Change Notice (DCN) "Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)" (24852-RD-M6N-B05-M0047)
- Operation Change Document (OCD) "Sump MT-B05-0042 Immersion Pump (MP-B05-M0080)" (24852-RD-OCD-B05-00006).
- DCN "EI&C Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)" (24852-RD-E1N-B05-E0001)
- DCN "Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)" (24852-RD-M6N-B04-M0120)
- DCN "Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)" (24852-RD-J3N-B04-J0016)
- Design Change Notice "Replace MWS Surge Drum Pump Isolators" (24852-RD-30N-B02-M0016)

This permit modification request is submitted to modify the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Permit pursuant to the following compliance schedule item and the subsequent approval to delay submittal of the permit modification request until 30 days after the effective date of the PCAPP Part B Operating Permit.

- Compliance schedule item identified in the approval of the Temporary Authorization (TA) for Permit Modification 293, dated 8 May 2020 with subject "Approval of Temporary Authorization (TA) Request for Class 2 Permit Modification Request #293 – Spent Decontamination System (B05) – Recovery Strategy, Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Research Development and Demonstration Permit No. CO-04-07-01-01".

"5. Regarding PCAPP's response to the Division's comment on the schedule for final recovery and permanent repair of the system, PCAPP will modify the proposed language to state:

"I.J.3.i. No later than 90 days after receipt of this letter, the Permittees shall submit a permit modification request detailing the proposed permanent modifications to the B05 Spent Decontamination System design with a schedule for the final recovery and permanent repair of the B05 Spent Decontamination System.""

- Letter from Kevin Mackey to Michael W. Cobb, Walton Levi, and Kenneth Harrawood, dated 28 July 2020, titled "Approval of PCAPP Request to Delay Submittal of Permit Modification Requests Identified in Compliance Schedule Items I.J.3.i and I.J.4. of the PCAPP Resource Conservation and Recovery Act (RCRA) Research, Development and Demonstration (RD&D), Pueblo Chemical Agent–Destruction Pilot Plant (PCAPP) Research Development and Demonstration Permit No. CO-04-07-01-01"

A request for temporary authorization to implement the proposed modifications are being transmitted in accordance with 6 CCR 1007-3 § 100.63(e) in a separate letter (Chron20-02249). The Permittees current schedule projections indicate that approval of the Temporary Authorization will allow for completion of the installation and subsequent Division review and acceptance of the associated Facility Construction Certifications (FCC)/Independent Certification of Facility Modification (ICFM) prior to 31 December 2020. Due to the size and complexity of this design change and to allow continued operation of PCAPP safety systems during Spent Decontamination System modifications, the Permittees are proposing a phased approach. The phased field installation and phased FCC/ICFM approvals are described in Enclosure 1.

The Permittees request the following revision to the compliance schedule item included in the approval of the Temporary Authorization (TA) for Permit Modification 293, dated 8 May 2020, or the addition of this revised compliance schedule item to the PCAPP State-RCRA Permit. The reduced scope in each of the phased FCC/ICFM package submittals supports the request for a reduction in the review and approval timeframe for the final Block 7 FCC/ICFM submittal from 30 days to 10 calendar days (Enclosure 1). The Facility Construction Certification Letter regarding the "Certificate of Carbon Steel Piping in the Upstream Portion of the B05 System" dated 3 June 2020, stated that the upstream portion of the tank/piping system is capable of handling hazardous waste without release through 31 December 2020. Therefore, the Permittees request replacement of "initiation of the 105 mm campaign" with "31 December 2020" in the I.J.3.h. compliance schedule item.

"4. …

"I.J.3.h. No later than 10~~30~~ calendar days prior to 31 December 2020~~initiation of the 105 mm campaign~~, the Permittees shall complete the assessment actions identified in the approved B05 Spent Decontamination System assessment plan, shall have the results certified by a Colorado Registered Professional Engineer,

and shall submit the certified results to the Division. The certification must meet the requirements specified in 6 CCR 1007-3 Parts 264. 196 (f) and 100.12(d).""

Revisions to the following parts of the PCAPP State-RCRA Permit are proposed in this permit modification request based on the DCNs and OCD. A summary of proposed changes to permit conditions are identified in Enclosure 2.

- List of Permit Modifications (Enclosure 3)
- Part IV: Sections IV.A.4.d., IV.D.4.d.i., IV.D.4.d.ii., IV.D.4.d.iv., and IV.L.4. and Tables IV.A.4.d.a., IV.A.4.d.b., and the table in Section IV.B.1. (Enclosure 4)
- *Waste Analysis Plan*, Attachment D: Sections D-5d(3) through D-5d(6) (Enclosure 5)
- *Inspection Plan*, Attachment K: Acronyms and Abbreviations, Section K-5b, Table K-11, and Appendix K-4, RCRA Inspection Forms/Sheets (Enclosures 6 and 7)
- *Operations Plan*, Attachment L: Introduction, Munitions Washout – B02, Agent Collection and Neutralization – B04, and Toxic Storage and Spent Decon – B05 (Enclosure 8)

The DCNs and OCD provide details regarding the design changes proposed in this permit modification request. Red-lined piping and instrument diagrams (P&IDs) are provided in the DCNs and OCD, including some that are incorporated into the Permit. The Permittees will resubmit the impacted permit drawings via future Design Change Summary permit modification request(s) (PMR(s)) once they have been revised and reissued. Attachment E will be updated accordingly via these future PMR(s) and is not included herein.

The Permittees seek approval for permanent revisions to equipment configurations, operations, and waste management activities identified in this permit modification request, and in the DCNs and OCD. The proposed revisions are described in detail in the following sections and appendices within the design change documents (Enclosures 9 through 14 of this permit modification request).

[Note: References to PDF page numbers are for the individual documents included in the enclosed Compact Disk (CD).]

DCN 24852-RD-M6N-B05-M0047 (Enclosure 9)

- Description of Change (beginning on PDF page 5 of the DCN)
- Justification for Change (PDF page 11)
- Appendix A, Piping & Instrument Diagrams (P&IDs) (PDF page 21)
- Appendix B, Process Flow Diagrams (PFDs) (PDF page 51)
- Appendix C, Piping Isometrics (PDF page 59)
- Appendix D, B02, B04, & B05 System Design Description Changes (PDF page 121)
- Appendix E, Set Point Matrix (PDF page 147)
- Appendix F, Instrument Index (PDF page 148)
- Appendix G, Engineering Specification for Piping Material (R)(PDF page 150)
- Appendix H, B05 Operations Spare Parts List (PDF page 157)
- *Appendix I, there is no Appendix I in this DCN*
- Appendix J, B02 & B05 Master Equipment List (PDF page 164)

- Appendix K, B02, B04 & B05 Master Line List (PDF page 166)
- Appendix L, B02, B04 & B05 Master Valve List (PDF page 172)
- Appendix M, B04 & B05 Master Specialty List (PDF page 179)
- Appendix N, B02, B04 & B05 Configured Items List (PDF page 184)
- Appendix P, RCRA Level 2 Alarm List Additions (PDF page 194)
- Appendix Q, B05 Alarm & Interlock (A&I) Matrix (PDF page 195)
- *Appendix R, there is no Appendix R in this DCN*
- Appendix S, Support Detail and Hose Data (PDF page 199)
- Appendix T, Keckley Pressure Drop Chart for Basket Strainers (PDF page 239)
- Appendix U, B02 Booster Pump Analysis (PDF page 240)

OCD 24852-RD-OCD-B05-00006 (Enclosure 10)
- Description and Justification of Changes (PDF page 1 of the OCD)
- Appendix A, P&IDs (PDF page 7)
- Appendix B, Sump Pump MP-B05-0080 Data (PDF page 11)
- Appendix C, Process Flow Diagram Changes (PDF page 18)
- Appendix D, Isometrics (PDF page 19)
- Appendix E, System B05 Mechanical Lists (PDF page 24)
- Appendix F, System B04 Mechanical Lists (PDF page 29)
- Appendix G, System B05 Operational Spare Parts List (PDF page 31)
- Appendix H, System B04 Operational Spare Parts Lists (PDF page 32)
- *Appendix I, there is no Appendix I in this OCD*
- Appendix J, Pipe Specification R (PDF page 33)

DCN 24852-RD-E1N-B05-E0001 (Enclosure 11)
- Description (beginning on PDF page 5 of the DCN)
- Justification for Change (PDF page 8)
- Attachment E1, Electrical (PDF page 12)
- Attachment E2, Electrical (PDF page 24)
- Attachment J, Instrument Index (PDF page 29)

DCN 24852-RD-M6N-B04-M0120 (Enclosure 12)
- Description (beginning on PDF page 1 of the DCN)
- Justification for Change (PDF page 2)
- Attachment A, 24852-RD-M6-B04-M0020 (PDF page 6)
- Attachment B, B04 Operations Spare Parts List (PDF page 7)

DCN 24852-RD-J3N-B04-J0016 (Enclosure 13)
- Description (beginning on PDF page 1 of the DCN)
- Justification for Change (PDF page 2)
- Attachment A, Logic Diagrams (PDF page 6)
- Attachment B, P&IDs (PDF page 15)
- Attachment C, Set Point Matrix (PDF page 17)
- Attachment D, System Design Description (SDD) (PDF page 18)
- Attachment E, System Safety Design Change Screening Checklist (PDF page 26)

Design Change Notice (24852-RD-30N-B02-M0016) (Enclosure 14)

- Description (beginning on PDF page 1 of the Design Change Notice)
- Justification for Change (PDF page 1)
- Attachment A, Air Operated Diaphragm Pump Data Sheet (PDF page 6)
- Attachment B, Bill of Materials (PDF page 9)

The proposed changes to the equipment configuration and operations are described below. [Note: "Spent decontamination waste streams" hereafter referred to as "spent decon".]

Spent Decontamination System (SDS) Sumps and Transfer Lines (Figures 1 and 2)

- Installation of stainless steel piping and Teflon™ fluorethylene propylene (FEP) lined hoses for transfer of spent decontamination (decon) waste streams from the following Category A sumps to the Agent/Water Separator Tanks (MV-B04-0001 and -0002) and the Munitions Washout System (MWS) surge drum booster pump discharge lines. (Figure 2)
  - Sumps MT-B05-0041, -0042, -0044, and -0045 (MWS Room)
  - Sumps MT-B05-0040 and -0046 (MWS decon airlocks A)
  - Discharge lines for sumps MT-B05-0042 and -0044 will be routed through the trenches, requiring cutting of the trench grating to allow the hoses to enter and exit the trenches (also referred to as troughs). Metal flanges on the hoses will be wrapped with chemical tape to protect the coatings in the trenches. The relatively low pressures present during transfer of spent decon through the hoses will not produce vibrations or movement that will impact the coatings in the trenches.
  - Discharge from MT-B05-0046 will be transferred to sump MT-B05-0042 through a combination of transfer lines and flow through a portion of the lined and coated spent decon trenches in the MWS Room. (Trench flow path depicted as a dashed line on Figure 2).
  - Discharge from MT-B05-0040 will be transferred through the eastern wall of the airlock to MT-B05-0041, from which the spent decon will be transferred to the Agent/Water Separator Tanks as described above.
- Installation of stainless steel piping and Teflon™ FEP lined hoses for transfer of spent decon and Autoclave condensate to the MWS Wash Water Collection Tanks #1 and #2 (MV-B04-0104 and -0204) via a connection on the common discharge of the air operated diaphragm (AOD) wash water collection pumps (MP-B04-0001A/B). (Figure 2)
  - Sumps MT-B05-0047 and -0048 (TMA A and TMA decon airlock)
  - Sump MT-B05-0047 and the autoclave condensate discharge will be combined inside the Toxic Room and tied into the discharge line from the AOD wash water collection pumps (MP-B04-0001A/B)
  - Discharge from MT-B05-0048 will be transferred to sump MT-B05-0047 through a combination of transfer lines and by flow through a portion of the Toxic Maintenance Area (TMA) A lined and coated spent decon trenches. (Trench flow path depicted as a dashed line on Figure 2.)
- Discharge piping from sump MT-B05-0066 ties into the discharge piping from the SDS pumps MP-B05-0101A/B to the MWS Wash Water Collection Tanks #1 and #2 for

storage prior to treatment in the Agent Hydrolyzers (MV-B04-0102 and -0202). (Figure 2)

- Discharge piping from sumps MT-B05-0040, -0046, and -0048 will be routed through walls towards sumps MT-B05-0041, -0042, and -0047 respectively. (Figure 2)
- Sump pumps, piping, and hose supports are depicted in Appendix C of DCN 24852-RD-M6N-B05-M0047. The rationale and calculations for the materials of construction, and the loading on the steel supports are provided in Appendix S of DCN 24852-RD-M6N-B05-M0047.
- Wherever possible, piping and hoses will be placed in trenches to reduce tripping hazards for personnel working in demilitarization protective ensemble (DPE) suits.

Spent Decon Sump Pumps (Figure 2)

- A new pump (MP-B05-0081) is proposed for sump MT-B05-0045. The following Category A sump pumps will be replaced with smaller polypropylene pumps: MP-B05-0040, -0046, -0047, and -0048.
  - The pumps will be connected to the piping using 1.5 inch nitrile rubber flex hoses that have textile reinforcement and seal-welded threaded connections.
  - The existing air supply hoses will be connected to the new pumps.
  - The existing anchor bolts and grout pads will be reused for the new pumps.
- Category A sump MT-B05-0042 will be equipped with a new submersible pump with equipment tag number MP-B05-0080 (OCD).

Spent Decontamination System Tanks (Figure 2)

- Waste in SDS Tank #1 (MV-B05-0101) and #2 (MV-B05-0201) will be transferred to the MWS Wash Water Collection Tanks instead of the Agent Hydrolyzers.
- The waste transfer will be performed using the SDS feed pumps (MP-B05-0101A/B) through new 316 stainless steel pipe spools and Teflon™ FEP lined hoses.

MWS Wash Water Collection Tanks

- MWS Wash Water Collection Tanks will receive the following waste streams, MWS wash water from the Agent-Water Separators, spent decon from SDS Tank #1 and #2 and from sumps MT-B05-0047, -0048, and -0066; and condensate from the autoclave condensate drum.
- The MWS wash water and/or spent decon is transferred to the Agent Hydrolyzers for treatment, in accordance with the hydrolyzer batch recipe identified in Agent Collection and Neutralization – B04 compliance tables in the *Operations Plan*, Attachment L.

MWS Surge Drum Piping and Agent-Water Separators

- Spent decon collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045, and -0046 is transferred through the current surge drum booster pump discharge lines with MWS wash water from the Washed Agent/Water Surge Drums to the Agent-Water Separators

Agent Hydrolyzer Batch Recipe

- MWS wash water and/or spent decon, stored in the MWS Wash Water Collection Tanks, will be transferred to the Agent Hydrolyzers for treatment. Therefore, the batch recipe is revised to measure the total volume of the MWS wash water and/or the spent decon from

the MWS Wash Water Collection Tanks, instead of measuring the volume of each component in the mixture.

Equipment and Components to be Removed or Abandoned in Place

- SDS feed pump and spare, MP-B05-0201A/B.
- Class AB piping, equipment, and components between the SDS Tanks #1 and #2 and the SDS feed pumps and spares, MP-B05-0101A/B and MP-B05-201A/B including both the suction connections and the discharge connections.
- Existing Category A influent piping that transferred spent decon to the SDS Tanks #1 and #2 will either be removed to accommodate new pipe routings or will be abandoned in place. This piping consists of the Category A sump suction and discharge piping and the Autoclave condensate discharge.
- The current sump pumps with equipment tag numbers MP-B05-0040, -0046, -0047, and -0048 will be removed.
- The current sump pump with equipment tag numbers MP-B05-0045 will be abandoned in place.

pH Control

- pH control will be verified using pH probes located at the discharge from the SDS Tanks #1 and #2.

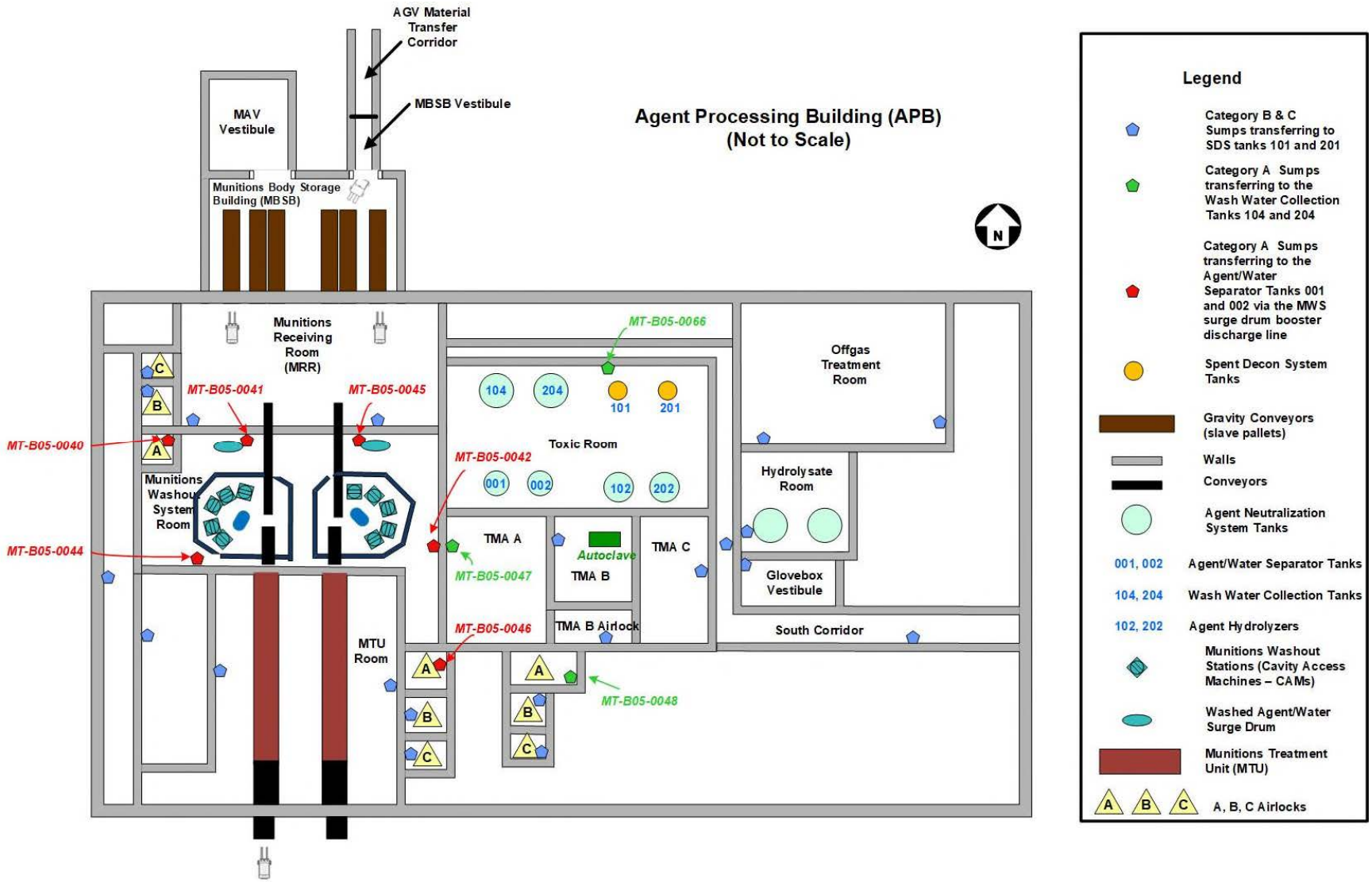

Figure 1 Agent Processing Building (APB) Sump Locations

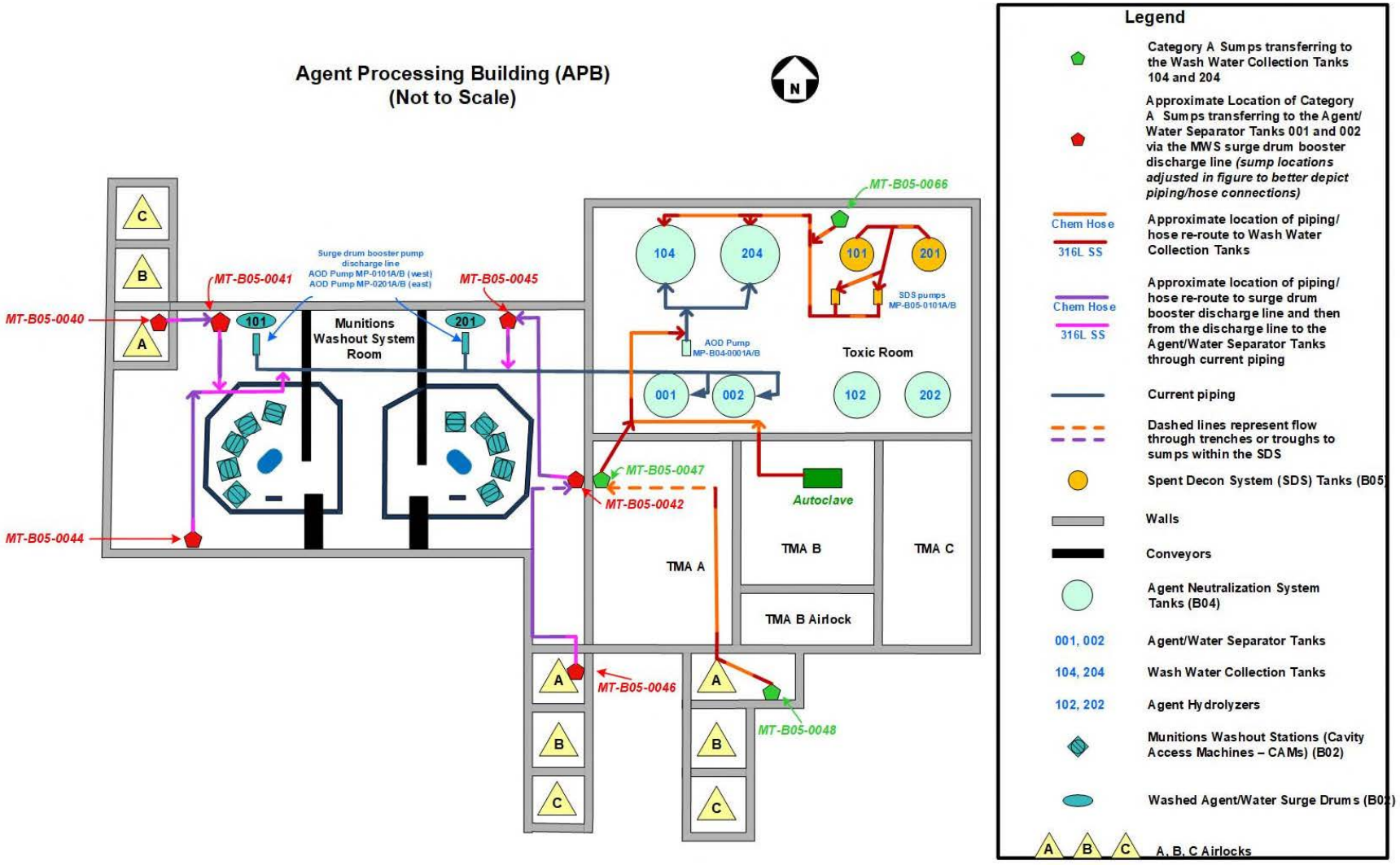

Figure 2 Approximate Location of Re-routed Spent Decon Transfer Lines

To address the design changes described above, the following changes to the Permit are proposed.

Part IV

The proposed revisions to Part IV add descriptions of the proposed equipment configuration and the proposed spent decon transfer operations. These revisions are presented using "track changes" in Enclosure 4 and include the following:

- Section IV.A.4.d.: The description of the SDS has been expanded to identify which sumps transfer spent decon to the SDS tanks, to the MWS Wash Water Collection Tanks, and to the Agent-Water Separators. In addition, the revision identifies that the MWS Wash Water Collection Tanks also receive condensate from the autoclave condensate drum.
- Table IV.A.4.d.a.: The materials of construction for the new 316 L stainless steel piping, the FEP lined flexible hoses, and stainless steel and nitrile rubber connections have been added for the proposed ancillary equipment.
- Table IV.A.4.d.b.: The sump pump tag number, MP- B05-0081, has been added for the new sump pump that will replace the pump at sump MT-B05-0045. The current sump pump MP-B05-0045 will be abandoned in place.
- Table IV.A.4.d.b.: The drawing number depicting sump MT-B05-0047 has been corrected to 24852-RD-M6-B05-M0024.
- Table IV.A.4.d.b.: The sump pump tag number, MP- B05-0080, has been added for the new submersible sump pump at sump MT-B05-0042. Sump pump MP-B05-0042 was previously removed and updated in the *Operations Plan*, Attachment L in the Permit. Currently, sump pump MT-B05-0047 transfers spent decon from sump MT-B05-0042 to the SDS Tanks #1 and #2.
- Table in Section IV.B.1.: Add K903 hazardous waste code to the approved waste codes for the MWS System, the APB - Agent Water Separators and the APB - MWS Wash Water Collection Tanks because spent decon that has the potential to carry the K903 hazardous waste codes may be transferred to these tank systems.
- Sections IV.D.4.d.i. and IV.D.4.d,ii.: Spent decon has been added to the description of waste streams that will be received in the MWS Wash Water Collection Tanks and in the Agent Water Separators.
- Section IV.D.4.d.iv.: The description of the waste streams/materials that may be received by the Agent Hydrolyzers has been revised to describe the MWS wash water and/or spent decon that will be received from the MWS Wash Water Collection Tanks. Previously, spent decon from the SDS Tanks #1 and #2 were transferred directly to the Agent Hydrolyzers, instead of being transferred to the MWS Wash Water Collection Tanks prior to transfer to the Agent Hydrolyzers for treatment.
- Section IV.D.4.d.iv.(D): The Agent Hydrolyzer batch recipe has been updated to add the combined MWS wash water and/or spent decon, and remove the individual batch additions of MWS wash water and spent decon.
- Section IV.L.4: The proposed revision adds "or another closed system" to clarify that to meet the 6 CCR 1007-3 Part 264 Subpart CC requirements (ref: § 264.1084(j)(1)) for transfer of hazardous waste between tanks, either continuous hard piping or another closed system can be used.

Waste Analysis Plan, Attachment D

The proposed revisions to the configuration of the SDS system changes the waste streams received by the SDS tanks, the Agent Water Separator, and the MWS Wash Water Collection Tanks. The following revisions to the *Waste Analysis Plan* are presented using "track changes" in Enclosure 5.

- Section D-5d(3): Spent decon transferred from sumps MT-B05-0040, -0041, -0042, -0044, -0045 and -0046 has been added to the waste streams approved for transfer to the Agent-Water Separators.
- Section D-5d(4): Spent decon transferred from sumps MT-B05-0047, -0048, and -0066, wash water and spent decon from the Agent Water Separator Tanks, the contents of the Spent Decon Tanks, and the condensate from the autoclave condensate drum are identified as the waste streams approved for transfer to the MWS Wash Water Collection Tanks.
- Section D-5d(5): Condensate from the autoclave and spent decon that transfers to the Agent Water Separators and the MWS Wash Water Collection Tanks have been removed from the waste streams that are transferred to the SDS Tanks #1 and #2.
- Section D-5d(5): The volume of hydraulic fluid approved to enter the lined category A sumps from spills from industrial equipment has been revised from 1 gallon to 50 gallons. The rationale for this change is included in the subsection titled Compatibility of Proposed Equipment with Associated Waste Streams within the section Justification for Changes section, and in Enclosure 2 of this permit modification request.
- Section D-5d(6): The SDS Tanks #1 and #2 have been removed from the list of tanks that transfer waste directly to the Agent Hydrolyzers.

Inspection Plan and Appendix K-4 to the Inspection Plan

To incorporate new and revised inspection requirements into the *Inspection Plan*, Attachment K of the Permit, the following revisions are proposed. These proposed revisions are presented using track changes in Enclosures 6 and 7.

- Section K-5b: Clarification describing spent decon transfer from sumps to the Spent Decon Tanks, Agent Water Separators, and the MWS Wash Water Collection Tanks has been added.
- Table K-11: Additional inspection requirements have been added to address the new equipment configuration.
- Appendix K-4: PCAPP Forms that implement RCRA inspection requirements have been revised to include inspection criteria for newly installed specific piping, hoses, connections, and equipment for inspection:
  Revised PCAPP Forms:
  - OPS-OAP-F018 (MWS)
  - OPS-OAP-F019 (TMA)
  - OPS-OAP-F020 (NW A-L)
  - OPS-OAP-F021 (SW A-L)
  - OPS-OAP-F022 (SE A-L)
  - OPS-OAP-F023 (TOX Wash Water)
  - OPS-OAP-F024 (TOX ANR)

- OPS-OAP-F025 (TOX AWS)
- OPS-OAP-F026 (TOX SDS)
- OPS-OAP-F041 (TOX)

New PCAPP Form to implement specific sump inspection criteria requirements for Sumps MT-B05-0042 and MT-B05-0044 in MWS:

- OPS-OAP-F124 (MWS Sumps)

New piping, hoses, and pumps will be inspected as currently required by Attachment K, of the Permit.

Daily RCRA inspections are performed looking for indication of spills and leaking equipment, weekly for evidence of damage to the secondary containment coatings, and quarterly the gratings over the trenches/troughs are removed to allow inspections of the coatings in the troughs/trenches.

Operations Plan, Attachment L

The following revisions are proposed in the *Operations Plan*, Attachment L and are presented in Enclosure 8 using "track changes":

- Revisions to process descriptions in the following subsections of the *Operations Plan* in accordance with the DCNs and OCD:
  - APB Processing – Agent Neutralization
  - APB Processing – Spent Decon Collection, Storage and Processing
  - APB Processing – Agent Hydrolyzer Tanks and Agent Hydrolysate Hold Tanks
- Correction and update of equipment numbers, equipment names/descriptions, operating parameters, and the instrument numbers for the methods of monitoring in accordance with the DCNs and OCD, as well as the B04 and B05 Setpoint Matrices in the following system descriptions and compliance tables:
  - Munitions Washout System – B02
  - Agent Collection and Neutralization – B04
  - Toxic Storage and Spent Decon – B05
- Addition of pH monitoring and the response to low pH conditions in the suction side piping downstream of the SDS tanks.

Justification for Changes:

Implementation of the proposed SDS design changes will provide a long-term equipment configuration for transferring, aggregating, and storing the spent decon wastes prior to treatment in the Agent Hydrolyzers. These proposed changes are necessary to address concerns with the overall condition of the SDS carbon steel piping in areas where agent-contaminated hazardous wastes are managed in the SDS. The proposed equipment, materials of construction, and operations practices will provide the means to manage the spent decon wastes in accordance with 6 CCR 1007-3 Part 264, Subpart J requirements. The revisions to the equipment configuration were designed to meet the requirements of 6 CCR 1007-3 § 264.192 (Enclosure 16).

Compatibility of Proposed Equipment with Associated Waste Streams

As described in DCN 24852-RD-M6N-B05-M0047, the OCD, and in *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (24852-30H-B05-B0001) (Enclosures 9, 10, and 15), the materials of construction for the piping, hoses, components, and tanks are compatible with the spent decon wastes:

- The new piping will consist of ASTM International (ASTM) A312 Type 316L stainless steel piping and with butt-welded 316L connections.
  - Table 1, titled Chemical Compatibility Chart for the SDS Feed Streams, and Attachment C in the *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (Enclosure 15) presents compatibility ratings for 316/316L stainless steel with spent decon system feed streams.
- PureFlex FLEXCHEM chemical transfer hoses or equivalent (Teflon™ FEP hose with Viton™ O-ring seals) will also be used in lieu of hard piping for connections to the sump pumps. (Enclosures 9 and 10)
  - The wetted materials in the PureFlex FLEXCHEM chemical transfer hoses are the same as in the Goodyear HI-PER® chemical hose and are compatible with the spent decon waste streams that will be transferred through the hose assembly, as described in the following table and attachments to the *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (Enclosure 15) provide supporting documentation demonstrating that the proposed PureFlex FLEXCHEM chemical transfer hoses are suited for service in the Spent Decontamination System.
    - Table 1, titled Chemical Compatibility Chart for the SDS Feed Streams, and Attachment C present compatibility ratings for Viton™ with Spent Decontamination System feed streams.
    - Attachment D provides an assessment of the organic components of the Spent Decontamination System feed streams with Teflon™
    - Attachment E presents the results of testing performed with mustard agent on plastics.

      CB-008776, Johnnie M. Albizo, et., al, October 1979. Compatibility of Plastics with Mustard (HD), Thiodiglycol, VX Hydrolysis Products, DS-2, HTL, and Tetrachloroethylene, Aberdeen Proving Ground, Maryland (DOD), DRDAR-CLJ-R
  - The following properties of Teflon™ make this material a good choice for use in spent decon service:
    - Low coefficient of friction against any solid.
    - Hydrophobic, meaning that neither water nor water containing substances wet Teflon™.
    - Pure Teflon™ is almost chemically inert.
    - Teflon™ has a large operating temperature range proving thermally stable enough to be used between -325°F and 500°F without degrading.
    - High flexural strength even at low temperatures.
    - High electrical resistance and dielectric strength.
    - Few chemicals are known to chemically react with Teflon™ resins, i.e. molten alkali metals, gaseous fluorine and a few fluorochemicals such as chlorine

trifluoride or oxygen difluoride which liberate free fluorine at elevated temperatures, none of which are present in the Spent Decontamination System feed streams.
        - The fluorine atoms in the Teflon™ form a protective sheath around the carbon core of each molecule and impart its high corrosion resistance.
    - The temperature and pressure rating of the PureFlex FLEXCHEM chemical transfer hoses are suitable for the spent decon service.
- The connections from the Category A sump pumps to the suction and discharge lines will consist of nitrile rubber flex hoses with textile reinforcement.
    - Nitrile rubber is a suitable material for service with dilute spent decon solutions
        - Nitrile polymer is a synthetic rubber copolymer of acrylonitrile (ACN) and butadiene that provides a fair resistance against ~ 10% hydrochloric acid and ~ 10% sodium hydroxide
        - Nitrile rubber is resistant to gases, aliphatic hydrocarbons, oils, and fuels
        - Nitrile rubber is generally attacked by ketones, ozone, sunlight, aromatic oils, weather, and flame, which do not pose a concern with spent decon transfers
        - Nitrile rubber has good tear resistance and excellent abrasion resistance
        - Low temperature range of -30°F to -40°F and high temperature range up to 250°F
        - Tensile strength of 200-3000 psi
        - Elongation of 600% maximum
        - References: Rubber Manufacturer Mykin Inc., Goodyear Rubber, and Timco Rubber
    - These nitrile rubber flex hose connections have temperature and pressure ranges that are suitable for the system design conditions.
- The MWS Surge Drum pump isolators will be replaced with Proco 231/ET Teflon™ lined isolators (or equivalent), which are chemically resistant to acidic process fluids.
    - Attachment D and E in the *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (Enclosure 15) present the compatibility of acidic and agent-contaminated solutions with Teflon™.
- Except for the submersible pump MP-B05-0080, the current pumps will be replaced with non-metallic polypropylene Sandpiper S15 pumps with connections to the piping and hoses composed of nitrile rubber with textile reinforcement. This same pump type was approved for replacement and service in sumps per DCNs 24852-RD-M6N-M0043 and M0044 in Permit Modification Request 286 to the PCAPP RCRA Research, Development, and Demonstration (RD&D) Permit. The Sandpiper S15 pumps, weighing approximately 80 pounds (lbs.), will replace the current pumps which weigh as much as 500 lbs. The reduction in size and weight of these pumps and components will facilitate repair and replacement of parts during maintenance evolutions by workers in DPE suits. The wetted surfaces are compatible with spent decon solutions and have temperature and pressure ratings that are suitable for the design conditions.
- A Tsurumi model 50SFQ2.75 submersible sump pump with 316 SS wetted components with Viton elastomers will be installed in sump MT-B05-0042 (equipment tag MP-B05-0080). The wetted surfaces are compatible with spent decon solutions.

- Category A sump pumps MP-B05-0041, -0044, and -0066 have previously been replaced with non-metallic polypropylene pumps; therefore, the pumps will not be replaced. The piping and other components connected to these pumps will be replaced with new materials per DCN 24852-RD-M6N-B05-M0047.
- The grade 2 titanium MWS Wash Water Collection Tanks are resistant to corrosion from acidic and basic solutions, and are compatible with the spent decon, and the MWS wash water and/or spent decon, which they receive and store.
- The grade 2 titanium Agent Water Separator Tanks are resistant to corrosion from acidic and basic solutions, and are compatible with the spent decon, and the MWS wash water and/or spent decon, which they receive and store.
- The grade 2 titanium Agent Hydrolyzers are resistant to corrosion from both acidic and basic solutions, and are compatible with agent concentrate from the Agent-Water Separators, the MWS wash water and/or spent decon from the MWS Wash Water Collection Tanks, sodium hydroxide, hot water, and when necessary, failed hydrolysate batches.
- The grade 2 titanium and stainless steel piping, Teflon™ FEP hose with Viton™ O-ring seals, and the nitrile rubber flex hose connections in the MWS and Toxic Rooms are compatible with the fire retardant water-glycol hydraulic fluid (Houghto-Safe 620 or equivalent) used in the operation of the Munitions Washout System. This hydraulic fluid is also compatible with downstream equipment. Evaluations determined that no negative impact will occur to downstream treatment processes if up to 50 gallons of hydraulic fluid were to be introduced into the Spent Decontamination System. Treatment processes downstream of the MWS include agent neutralization in the agent hydrolyzers, biological treatment of hydrolysate in the immobilized cell bioreactors (ICB™), and evaporation, crystallization, and filtration of the bio-treated hydrolysate in the Brine Reduction System.
    - The hydraulic fluid reservoirs for the hydraulic power units on MWS lines 1 and 2 each contain 150 gallons of hydraulic fluid. In the unlikely event that a release from the hydraulic lines or reservoirs occurs, the Permittees request that the volume of hydraulic liquid that is approved to be introduced into the Spent Decontamination System from spills from industrial equipment be increased from 1 gallon to 50 gallons in the *Waste Analysis Plan* and the *Operations Plan*.
    - Hydraulic fluid reservoirs: MT-B02-0111-01 and MT-B02-0211-01 (24852-RD-M6-B02-M0006 and 24852-RD-M6-B02-M0007)

The redlined and annotated drawings presented in the DCNs and OCD (Enclosures 9 and 10) depict the portions of the current Spent Decon System that will be used and will be taken out-of-service as part of these permanent repairs to the SDS.

Rationale for Use of Lined Trenches and Sumps MT-B05-0041, -0042, -0045, and -0047 to Aggregate Spent Decon Waste Streams (Figure 2)

The Permittees intend to use four lined sumps with interstitial monitoring (MT-B05-0041, -0042, -0045, and -0047) to not only collect and transfer waste generated in the immediate vicinity of the sumps, but to also receive wastes from other sumps for transfer to the Agent Water Separators or the MWS Wash Water Collection Tanks. In addition, the proposed waste transfer

configurations will use two sections of steel lined and coated trenches that are covered with grating for transfer of liquids into two of the sumps (MT-B05-0042 and MT-B05-0047). These sumps meet the definition of a lined sump/trench in Section I.D. of the PCAPP Hazardous Waste Permit:

> "Lined sump/trench" is defined in this Permit as a steel-reinforced concrete secondary sump/trench with a welded-steel primary liner and an annulus between the two for leak detection monitoring purposes."

Lined sumps/trenches at PCAPP have been designed and permitted to function as primary containment. They function as primary containment because PCAPP intentionally places waste in the lined sump/trench as part of normal operations (e.g., when decontamination of entrants results in decon that flows to one of these sumps). Specifically, in past permitting efforts and the current permit (ref: Part IV, Table IV.A.4.d.b and Attachment K, Section K-5b), they are considered ancillary equipment to a tank system (ref: 6 CCR 1007-3, Section 264.190(c)). These sumps have low storage capacities and short accumulation times since they are equipped with level switches/alarms that identify the presence of liquids and dedicated pumps that are used to transfer the sump contents (excluding a few inches that the pump cannot remove) to tank storage. Using lined sumps/trenches for transferring and receiving waste (to and from other lined sumps/trenches) as proposed in this request, qualifies as primary containment used to distribute and control hazardous waste to a tank and therefore these "interconnected" lined sump/trenches remain properly regulated as ancillary equipment.

The following summarizes the basis for the proposed spent decon collection and transfer equipment configuration.

Sump MT-B05-0041, Northwest Corner of MWS Room

Sump MT-B05-0041 will receive spent decon solutions from the MWS northwest airlock sump (MT-B05-0040) through piping and hoses routed through the eastern wall of the airlock. The MWS northwest airlock is one of the two airlocks used for emergency egress by DPE entrants.

- Transfer of the liquids to sump MT-B05-0041 requires no additional control interlocks that could delay the transfer of decon fluid and the evacuation of entrants.
- Routing of the sump MT-B05-0040 spent decon directly to the pressurized B02 header would require that no other pumps be pumping through the line when personnel are egressing. This is not feasible in some emergency scenarios.

Sump MT-B05-0042, Southeast Corner of MWS Room

Sump MT-B05-0042 will receive spent decon solutions from the the MWS southeast airlock sump (MT-B05-0046) through a combination of transfer lines and by flow through a portion of a lined and coated trench near sump MT-B05-0042. The MWS southeast airlock is one of the two airlocks used for emergency egress by DPE entrants. The benefits of this flow path include the following:

- Transfer of the liquids to sump MT-B05-0046 requires no additional control interlocks that could delay the transfer of decon fluid and the evacuation of entrants.

- The location of piping and hoses on the wall between the MWS and MTU does not pose a tripping hazard and will remain out of the north-south path of the monorail in the MWS hallway.
- The hose end will extend beneath the grating of the steel lined trench to focus the free flow into the trench lining and into the sump.
- The coatings in the trenches are inspected daily to identify unexplained liquids and quarterly to identify damage to coatings.

Alternate paths were considered but determined to either not be constructible or not to be operable:

- Routing of the sump MT-B05-0046 spent decon directly to the pressurized B02 header would require that no other pumps be pumping through the line when personnel are egressing. This is not feasible in some emergency scenarios.
- Location along the east wall of the hallway could result in damage to either the monorail or the hose and would interfere with use of the breathing air hose change stations.
- Extending the hose from the western wall and across the floor to the sump will pose a tripping hazard and will interfere with the use of the breathing air hose change stations.

Sump MT-B05-0045, Northeast Corner of MWS Room

Sump MT-B05-0045 will receive spent decon from the southeast MWS sump MT-B05-0042 through a combination of transfer lines and hoses that will be located within the north-south trench in the MWS room. The spent decon will then be transferred from sump MT-B05-0045 to the Agent Water Separators.

This sump to sump transfer is required because of the spatial limitations in the MWS hallway above and surrounding sump MT-B05-0042, and the limiting conditions associated with DPE entrants performing pump replacements.

- A submersible pump is required in sump MT-B05-0042 due to space limitation above the sump.
- The only submersible pumps available that are chemically compatible with the waste, can fit into the sump, and that can be carried and installed by two DPE entrants, are not powerful enough to transfer the sump's contents into the pressurized B02 header. Therefore, transfer of the contents of sump MT-B05-0042 to sump MT-B05-0045 is the best option.

Sump MT-B05-0047, TMA A Room

Sump MT-B05-0047 will receive spent decon solutions from the TMA-A airlock sump (MT-B05-0048) through a combination of transfer lines and by flow through a portion of the TMA-A trench. The benefits of this flow path include the following:

- The hose and piping along the eastern wall along the berm in TMA-A will encounter minimal obstructions and will have a step platform over it, reducing the tripping hazards to DPE entrants.
- The steel-lined and coated trench slopes towards the sump and is intended to transfer liquids to the sump.

- The coatings in the trenches are inspected daily to identify unexplained liquids and quarterly to identify damage to coatings.

Alternate paths were considered but determined to either not be constructible or not to be operable:

- Installation of new piping along the current piping path
  - Spent decon solutions from the TMA-A airlock sump are currently transferred through piping that parallels the monorail's path, in a location a few feet above and to the side of the monorail. Installation of new piping along this path is not possible because DPE entrants cannot safely work at the heights required.
  - It is not possible to mount supports from the ceiling or the walls at the required height.
- Installation of the new piping along the walls of TMA-A
  - The transit path of the monorail along the south wall would create a high risk of damaging either the monorail or the hoses if the hoses are attached to the walls within accessible height of workers wearing DPE suits.
  - Equipment, vent lines, electrical conduit, and Tox Room stairs along the west wall of TMA-A would obstruct the path of the hoses or piping.
- Extending piping or hoses across the TMA-A floor or within the trench
  - Hoses or piping across the floor will become obstacles to movement of waste containers and waste items within the TMA-A; and a potential tripping hazard for DPE entrants.
  - The sharp angle required to install the hose in the trench is not feasible.
- A tie into the Sump MT-B05-0047 discharge line is not be feasible due to the number of control interlocks required to coordinate flow with the B04 and autoclave piping, which also tie into the line.

pH Control

pH control will be verified using pH probes located at the discharge from the SDS Tanks #1 and #2, as referenced in change pages for Table L-7 of the *Operations Plan* in Enclosure 8.

Inspections of the Spent Decontamination System

Daily and quarterly RCRA inspections will be performed and corrective actions taken for unsatisfactory conditions in accordance with the *Inspection Plan*, Attachment K of the Permit.

Corrosion Monitoring Plan

In accordance with Section I.J.4. of the Permit and the following referenced letter, the Permittees intend to submit a permit modification request with an updated version of the *Corrosion Monitoring Plan for Resource Conservation and Recovery Act (RCRA) Tank Systems* (Attachment M of the Permit).

- Letter from Kevin Mackey to Michael W. Cobb, Walton Levi, and Kenneth Harrawood, dated 28 July 2020, titled "Approval of PCAPP Request to Delay Submittal of Permit Modification Requests Identified in Compliance Schedule Items I.J.3.i and I.J.4. of the PCAPP Resource Conservation and Recovery Act (RCRA) Research, Development and

Demonstration (RD&D), Pueblo Chemical Agent–Destruction Pilot Plant (PCAPP) Research Development and Demonstration Permit No. CO-04-07-01-01".

Revision 010 of the *Corrosion Monitoring Plan for Resource Conservation and Recovery Act (RCRA) Tank Systems* will address non-metallic parts of hazardous waste tank systems, including the non-metallic parts that will be installed per DCN 24852-RD-M6N-B05-M0047 and OCD 24852-RD-OCD-B05-00006 addressed in this permit modification request. No revisions to the *Corrosion Monitoring Plan* are included in this permit modification request, instead the necessary revisions will be incorporated into a future permit modification request scheduled for submittal on or before 30 days after the effective date of the PCAPP Part B Operating Permit.

Additional Information:

Waste Management

Waste generated during the removal of piping, pumps, and associated connections will be decontaminated during the waste generation process, will be accumulated in a 90-day accumulation area, will be monitored, and if necessary will be treated in the Secondary Decontamination Unit, the Autoclave, and/or by the decontamination of agent-contaminated waste process in accordance with Part V of the Permit. The Permittees estimate that the following waste streams will be generated during the reconfiguration of the Spent Decontamination System per the proposed design. The estimated weights and volumes for these waste streams are approximate, and are likely to change based on field conditions as the work is performed.

- 4 diaphragm pumps: total weight of 2400 pounds (lbs.)
- 4 strainers: 240 lbs.
- Miscellaneous pipe and components: 600 lbs.
- Miscellaneous waste (e.g., absorbents, spill pillows, empty containers): 10 fifty-five gallon drums
- Personal Protective Equipment (including DPE suits, aprons, gloves, etc.): 36 fifty-five gallon drums

DCN "EI&C Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)" (24852-RD-E1N-B05-E0001) (Enclosure 11)

DCN 24852-RD-E1N-B05-E0001 and associated OCD 24852-RD-OCD-B05-00006 propose changes to the Electrical, Instrumentation and Controls (EI&C) that will address the revisions to the Spent Decontamination System design described in DCN 24852-RD-M6N-B05-M0047 and this permit modification request. These changes to the EI&C will address the transfer of waste from the Category B and C sumps and the Off gas Treatment System (OTS) scrubber blowdown to the Spent Decon Holding Tanks, and the transfer of waste from the Category A sumps and Autoclave condensate line to either the MWS Wash Water Collection Tanks or the Agent Water Separators.

DCN 24852-RD-M6N-B04-M0120 "Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)" (Enclosure 12)

DCN 24852-RD-M6N-B04-M0120 proposes to add a caustic solution line in the Toxic Room to facilitate the use caustic for agent-decontamination of equipment, parts, and waste. The caustic

line will consist of Goodyear Fabchem Ultra-high Molecular Weight Polyethylene (UHMWPE) (or equivalent) chemical hose with stainless steel valves and connections, and will be connected to the caustic feed line in the Toxic Room. Use of this caustic line will reduce the distance that DPE entrants must walk with buckets of caustic to decontaminate agent-contaminated equipment and waste.

DCN "Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)" (24852-RD-J3N-B04-J0016) (Enclosure 13)

DCN 24852-RD-J3N-B04-J0016 updates the software logic to improve the automation of the wash water transfers from the Agent Water Separators to the MWS Wash Water Collection Tanks. Along with other improvements, the software revisions will add an Auto-Start for the pump transfer to the MWS Wash Water Collection Tanks when an Agent Water Separator reaches a high level. These revisions will continue to allow both automated and manual operation of the wash water pumps MP-B04-0001A/0001B.

Design Change Notice "Replace MWS Surge Drum Pump Isolators" (24852-RD-30N-B02-M0016) (Enclosure 14)

Design Change Notice 24852-RD-30N-B02-M0016 proposes to replace the existing EPDM lined isolators on the MWS Surge Drum pumps with Teflon™ lined isolators. The current EPDM-lined isolators have experienced degradation over time due to the acidic nature of the waste streams generated by the MWS. The Permittees propose to replace the current isolators with Proco 231/ET Teflon™ lined isolators (or equivalent), which are more chemically resistant to acidic process fluids. Compatibility of Teflon™ lined transfer lines with agent-contaminated acidic waste streams is described in *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (24852-30H-B05-B0001**)**.

Category B and C Sump and Off gas Treatment System Scrubber Transfer Lines that will not be Modified by this Permit Modification Request

- Transfer of spent decon waste streams from the following Category B and C sumps (identified by pump number) will continue through the current inflow piping and headers to SDS Tank #1 and #2. (Figure 2)
    - Sump pumps MP-B05-0049 and -0050 (TMA airlock)
    - Sump pump MP-B05-0051 (Off-gas Treatment Room)
    - Sump pump MP-B05-0052 (TMA Category B Room)
    - Sump pump MP-B05-0053 (Glove Box Vestibule)
    - Sump pump MP-B05-0054 (TMA Category C Room)
    - Sump pump MP-B05-0055 (MWS Washout Water Storage Room)
    - Sump pumps MP-B05-0056 and -0074 (MTU Room)
    - Sump pump MP-B05-0057 (MWS Room Airlock)
    - Sump pump MP-B05-0058 (TMA Air Lock)
    - Sump pumps MP-B05-0059 and -0060 (Munitions Receiving and Traveling Area)
    - Sump pump MP-B05-0061 (Agent Hydrolysate Tank Room)
    - Sump pump MP-B05-0062 (East Corridor)
    - Sump pump MP-B05-0063 (West Corridor)
    - Sump pumps MP-B05-0064, -0065, and -0069 (MWS Room Air Lock)

    - Sump pump MP-B05-0070 (Off-gas Treatment Room)
    - Sump pump MP-B05-0075 (South Corridor)
- Off gas Treatment System (OTS) scrubber blowdown will also continue to be transferred through the current header to the SDS Tanks #1 and #2.

Justification for Classification:
In accordance with 6 CCR 1007-3 Part 100 Appendix I to Section 100.63, the following supports the determination that this permit modification request meets the criteria for classification as a Class 2 permit modification request.

- 6 CCR 1007-3 Part 100, Appendix I, G.2.: Revisions address modifications to a tank unit without increasing the capacity of the unit. (Class 2 modification)
- 6 CCR 1007-3 Part 100, Appendix I, G.4.: Revisions address modifications to the management of a tank unit without increasing the capacity of the unit. (Class 2 modification)

Enclosures:

Enclosure 1:	Phased Field Installation and Facility Construction Certification (FCC)/Independent Certification of Facility Modification (ICFM) Approach
Enclosure 2:	Summary of Proposed Revisions to the PCAPP Hazardous Waste Permit
Enclosure 3:	Proposed Revisions to the *List of Permit Modifications* with changes depicted using "track changes"
Enclosure 4:	Proposed Revisions to Part IV with changes depicted using "track changes"
Enclosure 5:	Proposed Revisions to *Waste Analysis Plan*, Attachment D, with changes depicted using "track changes"
Enclosure 6:	Proposed Revisions to *Inspection Plan*, Attachment K, with changes depicted using "track changes"
Enclosure 7:	Proposed Revisions to *Inspection Plan*, Attachment K, Appendix K-4, Inspection Forms/Sheets, with changes depicted using "track changes"
Enclosure 8:	Proposed Revisions to *Operations Plan*, Attachment L, with changes depicted using "track changes"
Enclosure 9:	Document Change Notice "Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)" (24852-RD-M6N-B05-M0047)
Enclosure 10:	Operations Change Document "Sump MT-B05-0042 Immersion Pump (MP-B05-M0080)" (24852-RD-OCD-B05-00006)
Enclosure 11:	Document Change Notice "EI&C Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)" (24852-RD-E1N-B05-E0001)
Enclosure 12:	Document Change Notice "Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)" (24852-RD-M6N-B04-M0120)
Enclosure 13:	Document Change Notice "Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)" (24852-RD-J3N-B04-J0016)
Enclosure 14:	Design Change Notice "Replace MWS Surge Drum Pump Isolators" (24852-RD-30N-B02-M0016)

Enclosure 15: *White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service* (24852-30H-B05-B0001)
Enclosure 16: Design and Installation of New Tank System or Components (6 CCR 1007-3 § 264.192)

Enclosed CD contains complete MS Word files for the List of Modifications, Part IV, Attachments D, K, and L of the PCAPP State-RCRA Permit, and the individual PDFs of the design change documents.

Enclosure 1

Phased Field Installation and Phased Facility Construction Certification (FCC)/Independent Certification of Facility Modification (ICFM) Approach

Phased Field Installation and Phased Facility Construction Certification (FCC)/Independent Certification of Facility Modification (ICFM) Approach

The Spent Decontamination System is a tank system consisting of lined and unlined coated sumps, transfer piping and pumps, and two Spent Decontamination System Holding Tanks. This tank system aggregates non-agent and agent-contaminated waste streams generated throughout the APB and as described in Section D-5d(f) in the *Waste Analysis Plan*, Attachment D of the Permit.

Currently, waste streams collected in sumps located in category A, B, and C areas of the APB are pumped to Spent Decontamination Holding Tank #1. Spent Decontamination Holding Tank #2 is currently out-of-service, but will be placed back into service after approval of either a temporary authorization or this permit modification request, and acceptance of the Facility Construction Certification documentation after field installation of the revised spent decontamination system design.

Continued operation of the Spent Decontamination System is required for maintenance of the safety envelope in the APB and to perform physical Resource Conservation and Recovery Act (RCRA) inspections. At a minimum, operations, maintenance, and waste management personnel who work in the Category A and B areas of APB, generate decontamination solutions as they exit the agent-contaminated areas through the airlocks. Therefore, the Permittees are proposing to perform the flushing and abandonment or removal of piping and the installation of new pipes, hoses, and pumps in phases, called "blocks". Performing the removal, abandonment and new installation in blocks allows continued operation of some parts of the Spent Decontamination System while other parts are being replaced; thereby, maintaining the safety envelope and continuing to meet inspection and preventative maintenance requirements in the PCAPP RCRA Permit. The locations of the blocks are identified in Figure 3 and in the table below.

The Permittees propose to submit separate FCC/ICFM packages for each block. This phased approach to obtaining FCC/ICFM acceptance will allow blocks to be placed back into service, allowing work on other blocks and maintenance of the APB safety envelope.

The following table and Figure 4 provide a summary of the work to be performed in each block and the approximate timeframe required to complete the work for the specified block.

Block #	**Sump/Equipment** **[Work Description: Replace Carbon Steel Pipe with 316L Stainless Steel Pipe and Teflon™ FEP Hose, Install Pumps and Strainers; Replace Tank Fittings and Connections; Remove Piping or Abandon in Place]**	**Approximate Work Duration (days)** **[Assuming Normal Operating Conditions]**
1	Sump 41	2 days
2	Autoclave Condensate Line, Sump 47	5 days
3	Sump 45	2 days
4	Wash Water Collection Tanks, Sump 66	6 days
5	Spent Decontamination System in Toxic Room	2 days
6	Sump 42	2 days
7	Sumps 40, 46, and 48	8 days
8	Electrical and Instruments/Controls for parts of Blocks 4, 5, and sump 42 in Block 6	5 days

Note: Days identified in table may not be consecutive.

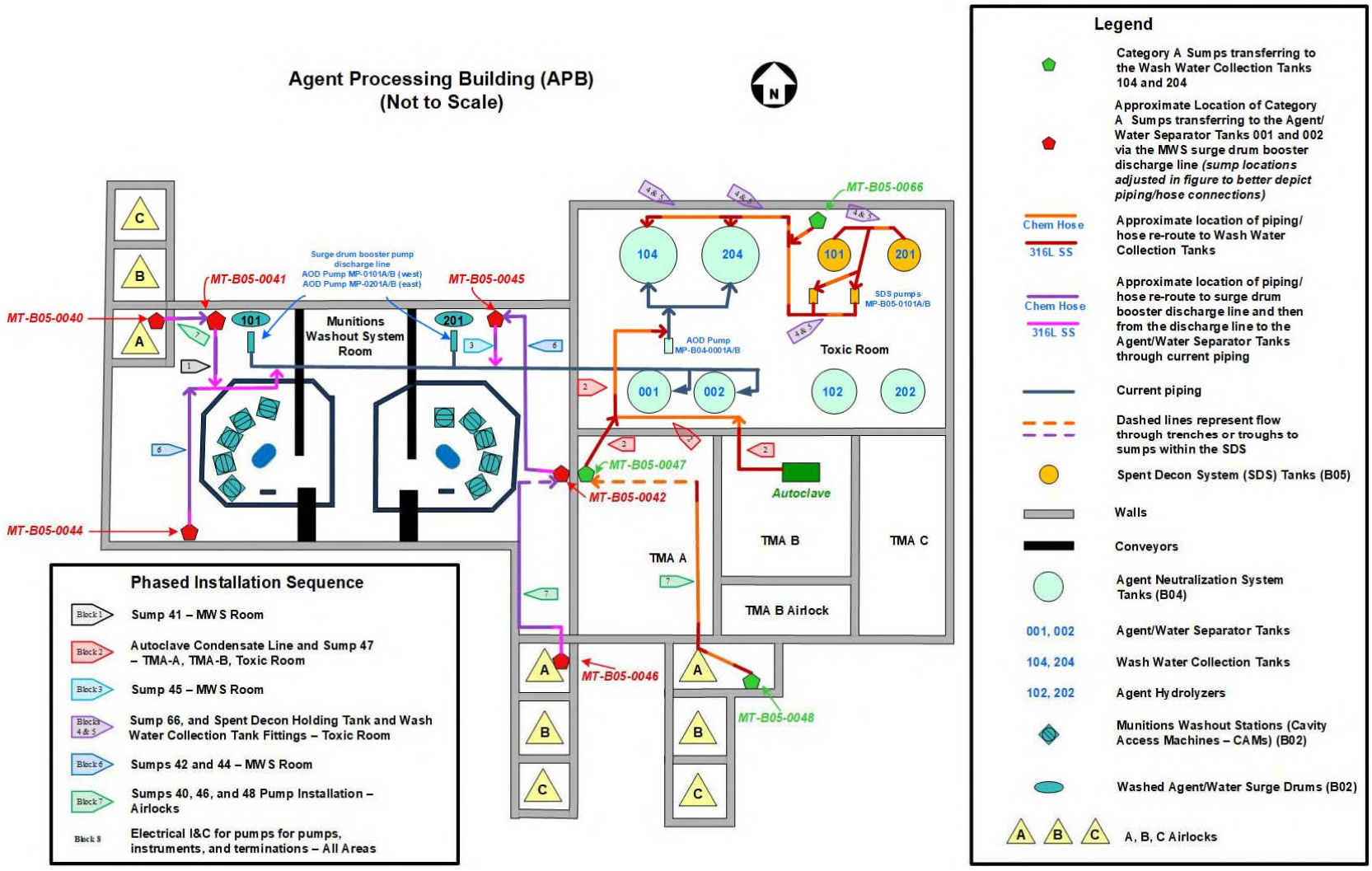

Figure 3 Spent Decontamination System Phased Installation Sequence

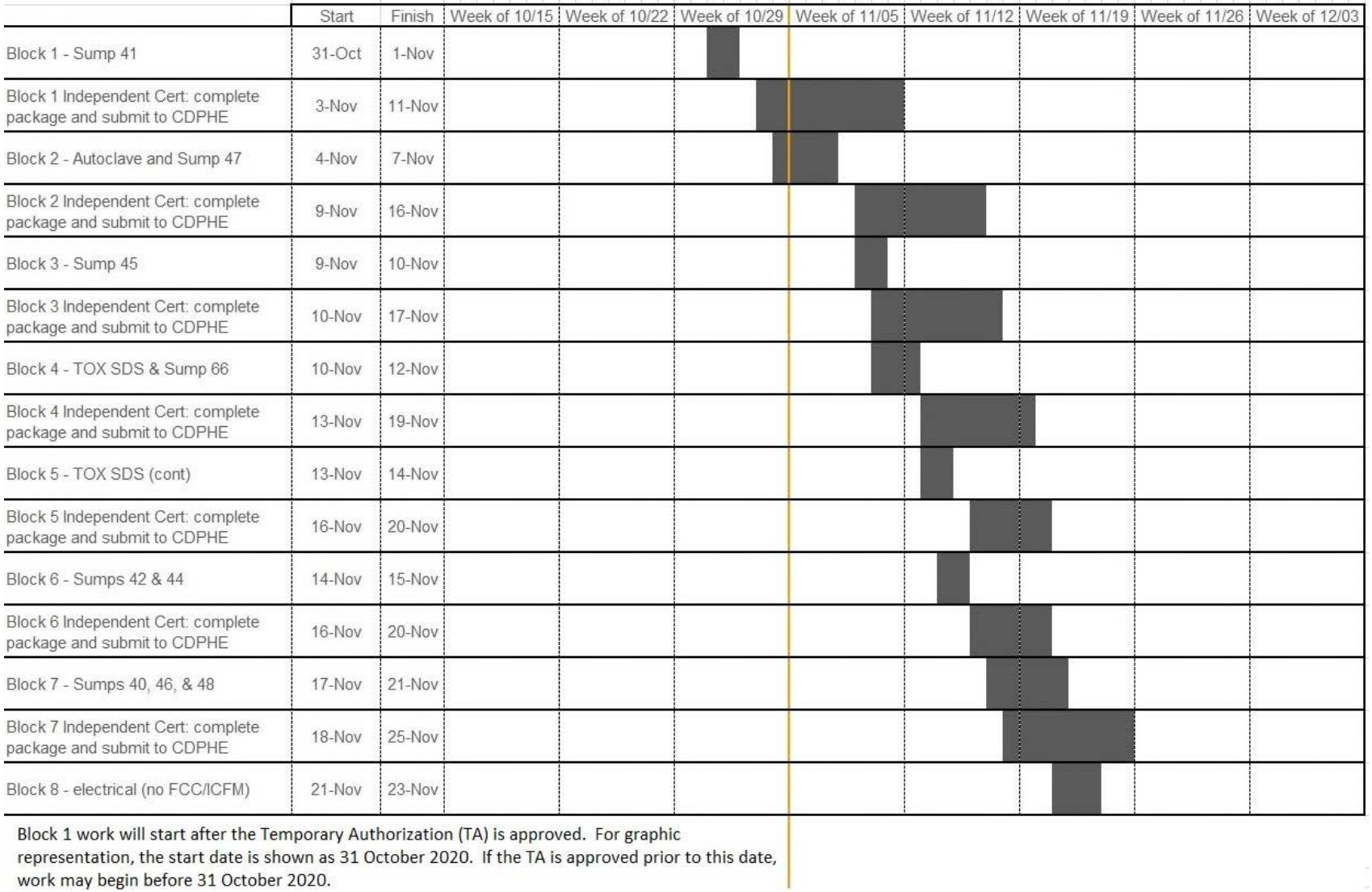

Figure 4 Estimated Schedule for Field Work and FCC/ICFM Package Submittal

Enclosure 2

Summary of Proposed Revisions to the PCAPP Hazardous Waste Permit

Summary of Proposed Revisions to the PCAPP State-RCRA Permit	
Proposed Revisions	**Rationale for Proposed Revision(s)**
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List of Permit Modifications ("change pages" in Enclosure 3)	
Modification # B001 Class: 2 Effective Date: [insert date] Title: "Spent Decontamination System (B05) – Long Term" Summary: This permit modification request incorporates design changes for ancillary equipment to tank systems in the Agent Processing Building (APB) in response to concerns regarding Spent Decontamination System (SDS) piping integrity.	
Part IV ("change pages" in Enclosure 4)	
IV.A.4.d. The spent decontamination solution is collected in sumps located throughout the APB and pumped to one of two Spent Decon Holding Tanks, except for the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066. ~~The spent decontamination solution is then pumped to the Agent Hydrolyzer Tanks in accordance with the hydrolyzer recipe.~~ The spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045 and -0046 is pumped to the Agent-Water Separator Tanks. The spent decontamination solution collected in sumps MT-B05-0047, -0048, and -0066 is pumped to the MWS Wash Water Collection Tanks. The MWS Wash Water Collection Tanks also receive the condensate from the autoclave condensate drum. All of these tanks are located in the Toxic Room (room APB-120).	The spent decontamination solution collected in the Category A lined sumps will be transferred to the Agent-Water Separators or to the MWS Wash Water Collection Tanks as depicted in Figures 1 and 2 of this permit modification request. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56)]. Condensate from the autoclave condensate drum will be transferred to the MWS Wash Water Collection Tanks, and not to the SDS Tanks #1 and #2. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (pdf page 7) and revised flow diagram 24852-RD-M5-B24-B0004 (PDF page 57)]
Table IV.A.4.d.a. Column: Spent Decon Holding Tanks #1 & #2 (MV-B05-0101, MV-B05-0201) Row: Material of Construction Stainless steel (316L) for tank; carbon steel piping with a minimum ⅛ inch corrosion allowance, stainless steel (316L) piping with no corrosion allowance, PureFlex FLEXCHEM chemical transfer hoses or equivalent (Teflon™ FEP hose with Viton™ O-ring seals) for ancillary piping	Materials of construction for ancillary piping. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6), B05 Upstream Changes (PDF pages 7 and 8). Piping Class Specification Report for Pipe Class R (stainless steel 316L) (PDF page 150)].
Table IV.A.4.d.b. Row: Sump Tag Number MT-B05-0045 Sump Pump Tag Number: MP-B05-00814~~5~~ Row: Sump Tag Number MT-B05-0047 Drawing: 24852-RD-M6-B05-00242~~6~~ Row: Sump Tag Number MT-B05-0042 Sump Pump Tag Number: MP-B05-00804~~2~~	Sump pump MP-B05-0045 will be abandoned in place. A new sump pump MP-B05-0081 will be installed. [Reference: DCN 24852-RD-M6N-B05-M0047, drawing 24852-RD-M6-B05-M0025 (PDF page 46)]. Submersible sump pump MP-B05-0080 will be installed in sump MT-B05-0042.

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Note 1: For rows where only sump pump tag numbers are shown, the sumps are considered secondary containment sumps (i.e., they are not lined with steel liners), and only their associated pumps are considered ancillary equipment to the Spent Decon Holding Tank System. Hazardous waste collected in these unlined sumps must be removed within 24 hours of detection as described in this section of the permit. Unlined sumps must not be utilized for the routine management of wastes. The other rows in the above table correspond to lined sumps, which are ancillary equipment to the Spent Decon Holding Tanks, the Agent Water Separators, or the MWS Wash Water Collection Tanks ~~System~~. After waste removal required by this section is performed, a quantity of waste that the sump pump cannot remove may remain in the lined sumps.	[Reference: DCN 24852-RD-M6N-B05-M0047, drawing 24852-RD-M6-B05-M0025 (PDF page 46); and drawings 24852-RD-M6-B05-M0024 and M0025, OCD 24852-RD-B05-00006].
Section IV.B.1. Table: Building/Unit Description: APB – MWS System; APB – MTU System, APB – Washed Agent and Water Surge Drum Tanks, APB – Agent Water Separator Tanks, APB – MWS Wash Water Collection Tanks Listed Codes: K901, K902, K903	Spent decontamination solutions characterized with the K903 hazardous waste code may be transferred from the B05 to the B02 and B04 tank systems.
Section IV.D.4.d.i. Agent Water Separator Tank System: The Agent Water Separator Tanks may receive only the mustard agent/wash water mixture from the Washed Agent and Water Surge Drum Tanks, the spent decontamination solution collected in sumps specified in Section IV.A.4.d, and rinse material (e.g., line flushing).	Revised for consistency with Section IV.A.4.d. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56).
Section IV.D.4.d.ii. MWS Wash Water Collection Tank System: The MWS Wash Water Collection Tanks may receive only the wash water portion from the Agent Water Separator Tanks, the contents of the Spent Decon Holding Tanks, the condensate from the autoclave condensate drum, the spent decontamination solutions collected in sumps specified in Section IV.A.4.d., and rinse material (e.g., line flushing).	Revised for consistency with Section IV.A.4.d. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56).
Section IV.D.4.d.iv. Agent Hydrolyzer Tank System: The Agent Hydrolyzer Tanks may receive only the following waste streams/materials: hot process water, steam, the contents of the MWS Wash Water Collection Tanks, ~~MWS wash water from the MWS Wash Water Collection Tank System, spent decontamination solution from the Spent Decon Holding Tank System,~~ agent concentrate (HD or HT) from the Agent Water Separator Tank System, failed hydrolysate, rinse material (e.g., line flushing), and sodium hydroxide solution (25% NaOH). Agent shall be treated in the Agent Hydrolyzer Tank System in accordance with the following requirements:	The contents of the SDS Tanks #1 and #2will be transferred to the MWS Wash Water Collection Tanks, and not directly to the Agent Hydrolyzer Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6) and revised flow diagram 24852-RD-M5-B05-B0001 (PDF page 54)]. The contents of the MWS Wash Water Collection Tanks will be transferred to the Agent Hydrolyzer Tanks for treatment. [Reference: DCN 24852-RD-M6N-B05-M0047, revised flow diagram 24852-RD-M5-B04-B0001 (PDF page 51)]

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Section IV.D.4.d.iv.(D) For agent batches, hot process water shall be used and the temperature shall be 175ºF (+/- 5ºF) prior to adding any agent (HD or HT) concentrate. For other batch types (i.e., the contents of the MWS Wash Water Collection Tanks~~spent decon, wash water~~, failed hydrolysate batch), the acceptable temperature range is ambient to 195 ºF. For all batch types, the contents shall be thoroughly mixed using the recirculation pump.	The contents of the SDS Tanks #1 and #2 will be transferred to the MWS Wash Water Collection Tanks, and not directly to the Agent Hydrolyzer Tanks. Therefore, agent hydrolyzer batches will contain mixtures with variable concentrations of MWS wash water and spent decon solutions from the MWS Wash Water Collection Tanks.
IV.L.4. Transfer of hazardous waste to the tank from another tank shall be conducted using a continuous hard piping system or another closed system that does not allow exposure of the hazardous waste to the atmosphere.	Revised to clarify that to meet the 6 CCR 1007-3 Part 264 Subpart CC requirements (ref: § 264.1084(j)(1)) for transfer of hazardous waste between tanks, either continuous hard piping or another closed system can be used. The proposed ancillary equipment, including the flex hoses and connections, meets the definition of another closed system that will not allow exposure of the hazardous waste to the atmosphere.
***Waste Analysis Plan*, Attachment D ("change pages" in Enclosure 5)**	
Section D-5d(3) The Agent Water Separator receives the mustard agent (HT/HD) and wash water from the drained and washed munitions and the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045 and -0046. The Agent Water Separator separates the wash water from mustard agent (HT/HD) based on density. Mustard agent (HT/HD) has a density greater than the density of water. The mustard agent (HT/HD) is the bottom phase and wash water is the upper phase. The agent phase is pumped to the agent hydrolyzers. The water phase is pumped to the MWS Wash Water Collection Tanks.	The spent decontamination solution collected in referenced sumps will be transferred to the Agent-Water Separator Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagram 24852-RD-M5-B05-B0004 (PDF page 55)].
Section D-5d(4) The MWS Wash Water Collection Tanks receive the wash water portion from the Agent Water Separator Tanks, the contents of the Spent Decon Holding Tanks, the condensate from the autoclave condensate drum, and the spent decontamination solution collected in sumps MT-B05-0047, -0048, and -0066. The contents of the MWS Wash Water Collection Tanks are transferred intermittently to the agent hydrolyzers according to the requirements of the hydrolyzer recipe.	The contents of the SDS Tanks #1 and #2 will be transferred to the MWS Wash Water Collection Tanks, and not to the Agent Hydrolyzer Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6) and revised flow diagram 24852-RD-M5-B05-B0001 (PDF page 54)]. The condensate from the autoclave condensate drum will be transferred to the MWS Wash Water Collection Tanks, and not to the SDS Tanks #1 and #2. [Reference: DCN 24852-RD-M6N-B05-

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	M0047, B05 Upstream Changes (PDF page 7) and revised flow diagram 24852-RD-M5-B24-B0004 (PDF page 57)]. The spent decontamination solution collected in referenced three sumps will be transferred to the MWS Wash Water Collection Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagram 24852-RD-M5-B0 - B0005 (PDF page 56)].
Section D-5d(5) Spent Decon ~~Holding~~ Tank~~s~~ System The Spent Decontamination Holding Tanks aggregate the following waste streams: spent decontamination/rinse solutions from the APB, ERB, and medical facility; condensate from APB air handling units, steam lines, and hot process water~~, and autoclave~~; blowdown from the OTS scrubber; process liquids, including hydrolysate, that are generated during maintenance, repair, and decontamination activities; cleanup after incidental spills of fluids from industrial equipment in the immediate area of a spent decon system sump (e.g., propylene glycol, or lubricating fluids from the ~~metering~~ pumps~~ in the Tox Room.~~); fire suppression discharges; and spent decontamination solution collected in sumps located throughout the APB, except for the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066 as stated in Sections D-5d (3) and D-5d (4). The quantity of the liquids entering the category B and C sumps from incidental spills from industrial equipment during maintenance activities will be maintained to be one gallon or less. The quantity of hydraulic fluid entering the lined category A sumps (MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066) from spills from industrial equipment will be 50 gallons or less. The quantity of other liquids entering the lined category A sumps from industrial equipment will be one gallon or less. Tank systems cannot be drained or flushed into the lined category B and C decon system sumps without prior evaluation of engineering controls and material compatibility, and submittal of a summary of the engineering evaluation signed by a licensed Colorado professional engineer to CDPHE. Draining or flushing activities of ancillary equipment (e.g., piping) into lined category B and C sumps during routine maintenance activities that had previous engineering evaluations signed by a licensed Colorado professional engineer and approved by CDPHE will be performed without requiring additional, repeated evaluations and approvals. PCAPP will notify the Division within 24 hours after the flushing activity is completed.	The condensate from the autoclave condensate drum will be transferred to the MWS Wash Water Collection Tanks, and not to the SDS Tanks #1 and #2. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagram 24852-RD-M5-B24-B0004 (PDF page 57)]. Revised waste stream description to include fire suppression discharges and to clarify that spent decon solutions from specific sumps will no longer be transferred to the SDS tanks. Revised volume based on data of historical spills in the MWS room (maximum volume of 50 gallons entering the sumps) and additional volume allowance based on the volume of hydraulic fluid contained within the APB equipment. Addition of these quantities of hydraulic fluid will not negatively impact the downstream treatment processes or the equipment. The requirement to evaluate the engineering controls and material compatibility of wastes drained or flushed from APB tank systems into sumps is based on the incompatibility of carbon steel piping with acidic solutions. The carbon steel piping associated with the Category A sumps will be replaced with 316L stainless steel piping and FEP lined hoses. The carbon steel transfer lines associated with the Category B and C

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	sumps will remain in service. Therefore, this paragraph has been revised to clarify that evaluations are required prior to draining or flushing tank systems into lined Category B and C sumps.
Section D-5d(6) The agent hydrolyzers receive feed streams from: hot process water, MWS Wash Water Collection Tanks, ~~Spent Decon Holding Tanks,~~ mustard agent (HD/HT) from the Agent Water Separator Tanks, and sodium hydroxide (NaOH). Mustard agent (HD/HT) is neutralized by a hydrolysis reaction producing agent hydrolysate. The agent hydrolysate is a permitted waste and has the K903 hazardous waste code.	The contents of the SDS Tanks #1 and #2 will be transferred to the MWS Wash Water Collection Tanks, and not directly to the Agent Hydrolyzer Tanks. Therefore, agent hydrolyzer batches will contain mixtures of MWS wash water and spent decon solutions from the MWS Wash Water Collection Tanks.
***Inspection Plan*, Attachment K ("change pages" in Enclosure 6)**	
Section K-5b ~~With the exception of the sumps in the Off-gas Treatment Room (APB-116) and Hydrolysate Hold Tank Room (APB-122), the~~ ~~c~~Carbon-steel lined sumps are considered ancillary equipment to the Spent Decon Tanks, Agent Water Separator Tanks or MWS Wash Water Collection Tanks and are therefore considered primary containment. PCAPP may routinely and intentionally transfer wastes to these ancillary equipment sumps. For example, decontamination operations generate spent decontamination solution that flows to these sumps. These sumps have low storage capacities and short accumulation times. Each sump is equipped with level switches/alarms that identify the presence of liquids and dedicated pumps that are used to transfer the sump contents to the Spent Decon Tanks, Agent-Water Separator or MWS Wash Water Collection Tanks, which are all located in the Toxic Room (APB-120) (excluding a quantity that the sump pump cannot remove – this waste will remain in the lined sump). … The leak detection equipment of the lined sumps is maintained quarterly in accordance with Job Plan PMI-001029. ~~Inspection of the steel liner itself shall be in accordance with the method and frequency stated in 24852-RD-30G-000-V0001, *Corrosion Monitoring Plan for RCRA Tank Systems* that is incorporated into this permit.~~	Revised to clarify the updated equipment configuration in DCN 24852-RD-M6N-B05-M0047. Revision 009 of the *Corrosion Monitoring Plan for RCRA Tank Systems* refers to the *Inspection Plan* inspections; therefore, this revision removes a circular reference.
Table K-11 **Munitions Washout System (MWS) Room - APB 125 ref. dwg. 24852-RD-P1-APB-P0001** Sump Pumps (MP-B05-0041, ~~-0042,~~ -0044, -00814~~5~~) *Item:* Released HWCs *Frequency:* D *Types of Problems:* **Problem**: Presence of RCRA-regulated HWCs. **Inspection**: Inspect the floor~~area~~ for any liquids unrelated to	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047 and 24852-RD-OCD-B05-00006.

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ongoing decontamination or maintenance operations. *Item:* Pipes, Valves and Fittings *Frequency:* D *Types of Problems:* **Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon stainless steel piping and hoses, valves and fittings and the B04-AG1-Agent pipes, valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release HWCs. *Item:* Sump 42 *Frequency:* W *Types of Problems:* **Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 42 travels through the trench and terminates into Sump 45 for indications of leakage, corrosion or damage that has the potential to release HWCs. *Item:* Sump 44 *Frequency:* W *Types of Problems:* **Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 44 travels through the trench and terminates into the discharge piping of Surge Drum MV-B02-0101 Booster Pumps A/B for indications of leakage, corrosion or damage that has the potential to release HWCs.	
Table K-11 **Toxic Maintenance Area Category A Room - APB 126 ref. dwgs. 24852-RD-P1-APB-P0002, 24852-RD-P1-APB-P0005& 24852-RD-P1-APB-P0001** Sump Pump (MP-B05-0047) *Item:* Released HWCs *Frequency:* D *Types of Problems:* **Problem**: Presence of RCRA-regulated HWCs. **Inspection**: Inspect the floor~~area~~ for any liquids unrelated to ongoing decontamination or maintenance operations.	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047.

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Item: Pipes, Valves and Fittings *Frequency:* D *Types of Problems:* **Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon stainless steel piping~~pipes~~, hoses valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	
Table K-11 **Toxic Maintenance Area Category B Room - APB 127 ref. dwgs. 24852-RD-P1-APB-P0002 & 24852-RD-P1-APB-P0005** Sump Pump (MP-B05-0052) *Item:* Pipes, Valves and Fittings *Frequency:* D *Types of Problems:* **Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon pip~~es~~ing, valves, and fittings and the Autoclave condensate stainless steel piping, valves and fittings for indications of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047.
Table K-11 **Category A Airlocks - APB 134, 136 and 118 ref. dwg. 24852-RD-P1-APB-P0001, -P0004, & -P0005** Sump Pumps (MP-B05-0046, - 0048, -0040) *Item:* Pipes, Valves and Fittings *Frequency:* D *Types of Problems:* **Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon stainless steel piping, hoses~~pipes~~, valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047.
Table K-11 **Toxic Room - APB 120 ref. dwg. 24852-RD-P1-APB-P0002** **…** Spent Decon Feed Pumps (MP-B05-0101A & -0101B ~~and -0201A & -0201B~~) *(same revision at two locations)* *Item:* Pipes, Valves and Fittings	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047.

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Frequency: D *Types of Problems:* **Problem**: Damage, corrosion, or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B04-AG1-Agent, ~~B04-SD-Spent Decon,~~ B04-WW-Wash Water w/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid, ~~and B05-SD-Spent Decon~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves and fittings for indications of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to cause a release of HWCs and for those pipes, valves and fittings insulated, then inspect the insulation on the piping, valve or fitting for damage that could indicate leakage, or damage to the underlying pipe or fitting and that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the insulation or jacketing and deep dents in the insulation or jacketing.	
Inspection Forms/Sheets, Appendix K-4, *Inspection Plan* ("change pages" in Enclosure 7)	
Revisions to the following PCAPP Forms in accordance with Table K-11 of the *Inspection Plan:* • OPS-OAP-F018 (MWS) • OPS-OAP-F019 (TMA) • OPS-OAP-F020 (NW A-L) • OPS-OAP-F021 (SW A-L) • OPS-OAP-F022 (SE A-L) • OPS-OAP-F023 (TOX Wash Water) • OPS-OAP-F024 (TOX ANR) • OPS-OAP-F025 (TOX AWS) • OPS-OAP-F026 (TOX SDS) • OPS-OAP-F041 (TOX) • Created PCAPP Form OPS-OAP-F124 (MWS Sumps)	Revised to address inspection requirements for the updated ancillary equipment configuration described in DCN 24852-RD-M6N-B05-M0047.
***Operations Plan*, Attachment L ("change pages" in Enclosure 8)**	
Acronyms and Abbreviations SDS Spent Decontamination System	Addition to identify the use of the acronym "SDS".
Introduction: <u>APB Processing – Agent Neutralization</u> The agent water mixture from the washed agent and water surge drums is pumped to an Agent Water Separator (AWS) and the water phase collected in the MWS Wash Water Collection Tank. The ~~Agent Water Separator (~~AWS~~)~~ ~~T~~tanks ~~may only~~ receive the mustard agent/wash water mixture from the surge drum tanks and ~~rinse material~~spent decon. Spent decon from 6 (out of the total 9) category A sumps within the APB will be transferred to the AWS tanks (MV-B04-0001 and/or MV-B04-0002); remaining 3 (out of total 9) category A sumps and the autoclave condensate will be transferred to ~~T~~the MWS ~~W~~wash ~~W~~water (MWW) ~~C~~collection ~~T~~tanks (MV-B04-	Revised to describe the transfer of spent decon from Category A sumps to the Agent Water Separators and MWS Wash Water Collection tanks, and then transfer of the wash water and spent decon to the Agent Hydrolyzers. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B04-B0001 and B0002 (PDF pages 51 and 52)]

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0104 and/or MV-B04-0204)~~System may receive only the wash water portion from the AWS tanks and rinse material~~. In addition to the spent decon streams, wash water collection tanks will also collect wash water from the AWS tanks. The agent concentrate from AWS tanks will be diverted to Agent Hydrolyzers. Both AWS and wash water collection tanks are flow controlled into the Agent Hydrolyzers also referred as Agent Neutralization Reactors (ANRs). Agent destruction occurs in the Agent Hydrolyzers where agent reacts with water to produce thiodiglycol and hydrochloric acid. The hydrolyzers are operated in a batch mode. Normal hydrolyzer batches consist of agent concentrate (HD or HT) from the Agent Water Separator Tank System, hot process water, steam, MWS wash water and/or spent decon from the MWS Wash Water collection tank system, ~~spent decontamination solution from the Spent Decon Tank System,~~ and sodium hydroxide solution~~ and possibly failed hydrolysate~~. Failed hydrolysate may be routed back to Agent Hydrolyzers for additional treatment. … Hot process water, MWS wash water and/or spent decon shall be added to the Agent Hydrolyzer Tank and mixed using the recirculation pump.	
Introduction: <u>APB Processing – Spent Decon Collection, Storage and Processing</u> The Spent Decon System (SDS) Tanks may receive only the following waste streams: spent decontamination/rinsate solutions from the Category B and C areas in the APB, from the ERB, and the medical facility; condensate from ~~APB~~ air handling units, steam lines, and hot process water~~, and autoclave~~; blowdown from the OTS scrubber; process liquids, including hydrolysate, that are generated during laboratory and other~~operations~~ sampling activities, maintenance, repair, and decontamination activities; cleanup after incidental spills, fire suppression discharges; ~~of~~ and fluids from industrial equipment in the immediate area of a spent decon ~~system~~ sump (e.g., propylene glycol, or lubricating fluids from the ~~metering~~ pumps). ~~in the Tox Room.).~~ The quantity of the liquids entering the category B and C sumps from incidental spills from industrial equipment during maintenance activities will be maintained to be one gallon or less. The quantity of hydraulic fluid entering the lined category A sumps from spills from industrial equipment will be 50 gallons or less. The quantity of other liquids entering the lined category A sumps from spills from industrial equipment will be one gallon or less. The primary decontamination solution for use at PCAPP is water supplied through the site water system. Other decontamination materials may be employed in the ERB and APB to augment the decontamination capabilities. Those materials include the use of	Revised for consistency with proposed changes to Section D-5d(5) of the *Waste Analysis Plan*, Attachment D. [justification for Section D-5d(5) change above]

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surfactants, commercially available decontamination solutions, steam, and other Permittee-approved decontamination solutions that do not interfere with the hydrolysis process. If a decontaminant/treatment solution is used that is known to generate a false positive/negative with the Agent Monitoring System, the Permittee shall perform a post-monitoring system challenge after use of the decontamination solution to demonstrate that the interferent is not causing a continued impact to the MINICAMS® and DAAMS prior to placing the monitoring system back online. Tank systems cannot be drained or flushed into the lined category B and C decon system sumps without prior evaluation of engineering controls and material compatibility in accordance with Section D-5d(5) of the Waste Analysis Plan, Attachment D of this Permit.~~Tank systems cannot be drained or flushed into the decon system sumps without prior evaluation of engineering controls and material compatibility, and Colorado Department of Public Health and Environment (CDPHE) approval of a permit modification submitted in accordance with 6 CCR 1007-03 §100.63.~~	
Introduction <u>APB Processing – Agent Hydrolyzer Tanks and Agent Hydrolysate Hold Tanks</u> The agent hydrolyzer tanks may receive only the following waste streams: hot process water, waste from the MWS w~~W~~ash w~~W~~ater c~~C~~ollection t~~T~~anks, Agent Water Separator (AWS tanks), and sodium hydroxide (NaOH). MWS wash water tanks receive influent from spent decon holding tanks, category A sumps (3 out of total 9) and condensate from autoclave. Further, spent decon holding tanks receive decon fluids from personnel and equipment decon activities in Category B and C areas and condensate from Agent Processing Building (APB) air handling units (which drain to the sumps). ~~and the Spent Decon Holding Tanks, mustard agent (HD/HT) from the Agent Water Separator Tanks, and sodium hydroxide (NaOH).~~	Revised to improve process flow description.
PCAPP Waste Flowchart – 1 of 5 *Replaced figure with identically worded image*	Replaced figure with identical image with "track changes" accepted. No revisions except red strikeout font text deleted and blue font text changed to black color font.
Section III, Waste Characterization Replaced "WAP Table D-1" with "WAP Table D-5-1" for the following systems: • Munitions Transport and Storage – B23 • Munitions Unpacking and Projectile Disassembly – B01 • Munitions Washout System – B02 • Munitions Treatment Unit (MTU) – B03 • Agent Collection and Neutralization – B04 • Toxic Storage and Spent Decon – B05 • Biotreatment (BTA) and Bioreactor Offgas Treatment – B09/B11 • Water Recovery System – B14 • Brine Reduction System – B12	Corrected *Waste Analysis Plan* table number. *[These revisions are not included in the change pages in Enclosure 7. The proposed revisions are identified using track changes in the MS Word files on the enclosed CD.]*

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• Secondary Waste Treatment – B24 • Off-Gas Treatment System – B20 • AFA Filtration System – M07	
System Schematics: added the following figure numbers and titles. No revisions were made to the figures. • "Figure L-2" for Munitions Transport and Storage – B23 • "Figure L-3–Munitions Unpacking and Projectile Disassembly Schematic" for Munitions Unpacking and Projectile Disassembly – B01 • "Figure L-4–Munitions Washout Schematic" for Munitions Washout System – B02 • "Figure L-5–Munitions Treatment Unit" for Munitions Treatment Unit (MTU) – B03 • "Figure L-6–Agent Collection and Neutralization Schematic" for Agent Collection and Neutralization – B04 • "Figure L-7–Toxic Storage and Spent Decon Schematic" for Toxic Storage and Spent Decon – B05 • "Figure L-8–Biotreatment & Bioreactor Off-Gas Treatment Schematics" for Biotreatment (BTA) and Bioreactor Offgas Treatment – B09/B11 • "Figure L-9–Water Recovery System Compliance Schematic" for Water Recovery System – B14 • "Figure L-10–Brine Reduction System Compliance Schematic" for Brine Reduction System – B12 • "Figure L-11–Secondary Waste Treatment Schematics" for Secondary Waste Treatment – B24 • "Figure L-12–Off-Gas Treatment System Schematic" for Off-Gas Treatment System – B20 • "Figure L-13–ERB Ventilation System Schematic" for ERB Ventilation System – M02 • "Figure L-14–APB Ventilation System Schematic" for APB Ventilation System – M03 • "Figure L-15–Filtration System Schematic" for AFA Filtration System – M07	Added figure numbers to pages containing the figures for consistency with the Lists of Figures in the *Operations Plan* table of contents. *[These revisions are not included in the change pages in Enclosure 8. The proposed revisions are identified using track changes in the MS Word files on the enclosed CD.]*
Section VI, Hazard Analysis, Health and Safety Requirements, PPE Added the procedure "Personal Protective Equipment, 24852-SAF-SAP-W0022" to Section VI in the following systems: • Munitions Washout System – B02 • Agent Collection and Neutralization – B04 • Toxic Storage and Spent Decon – B05	Added the procedure "Personal Protective Equipment" to clarify that the requirements with both procedures "Personal Protective Equipment" and "Toxic Chemical Agent Safety" are used for PPE selection.
Compliance tables, added table numbers to the following systems: • "L-4" for system Munitions Washout System – B02 • "L-8" for system Biotreatment (BTA) and Bioreactor Offgas Treatment – B09/B11 • "L-9" for Water Recovery System – B14 • "L-11" for Secondary Waste Treatment – B24 • "L-13" for ERB Ventilation System – M02 • "L-14" for APB Ventilation System – M03	Added table numbers to pages containing the tables for consistency with the Lists of Tables in the *Operations Plan* table of contents.

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• "L-15" for AFA Filtration System – M07 • "L-16" for Agent Monitoring System (AMS) – J02	
Munitions Washout System – B02 compliance table *Line Number:* 46 *Equipment Number and Description:* MP-B02-02~~1~~01A Washed agent and water booster pump – 0201A – line 2 MP-B02-02~~1~~01B Washed agent and water booster pump – 0201B – line 2 *Operating Parameter:* B02 – Washed agent and water booster pumps 0201A and 02~~1~~01B – line 2 - (both pumps) – motive air – pressure – low	Corrected pump number
Agent Collection and Neutralization – B04, Section 1.1 Two agent hydrolyzers are used for agent hydrolysis. The process stream that exits the ANS is hydrolysate. After determination that the hydrolysate does not contain agent at a concentration above the performance-based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing. ~~When the hydrolysis reaction is complete, the hydrolysate is transferred from the agent hydrolyzers to the 7hydrolysate hold tank. Agent hydrolysate is held in the agent hydrolysate hold tank, where it is sampled to confirm agent destruction. Agent hydrolysate that is cleared for release is pumped to the thirty-day storage tanks where it is stored prior to feeding to the immobilized cell bioreactors (ICBs).~~	Moved text from Section V. Decontamination Information to clarify the treatment process criteria.
Agent Collection and Neutralization – B04, Section 1.2.1 The two agent-water separators receive HD/wash water or HT/wash water mixtures from MWS lines 1 and 2 and spent decon from B05 system category A sumps (MT-B05-0040, -0041, 0042, -0044, -0045, -0046).	The spent decontamination solution collected in the specified Category A lined sumps will be transferred to the Agent-Water Separator Tanks as depicted in Figures 1 and 2 of this permit modification request. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B05-B0004 (PDF page 55)].
Agent Collection and Neutralization – B04, Section 1.2.2 The MWS wash water collection tanks receive wash water from the agent-water separators, spent decon from spent decon holding tanks (MV-B05-0101 and/or MV-B05-0201), category A sumps (MT-B05-0047, -0048, -0066) and condensate from autoclave. MWS wash water collection tanks (containing wash water and/or spent decon) ~~is~~are pumped to feed the agent hydrolyzers intermittently according to the requirements of the hydrolyzer recipe. Simultaneously, part of the wash water is recirculated through agitating nozzles provided at the tank bottoms to keep the tank well mixed.	The spent decontamination solution collected in the Category A lined sumps will be transferred to the MWS Wash Water Collection Tanks as depicted in Figures 1 and 2 of this permit modification request. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Upstream Changes (PDF page 7) and revised flow diagrams 24852-RD-M5-B05-B0005 (PDF page 56)].

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… ~~Collected Wash Water Pumps are transfer MWS wash water to the agent hydrolyzers.~~ A flow totalizer measures the amount of agent hydrolyzer feed that is pumped from the wash water collection tanks~~wash water that is transferred to the agent hydrolyzers~~. When the batch quantity is reached, flow to the hydrolyzer is stopped by a control valve.	Revised to clarify the process description.
Agent Collection and Neutralization – B04, Section 1.3.1 Two agent hydrolyzers operate in a batch sequence that is controlled by the FCS. The agent hydrolyzers treat the agent according to a recipe consisting of agent, hot process water, MWS wash water and/or spent decon, and sodium hydroxide (NaOH)~~, and spent decon.~~ Liquid level indicators in the agent hydrolyzer tanks signal shutdown of the pumps and the inlet valves, as required. Feed streams enter the hydrolyzer as follows: • One nozzle for the MWS wash water (MWS wash water and/or spent decon)	Revised to clarify that agent hydrolyzer batches will contain mixtures with variable concentrations of MWS wash water and spent decon solutions from the MWS Wash Water Collection Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6)
Agent Collection and Neutralization – B04, Section V. ~~The process stream that exits the ANS is hydrolysate. After determination that the hydrolysate does not contain agent at a concentration above the performance based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing.~~ ~~The~~ Ppotential exists to generate agent-contaminated liquid and cleanup materials. Decontamination solutions may be collected in the room sumps and pumped to the spent decon holding tanks, agent water separators, MWS wash water collection tanks ~~system~~ or to containers for transfer and treatment.	Moved ANS process description to Section 1.1 of the B04 section of the *Operations Plan*.
Agent Collection and Neutralization – B04 1st compliance table *(Line numbers prior to re-numbering to address deleted row)* *Line Numbers:* 26, 29 through 34, 36 through 39 *Equipment Number and Description:* MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers *Line Numbers:* 27 *Equipment Number and Description:* MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers *Operating Parameter:* Gallons of wash water and/or spent decon[(b)]	Corrected Agent Hydrolyzer tank numbers. Corrected Agent Hydrolyzer tank numbers and updated the waste stream description [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 7)].

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Line Number: 28 – *deleted entire row* *Equipment Number and Description:* ~~MV-B04-0101/0201~~ ~~Agent hydrolyzers~~ *Operating Parameter:* ~~Gallons of spent decon~~[b] *Method for Monitoring:* ~~B04-FQIS-7042~~ *Response Level:* ~~1~~ *Line Number:* 35 *Equipment Number and Description:* MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers *Method for Monitoring:* B04-LAL-0961~~B~~A	The contents of the SDS Tanks #1 and #2 will be transferred to the MWS Wash Water Collection Tanks and will not be transferred directly to the Agent Hydrolyzer Tanks. The volume of the transfer from the MWS Wash Water Collection Tanks is measured by the totalizer B04-FQIS-7062 in Line 27 of the B04 compliance table. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6) and revised flow diagram 24852-RD-M5-B05-B0001 (PDF page 51)]. Corrected instrument tag number to B04-LAL-0961A
Agent Collection and Neutralization – B04 2nd compliance table *Line Numbers:* 2 through 22, and 66 *Equipment Number and Description:* MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers *Line Numbers:* 24 and 25 *Equipment Number and Description:* MP-B04-0103A/B Agent Hydrolyzer Recirculation Pumps *Line Numbers:* 27, 29, 31, 33 *Equipment Number and Description:* MV-B04-0103/0203 Agent hydrolysate hold tanks *Line Numbers:* 28, 30, 32, 34 *Equipment Number and Description:* MV-B04-0103/0203 Agent hydrolysate hold tanks *Line Number*: 5~~9~~5 *Line Number:* 61 *Equipment Number and Description:*	Corrected equipment numbers, equipment names/descriptions, operating parameter, and the instrument numbers for the methods of monitoring. 95 corrected to 55

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MP-B04-0106A/B MP-B04-0206A/B MP-B04-0306A/B Bioreactor Transfer Pumps *Method for Monitoring:* B04-TIT-7198 *Line Number:* 67 *Equipment Number and Description:* MV-B04-0102~~1~~/0202~~1~~ Agent hydrolyzers *Operating Parameter:* Gallons of wash water and/or spent decon (Monitored during Failed Hydrolysate Batch Operations) *Method for Monitoring:* B04-F~~G~~QIS-7062 *Line Number:* 68 – *deleted entire row* *Equipment Number and Description:* ~~MV-B04-0101/0201~~ ~~Agent hydrolyzers~~ *Operating Parameter:* ~~Gallons of spent decon~~ ~~(Monitored during Failed Hydrolysate Batch Operations)~~ *Method for Monitoring:* ~~B04-GQIS-7042~~ *Response Level:* ~~1~~ *Line Number:* 69 *Equipment Number and Description:* MV-B04-0102~~1~~/0202~~1~~ Agent hydrolyzers *Operating Parameter:* Gallons of caustic (Monitored during Failed Hydrolysate Batch Operations) *Method for Monitoring:* B04-F~~G~~QIS-7175 Note: h. Temperature range presented is for agent concentration batches. For other batch types (wash water and/or~~,~~ spent decon, failed batch), the temperature range is ambient to 195 ^{0}F.	Separate quantification of spent decon in the Agent Hydrolyzer batches is no longer applicable to the proposed design. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6)]
Toxic Storage and Spent Decon – B05, Section 1.1 The Spent Decon Tank system collects the following waste	Revised for consistency with proposed

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streams: spent decontamination (and rinse) solutions from the decontamination of personnel, equipment, and building features in the APB, ERB, and medical facility; fire suppression discharges collected in Category ~~A,~~ B, and C areas within the APB; ~~autoclave condensate from the Autoclave Condensate Drum Tank;~~ condensate from the APB air handling units, steam lines, and Hot Water Process; blowdown from the OTS scrubber; ~~condensate from the Autoclave;~~ process liquids generated during maintenance and repair activities, including flushing and draining of process equipment and tank systems during maintenance, repair, and decontamination activities; sample returns; and cleanup after spill of fluids from industrial equipment (e.g., propylene glycol and lubricating fluids). ~~These waste streams are collected from sumps located in category A, B, and C rooms of the APB that are pumped to the spent decon holding tanks~~ The contents of the two spent decon holding tanks (MV-B05-0101/0201) are transferred to the MWS wash water collection tanks. MWS wash water collection tanks comingle wash water with other fluids from Category A sumps (MT-B05-0047, -0048, -0066) and with condensate from autoclave. ~~agent hydrolyzers for processing.~~ Comingled spent decon and wash water mixture is flow controlled to ~~Aggregation and intermediate storage in the spent decon tanks~~ provide~~s~~ a more uniform solution for the agent hydrolyzer batch feed.	changes to Section D-5d(5) of the *Waste Analysis Plan*, Attachment D. [justification for Section D-5d(5) change above]
Toxic Storage and Spent Decon – B05, Section 1.2.1 Transfer of spent decon waste streams from the following category B and C sumps (identified by pump number) are transferred to Spent Decon Tank #1 (MV-B05-0101) and #2 (MV-B05-0201). • Sump pumps MP-B05-0049 and -0050 (TMA airlock) • Sump pump MP-B05-0051 (Off-gas Treatment Room) • Sump pump MP-B05-0052 (TMA Category B Room) • Sump pump MP-B05-0053 (Glove Box Vestibule) • Sump pump MP-B05-0054 (TMA Category C Room) • Sump pump MP-B05-0055 (MWS Washout Water Storage Room) • Sump pumps MP-B05-0056 and -0074 (MTU Room) • Sump pump MP-B05-0057 (MWS Room Airlock) • Sump pump MP-B05-0058 (TMA Air Lock) • Sump pumps MP-B05-0059 and -0060 (Munitions Receiving and Traveling Area) • Sump pump MP-B05-0061 (Agent Hydrolysate Tank Room) • Sump pump MP-B05-0062 (East Corridor) • Sump pump MP-B05-0063 (West Corridor) • Sump pumps MP-B05-0064, -0065, and -0069 (MWS Room Air Lock) • Sump pump MP-B05-0070 (Off-gas Treatment Room) • Sump pump MP-B05-0075 (South Corridor)	Added a list of which sump pumps will continue to transfer to the SDS tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6) and revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56)]

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Offgas Treatment System (OTS) scrubber blowdown is also transferred through a header to the Spent Decon Tanks. Sumps located in areas that could potentially store agent-containing waste are lined and have leak detection probes between the liner and the sump walls (e.g., category A sumps ~~MT-B05-0051 located within the curb surrounding the venture scrubber~~). Sumps located in areas that do not have the potential to store agent-containing waste are unlined. Contents of lined category A sumps are transferred to the following vessels: • MT-B05-0040, -0041, -0042, -0044, -0045 and -0046 (these constitute the MWS washout and MWS room decon airlock sumps) are transferred to Agent Water Separators (MV-B04-0001/0002) • MT-B05-0047, -0048, -0066 (these constitute TMA decon airlock, TMA and Toxic Room sumps) are transferred to MWS wash water collection tanks (MV-B04-0104/0204). Spent decon waste from category A, B, and C sumps is transferred to the MWS wash water collection tanks directly, via the Agent Water Separators, or via the Spent Decon Tanks.	Added a list of which sump pumps will continue to transfer to the Agent Water Separators and the MWS Wash Water Collection Tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6); revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56), and system design description changes (PDF page 139)]
Toxic Storage and Spent Decon – B05, Section 1.2.3 The spent decon holding tanks receive spent decon from category B and C sumps and receive OTS scrubber blowdown, which is then transferred to MWS wash water collection tanks (MV-B04-0104/0204). ~~waste from multiple sources for collection, mixing, and then feed to the hydrolyzer tanks.~~ The FCS system provides continuous, sequential, and manual control of the spent decon storage system. Operation of the FCS for this system is performed by a control room operator. ~~The spent decon tank system is designed to manage liquids containing minor traces of agent. If wastes containing greater percentages of agent are received in the spent decon tank system, the recipe at the hydrolyzer will be adjusted to receive additional volume of spent decon waste or a special reactor batch consisting of only spent decon solution may be processed in the hydrolyzer. At this time, the amount of agent in the spent decon system that will trigger adjustment of the hydrolyzer recipe has not been determined. In the event that abnormal conditions have occurred that could cause elevated concentrations of agent to be present in the spent decon, an analysis of the events will be performed to estimate the amount of agent in the spent decon. Based on the analysis, the amount of agent in the next batch will be decreased or the spent decon will be processed as a wash water and spent decon batch. Since the processed batch must meet the criteria that the agent concentration~~	Updated the text to describe flow into and out of the SDS tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6) and revised flow diagrams 24852-RD-M5-B05-B0004 and -B0005 (PDF pages 55 and 56)]

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~~be below detection limits, all of the agent from the spent decon system will be destroyed.~~	
Toxic Storage and Spent Decon – B05, Section 1.2.4 Fluid from the spent decon tank is drawn from the tank and ~~either recirculated back to the tank, or~~ is transferred to the MWS wash water collection tanks. pH monitoring is conducted on the suction side of the spent decon feed pumps as an indicator of the pH of the waste being transferred through the piping upstream and downstream of the spent decon tanks. A low low alarm of pH ≤ 6.0 for greater than 30 continuous minutes will initiate a corrosion assessment of the carbon steel piping through which the spent decon waste had been transferred.	Revised to describe the proposed pH monitoring and the response to low pH conditions downstream of the SDS tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6), Process SD fluid pH alarm point justification (PDF page 12); revised P&ID 24852-RD-M6-B05-M0001 (PDF pages 40), and system design description and Setpoint Matrix changes (PDF page 143 and 147)]
Toxic Storage and Spent Decon – B05, Section V. ~~The p~~Potential exists to generate agent-contaminated liquid and cleanup materials. Decontamination solutions may be collected in the room sumps and pumped to the spent decon holding tanks, agent water separators, MWS wash water collection tanks~~system~~ or to containers for transfer and treatment.	Revised to clarify that spent decon will be transferred to the agent water separators and the MWS Wash Water Collection tanks, as well as to the SDS tanks.
Toxic Storage and Spent Decon – B05: Addition of title "Figure L-7–Toxic Storage and Spent Decon Schematic" Figure L-7 revised to identify transfers from SDS sumps to the Agent Water Separators, the MWS Wash Water Collection Tanks, and the Spent Decon Holding Tanks.	Figure updated to show that spent decon will be transferred to the SDS tanks, the Agent Water Separators and the MWS Wash Water Collection tanks.
Toxic Storage and Spent Decon – B05 compliance table *Line Numbers:* 1 and 2 *Equipment Number and Description:* MP-B05-0101~~0~~A/B ~~MP-B05-0201A/B~~ Spent Decon Feed Pump and Spare MV-B05-0101/0201~~10102~~ Spent Decon Holding Tanks *Line Number:* 3 *Equipment Number and Description:* MV-B05-0101~~/10102~~ Spent Decon Holding Tanks *Normal Operating Range:* ~~<8'9"~~<10.22 ft *Method for Monitoring:* B05-LSHH-0826A *Line Number:* 4 *Equipment Number and Description:*	Corrected equipment numbers, equipment names/descriptions, operating parameter, and the instrument numbers for the methods of monitoring. Corrected the normal operating range for consistency with the B05 Setpoint Matrix.

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MV-B05-0201~~0101/10102~~ Spent Decon Holding Tanks *Method for Monitoring:* B05-LSHH-0826B *Line Number:* 5 *Equipment Number and Description:* MV-B05-0101~~/~~0201~~10102~~ Spent Decon Holding Tanks *Line Numbers:* 21 through 25 *Equipment Number and Description:* MP-B05-0081~~45~~ *Line Numbers:* 46 through 48 *Equipment Number and Description:* MP-B05-0080~~42~~ Rm APB-125 Sump MWS Room SE (A) ~~Pumped by MP-B05-0047~~ *Line Number:* 49 *Equipment Number and Description:* MP-B05-0080~~42~~ *Line Numbers:* 108 through 111 *Equipment Number and Description:* MP-B05-0061 Rm APB-122 Sump Hydrolysate Tank Room (C) ~~P~~ *Line Numbers:* 137 *Equipment Number and Description:* MV-B05-0101/~~1~~0201 Spent decon holding tank *Line Number:* 138 – *deleted entire row* *Equipment Number and Description:* ~~MV-B05-010/10201~~ ~~Spent decon holding tank~~ *Operating Parameter:* ~~High high level~~ *Method for Monitoring:* ~~B05-LSHH-0826A/B~~ *Response Level:* ~~2~~ *Line Number:* 142 – *addition of new row*	Added the proposed pH monitoring and the response to low pH conditions in the suction side piping downstream of the SDS tanks. [Reference: DCN 24852-RD-M6N-B05-M0047, B05 Downstream Changes (PDF page 6), Process SD fluid pH alarm point justification (PDF page 12); revised P&ID 24852-RD-M6-B05-M0001 (PDF pages 40), and system design description and Setpoint Matrix

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Equipment Number and Description: MP-B05-0101A/B Spent decon feed pump *Operating Parameter:* pH low *Normal Operating Range:* >6.5 pH *Method for Monitoring:* B05-AAL-0848AA/BB *Frequency of Monitoring:* Continuous *Response Level:* 1 *Line Number:* 143 – *addition of new row* *Equipment Number and Description:* MP-B05-0101A/B Spent decon feed pump *Operating Parameter:* pH low low *Normal Operating Range:* >6 pH *Method for Monitoring:* B05-AIT-0848A/B *Frequency of Monitoring:* Continuous *Response Level:* 2(3) Notes: 1. The lined sumps and lined trenches are ancillary equipment to the Toxic Storage and Spent Decon System (B05) and to Agent Collection and Neutralization System B04. They are ~~and~~ not secondary containment. ~~These primary containment sumps also function as secondary containment for other equipment, and the sudden and unexpected rise of liquid within these sumps could indicate leakage or spills in the area.~~ 2. The vapor pressure is calculated based on the sum of the vapor pressures from the concentrations of the individual components in the liquid phase. 3. A low low alarm of pH ≤ 6.0 for a greater than 30 continuous minutes duration will initiate an investigation and a corrosion assessment of the carbon steel piping through which the spent decon waste had been transferred.	changes (PDF page 143, 147, 148, and 192)] Revised to include the B04 system ancillary equipment. Added clarification to the Level 2 response that is required if a low low pH alarms for a greater than 30-continuous minutes duration.
Administrative Changes in Operations Plan: (1) Page numbers have been revised in the footers throughout the Operations Plan, Attachment L in the PCAPP State-RCRA Permit. These revisions are included in the MS Word file for the Operations	Several page numbers have been omitted and on several pages the numbering is non-consecutive (e.g., pages in the

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Plan on the CD enclosed with this permit modification request, but are not included in the "change pages" unless the page contains other requested revisions. (2) Several headers were continued after section breaks.	Building and Corridors section of the Operations Plan) Corrected blank headers within the Operations Plan

Enclosure 3

Proposed Revisions to the *List of Permit Modifications*

with changes depicted using “track changes”

LIST OF PERMIT MODIFICATIONS

Modification: ~~#~~ B001 Class: 2 Effective Date: [insert date]
Title: "Spent Decontamination System (B05) – Long Term"
Summary: This permit modification request incorporates design changes for ancillary equipment to tank systems in the Agent Processing Building (APB) in response to concerns regarding Spent Decontamination System (SDS) piping integrity.

Enclosure 4

Proposed Revisions Part IV,

with changes depicted using “track changes”

if a leaking munition results in response and decontamination activities that affect MTU operations.

Each MTU is a pre-manufactured, commercially available, electrically heated oven that is constructed as described in the vendor supplied drawing(s). Each MTU shall be designed and constructed to withstand a continuous internal negative pressure of at least 2.25 inches water column. Stainless steel parts in each MTU shall conform to ASTM A269, A276, A 312, and A330. Carbon steel parts in each MTU shall conform to ASTM A36. Nuts, bolts, and other threaded fasteners in each MTU shall conform to ASME B18.2.1, ASME B18.2.2, ASTM A193, and ASTM A194. Metallic components making up the pressure boundary within the treatment chamber of each MTU that could potentially come into contact with Mustard Agent, agent vapor, or other corrosive vapors, other than vent lines, shall be fabricated from 316L or RA330 stainless steel. In line filter bodies shall be fabricated from 316L stainless steel. Vent lines from each MTU shall be fabricated from Hastelloy C.

Treated munitions bodies and base plates are discharged from each MTU into open-top steel bins located beneath dedicated discharge chutes outside the APB. While accumulating treated metal parts, each metal parts bin shall reside within a double-wall steel bin enclosure.

IV.A.4.d Agent and Washwater Collection System: The mixture of washwater and agent from the MWS Washed Agent and Water Surge Drum Tanks is pumped to the two (2) Agent-Water Separator Tanks. Agent concentrate from the Agent-Water Separator Tanks is pumped to the Agent Hydrolyzer Tanks (described in IV.A.4.e below) for treatment. The water phase in the upper section of the Agent-Water Separator Tanks is known as MWS Wash Water and is pumped to the two (2) MWS Wash Water Collection Tanks. The MWS Wash Water is pumped intermittently to the Agent Hydrolyzer Tanks according to the hydrolyzer recipe (see Operations Plan Agent Collection and Neutralization System compliance table). Spent decontamination solution is generated throughout the APB whenever equipment, building surfaces, and personnel are decontaminated.

The spent decontamination solution is collected in sumps located throughout the APB and pumped to one of two Spent Decon Holding Tanks, except for the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066. ~~The spent decontamination~~

~~solution is then pumped to the Agent Hydrolyzer Tanks in accordance with the hydrolyzer recipe.~~ The spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045 and -0046 is pumped to the Agent-Water Separator Tanks. The spent decontamination solution collected in sumps MT-B05-0047, -0048, and -0066 is pumped to the MWS Wash Water Collection Tanks. The MWS Wash Water Collection Tanks also receive the condensate from the autoclave condensate drum. All of these tanks are located in the Toxic Room (room APB-120).

Details regarding these tanks are provided in the following two tables:

Table IV.A.4.d.a: Agent and Washwater Collection System Tanks

Tank Name (Tag ID)	**Agent Water Separator Tanks #1 & #2 (MV-B04-0001, MV-B04-0002)**	**MWS Wash Water Collection Tanks #1 & #2 (MV-B04-0104, MV-B04-0204)**	**Spent Decon Holding Tanks #1 & #2 (MV-B05-0101, MV-B05-0201)**
Configuration & Dimensions	Each tank is a vertical vessel with a 2:1 semi-elliptical top head and a conical bottom head and internal baffle. Eight (8) feet inside diameter; 13.667 feet tall (tangent-to-tangent).	Each tank is a vertical vessel with 2:1 semi-elliptical heads. Eleven (11) feet inside diameter; 13 feet tall (bottom tangent-to-top tangent).	Each tank is a vertical vessel with a flat top head and 2:1 semi-elliptical bottom head. Six (6) feet inside diameter; 10 feet tall (bottom tangent-to-face of flange).
Drawings	24852-RD-M6-B04-M0009	24852-RD-M6-B04-M0001, 24852-RD-M6-B04-M0002, 24852-RD-M6-B04-M0004, 24852-RD-M6-B04-M0010	24852-RD-M6-B05-M0021 thru M0036, 24852-RD-M6-B05-M0001 thru M0004.
Nominal Wall Thickness (inches)	shell: 0.25 to 0.313; head: 0.35; cone: 0.375	shell: 0.313; head: 0.491	shell and bottom shell: 0.5; head: 1.375
Operating Volume[1] (gal.)	4,786 each tank	8,412 each tank	1,692 each tank
Design Pressure	15 psig max. & full vacuum	15 psig max. & full vacuum	15 psig max. & full vacuum
Design Temp.	150 ºF maximum	250 ºF maximum	150 ºF maximum
Pressure Safety Valve Setting	15 psig	15 psig	15 psig

Table IV.A.4.d.a: Agent and Washwater Collection System Tanks			
Tank Name (Tag ID)	**Agent Water Separator Tanks #1 & #2 (MV-B04-0001, MV-B04-0002)**	**MWS Wash Water Collection Tanks #1 & #2 (MV-B04-0104, MV-B04-0204)**	**Spent Decon Holding Tanks #1 & #2 (MV-B05-0101, MV-B05-0201)**
Overfill Prevention[2] (liquid levels are measured from the tank bottom)	HLL (mustard agent phase): ≤ 4.33 feet, level switch closes inlet valve. HLL (water phase): ≤ 10.83 feet; HHLL alarm: ≤11.33 feet; interlocked to shut off Washed Agent and Water Booster Pumps. (all measured from the lower level transmitter (LT) tap located above shell-cone junction)	HLL: ≤13.0 feet level switch closes inlet valve on operating tank and opens inlet valve to the other MWS Wash Water Collection Tank on standby. HHLL alarm: ≤14.00 feet (both measured from LT tap located below tank bottom)	HHLL alarm: ≤ 10.22 feet (measured from lowest LT tap located below tank bottom)
Design Codes	ASME Boiler & Pressure Vessel Code, Section VIII, Division 1; ASME B31.3 Category M for piping	ASME Boiler & Pressure Vessel Code, Section VIII, Division 1; ASME B31.3 Category M for piping	ASME Boiler & Pressure Vessel Code, Section VIII, Division 1; ASME B31.3 for piping
Material of Construction	Titanium, grade 7 for tank; titanium , grade 2 with a minimum 1/16 inch corrosion allowance for ancillary piping	Titanium, grade 2 for tank & ancillary piping (minimum 1/16 inch corrosion allowance for ancillary piping)	Stainless steel (316L) for tank; carbon steel piping with a minimum ⅛ inch corrosion allowance, stainless steel (316L) piping with no corrosion allowance, PureFlex FLEXCHEM chemical transfer hoses or equivalent (Teflon™ FEP hose with Viton™ O-ring seals) for ancillary piping

1 Operating Volume = Volume from bottom of tank to HHLL
2 HHLL = High-high liquid level; HLL = High liquid level; alarms shall alert Control Room Operators

Table IV.A.4.d.b: Spent Decon Holding Tank Ancillary Equipment Sumps and Sump Pumps			
Sump Tag Number[1]	**Sump Pump Tag Number**	**Drawings**	**Location in APB**
MT-B05-0040	MP-B05-0040	24852-RD-M6-B05-M0023	MWS room decon air lock
MT-B05-0041	MP-B05-0041	24852-RD-M6-B05-M0023	MWS room (NW)
MT-B05-0044	MP-B05-0044	24852-RD-M6-B05-M0025	MWS room (SW)
MT-B05-0045	MP-B05-008145	24852-RD-M6-B05-M0025	MWS room (NE)

Table IV.A.4.d.b: Spent Decon Holding Tank Ancillary Equipment Sumps and Sump Pumps			
Sump Tag Number[1]	**Sump Pump Tag Number**	**Drawings**	**Location in APB**
MT-B05-0046	MP-B05-0046	24852-RD-M6-B05-M0026	MWS room decon air lock
MT-B05-0047	MP-B05-0047	24852-RD-M6-B05-M00242~~6~~	Toxic Maintenance Area (TMA) Category A Room
MT-B05-0048	MP-B05-0048	24852-RD-M6-B05-M0027	TMA decon air lock
MT-B05-0066	MP-B05-0066	24852-RD-M6-B05-M0027	Toxic Room
MT-B05-0042	MP-B05-00804~~2~~	24852-RD-M6-B05-M0024	MWS Room (SE)
MT-B05-0050	MP-B05-0050	24852-RD-M6-B05-M0021	TMA air lock
MT-B05-0052	MP-B05-0052	24852-RD-M6-B05-M0021	TMA Category B Room
MT-B05-0051	MP-B05-0051	24852-RD-M6-B05-M0029	Off-gas Treatment Room
MT-B05-0061	MP-B05-0061	24852-RD-M6-B05-M0034	Agent Hydrolysate Tank Room
N/A	MP-B05-0049	24852-RD-M6-B05-M0028	TMA Air Lock
N/A	MP-B05-0069	24852-RD-M6-B05-M0028	MWS Room Air Lock
N/A	MP-B05-0065	24852-RD-M6-B05-M0022	MWS Room Air Lock
N/A	MP-B05-0055	24852-RD-M6-B05-M0031	MWS Washout Water Storage Room
N/A	MP-B05-0056	24852-RD-M6-B05-M0031	MTU Room
N/A	MP-B05-0074	24852-RD-M6-B05-M0036	MTU Room
N/A	MP-B05-0057	24852-RD-M6-B05-M0032	MWS Room Air Lock
N/A	MP-B05-0058	24852-RD-M6-B05-M0032	TMA Air Lock
N/A	MP-B05-0053	24852-RD-M6-B05-M0030	Glove Box Vestibule
N/A	MP-B05-0054	24852-RD-M6-B05-M0030	TMA Category C Room
N/A	MP-B05-0062	24852-RD-M6-B05-M0034	East Corridor
N/A	MP-B05-0070	24852-RD-M6-B05-M0029	Off-gas Treatment Room

Table IV.A.4.d.b: Spent Decon Holding Tank Ancillary Equipment Sumps and Sump Pumps			
Sump Tag Number[1]	**Sump Pump Tag Number**	**Drawings**	**Location in APB**
N/A	MP-B05-0075	24852-RD-M6-B05-M0036	South Corridor
N/A	MP-B05-0063	24852-RD-M6-B05-M0035	West Corridor
N/A	MP-B05-0064	24852-RD-M6-B05-M0035	MWS Room Air Lock
N/A	MP-B05-0059	24852-RD-M6-B05-M0033	Munitions Receiving and Traveling Area
N/A	MP-B05-0060	24852-RD-M6-B05-M0033	Munitions Receiving and Traveling Area

1 For rows where only sump pump tag numbers are shown, the sumps are considered secondary containment sumps (i.e., they are not lined with steel liners), and only their associated pumps are considered ancillary equipment to the Spent Decon Holding Tank System. Hazardous waste collected in these unlined sumps must be removed within 24 hours of detection as described in this section of the permit. Unlined sumps must not be utilized for the routine management of wastes. The other rows in the above table correspond to lined sumps, which are ancillary equipment to the Spent Decon Holding Tanks, the Agent Water Separators, or the MWS Wash Water Collection Tanks. ~~System.~~ After waste removal required by this section is performed, a quantity of waste that the sump pump cannot remove may remain in the lined sumps.

IV.A.4.e. Agent Neutralization System: Both of the Agent Hydrolyzer Tanks are located in the Toxic Room (room APB-120). Hazardous waste treatment of mustard agent (HD and HT) occurs in these reactor tanks. The Agent Hydrolyzer Tanks are insulated with one and a half (1.50) inches of cellular glass insulation. Each Agent Hydrolyzer Tank shall be equipped with an agitator designed to thoroughly mix the tank contents, resulting in a homogenous mixture. The in-line static mixers shall be designed to ensure that the agent processed in the hydrolyzers is in droplet form to facilitate the hydrolysis reaction. The Agent Hydrolyzer Tanks shall be supplied with compressed air to maintain pressure in the reactor when the neutralized hydrolysate is pumped to the Agent Hydrolysate Hold Tanks. Details regarding the Agent Hydrolyzer Tanks are provided in the following table:

IV.A. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

IV.B.1. The following table lists the approved waste codes for staging, treatment and/or storage in the MSMs and the MSM Corridor, the ERB, the Energetic Transfer Corridor and ESM, and the APB:

Building/Unit Description	**D – Codes**	**Listed Codes**
MSMs, MSM Corridor, and ERB	D001, D002, D003, D004-D011, D022, D028, D029, D030, D034, D039, D040, D043	K901 and K902, P081, U105
Energetic Transfer Corridor and ESM	D001, D003, D004 thru D011, D030	P081, U105 [K901 or K902 not allowed. Only non-agent-contaminated energetic components]
AGV Corridor	D002 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902
APB Permitted Rooms not specified elsewhere in this table	D002 thru D011 inclusive, D019, D022, D028, D029, D034, D039, D040, D043	K901, K902, K903
APB – MWS System	D002 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902, K903
APB – MTU System		
APB – Washed Agent and Water Surge Drum Tanks		
APB – Agent Water Separator Tanks		
APB – MWS Wash Water Collection Tanks	D002 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902, K903
APB – Agent Hydrolyzer Tanks	D002 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902, K903
APB – Agent Hydrolysate Hold Tanks	D002, D004 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902, K903
APB – Spent Decon Holding Tanks	D002, D003, D004 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902, K903
APB – SDU	D002, D003, D004 thru D011 inclusive, D022, D028, D029, D034, D039, D040, and D043	K901, K902,
APB – Autoclave		
Outside APB – Treated Metal Parts Collection Bins	None	K901

IV.D.4.c.vi. The design air flow through a CAM drain header and the associated Washed Agent and Water Surge Drum Tank System shall be at least 70 scfm and the MWS vent blower shall be operating while a munition is being accessed, drained, or washed within the respective MWS.

IV.D.4.c.vii. Reserved

IV.D.4.c.viii. Each munition that has been drained and rinsed with water in a CAM shall be weighed at the Munitions Treatment Unit (MTU). The weight criteria to be used for rejecting munitions is provided in the Operations Plan, Attachment L of this Permit.

IV.D.4.d. Agent Treatment Area (Toxic Room)

IV.D.4.d.i. Agent Water Separator Tank System: The Agent Water Separator Tanks may receive only the mustard agent/wash water mixture from the Washed Agent and Water Surge Drum Tanks, the spent decontamination solution collected in sumps specified in Section IV.A.4.d, and rinse material (e.g., line flushing).

IV.D.4.d.ii. MWS Wash Water Collection Tank System: The MWS Wash Water Collection Tanks may receive only the wash water portion from the Agent Water Separator Tanks, the contents of the Spent Decon Holding Tanks, the condensate from the autoclave condensate drum, the spent decontamination solutions collected in sumps specified in Section IV.A.4.d., and rinse material (e.g., line flushing).

IV.D.4.d.iii. Spent Decon Holding Tank System: The Spent Decon Holding Tanks may receive only the waste streams identified in Section D-5d(5) in the Waste Analysis Plan, Attachment D of this Permit.

IV.D.4.d.iv. Agent Hydrolyzer Tank System: The Agent Hydrolyzer Tanks may receive only the following waste streams/materials: hot process water, steam, the contents of the MWS Wash Water Collection Tanks, ~~MWS wash water from the MWS Wash Water Collection Tank System, spent decontamination solution from the Spent Decon Holding Tank System,~~ agent concentrate (HD or HT) from the Agent Water Separator Tank System, failed hydrolysate, rinse material (e.g., line flushing), and sodium hydroxide solution (25% NaOH). Agent shall be treated in the Agent

Hydrolyzer Tank System in accordance with the following requirements:

IV.D.4.d.iv.(A) Operational limits for ANR batches shall be:
- Monthly average not exceeding 6 ANR batches per day (30 consecutive days)
- ≤ 42 ANR batches per week
- Each batch ≤ 8.6% agent.

IV.D.4.d.iv.(B) Treatment of mustard agent (HD or HT) shall not occur within an Agent Hydrolyzer Tank unless storage capacity equal to the volume of hydrolysate to be produced from the Agent Hydrolyzer Tank is available in at least one Agent Hydrolysate Hold Tank.

IV.D.4.d.iv.(C) The amount of mustard agent (HD and HT) concentrate from the Agent Water Separator Tank System treated per batch shall not exceed what is specified in the agent batch treatment recipe provided in the Operations Plan (see Agent Collection and Neutralization System compliance table).

IV.D.4.d.iv.(D) For agent batches, hot process water shall be used and the temperature shall be 175ºF (+/- 5ºF) prior to adding any agent (HD or HT) concentrate. For other batch types (i.e., the contents of the MWS Wash Water Collection Tanks~~spent decon, wash water~~, failed hydrolysate batch), the acceptable temperature range is ambient to 195 ºF. For all batch types, the contents shall be thoroughly mixed using the recirculation pump.

IV.D.4.d.iv.(E) Only Pureflex UltraflexTM 2” convoluted PTFE-lined steel-braided flexible hose isolators, or Division-approved equal, shall be used on the discharge side of the ANR recirculation pumps. The Permittees shall use a 48-batch changeout frequency for the PTFE-lined isolator.

IV.D.4.d.iv.(F) When treatment of a batch of agent (HD or HT) is complete, the resulting hydrolysate solution in the Agent Hydrolyzer Tank must be stable at a pH greater than 10 for a minimum of 30 minutes

device is in the secured closed position. The settings at which the device opens shall be as established in Permit Condition IV.A.4.

IV.L.3.c.iii. Opening of a safety device, as defined in 6 CCR 1007-3, §265.1081, is allowed at any time conditions require doing so to avoid an unsafe condition.

IV.L.3.d. The Permittees shall inspect the air emission control equipment in accordance with the following requirements:

IV.L.3.d.i. The fixed roof and its closure devices shall be visually inspected by the Permittees, as specified in the Inspection Plan, Attachment K of this permit, to check for defects that could result in air pollutant emissions. Defects include, but are not limited to, visible cracks, holes, or gaps in the roof sections or between the roof and the tank wall; broken, cracked or otherwise damaged seals or gaskets on closure devices; and broken or missing hatches, access covers, caps, or other closure devices.

IV.L.3.d.ii. The Permittees shall perform an initial inspection of the fixed roof and its closure devices on or before the date that the tank accepts hazardous waste. Thereafter, the Permittees shall perform the inspections at least once every year except under the special conditions provided for in Permit Condition IV.L.6.

IV.L.3.d.iii. In the event a defect is detected, the Permittees shall repair the defect in accordance with the requirements of Permit Condition IV.L.5.

IV.L.4 The Permittees shall transfer hazardous waste to a Tank in accordance with the following requirement:

Transfer of hazardous waste to the tank from another tank shall be conducted using a continuous hard piping system or another closed system that does not allow exposure of the hazardous waste to the atmosphere.

IV.L.5. The Permittees shall repair each defect detected during an inspection performed in accordance with the requirements of IV.L.3.d. as follows:

IV.L.5.a. The Permittees shall make first efforts at repair of the defect no later than 5 calendar days after detection, and repair shall be completed as soon as possible but no later than 45 calendar days after detection except as provided in Permit Condition IV.L.5.b.

Enclosure 5

Proposed Revisions to *Waste Analysis Plan*, Attachment D,
with changes depicted using “track changes”

Munitions bodies processed outside the normal operating ranges in Table L-4 and L-5 are K901 listed hazardous waste. Each bin filled when processing outside the normal operating ranges in Table L-4 and L-5 will be monitored for mustard agent (HD/HT) using laboratory method, *DAAMS by GC-MSD* (24852-GPP-GGL-00302), at 0.00002 mg/m^3 (GPL).

- Mustard agent (HD/HT) ≥ 0.00002 mg/m^3 (GPL); the munitions bodies in the bin are agent-contaminated K901 hazardous waste and will be managed in accordance with Table D-5-1 of the WAP
- Mustard agent (HD/HT) < 0.00002 mg/m^3 (GPL); the munitions bodies in the bin are amenable for recycling as scrap metal

If the 8 hour GPL is not demonstrated the MTU treated munitions bodies and baseplates will be managed as K901 hazardous waste.

D-5d (3) Agent Water Separator

The Agent Water Separator receives the mustard agent (HT/HD) and wash water from the drained and washed munitions and the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045 and -0046. The Agent Water Separator separates the wash water from mustard agent (HT/HD) based on density. Mustard agent (HT/HD) has a density greater than the density of water. The mustard agent (HT/HD) is the bottom phase and wash water is the upper phase. The agent phase is pumped to the agent hydrolyzers. The water phase is pumped to the MWS Wash Water Collection Tanks.

D-5d (4) MWS Wash Water Collection Tanks

The MWS Wash Water Collection Tanks receive the wash water portion from the Agent Water Separator Tanks, the contents of the Spent Decon Holding Tanks, the condensate from the autoclave condensate drum, and the spent decontamination solution collected in sumps MT-B05-0047, -0048, and -0066. The contents of the MWS Wash Water Collection Tanks are transferred intermittently to the agent hydrolyzers according to the requirements of the hydrolyzer recipe.

D-5d (5) Spent Decon ~~Holding~~ Tank~~s~~ System

The Spent Decontamination Holding Tanks aggregate the following waste streams: spent decontamination/rinse solutions from the APB, ERB, and medical facility; condensate from APB air handling units, steam lines, and hot process water~~, and autoclave~~; blowdown from the OTS scrubber; process liquids, including hydrolysate, that are generated during maintenance, repair, and decontamination activities; cleanup after incidental spills of fluids from industrial equipment in the immediate area of a spent decon system sump (e.g., propylene glycol, or lubricating fluids from the ~~metering~~ pumps ~~in the Tox Room~~); fire suppression discharges; and spent decontamination solution collected in sumps located throughout the APB, except for the spent decontamination solution collected in sumps MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066 as stated in Sections D-5d (3) and D-5d (4).

The quantity of the liquids entering the category B and C sumps from incidental spills from industrial equipment during maintenance activities will be maintained to be one gallon or less.

The quantity of hydraulic fluid entering the lined category A sumps (MT-B05-0040, -0041, -0042, -0044, -0045, -0046, -0047, -0048, and -0066) from spills from industrial equipment will be 50 gallons or less. The quantity of other liquids entering the lined category A sumps from spills from industrial equipment will be one gallon or less.

Tank systems cannot be drained or flushed into the lined category B and C decon system sumps without prior evaluation of engineering controls and material compatibility, and submittal of a summary of the engineering evaluation signed by a licensed Colorado professional engineer to CDPHE. Draining or flushing activities of ancillary equipment (e.g., piping) into lined category B and C sumps during routine maintenance activities that had previous engineering evaluations signed by a licensed Colorado professional engineer and approved by CDPHE will be performed without requiring additional, repeated evaluations and approvals. PCAPP will notify the Division within 24 hours after the flushing activity is completed.

The Permittee will use water as a primary decontamination solution, with other decontamination products as needed to facilitate the decontamination process. Spent decontamination solutions include water and steam, soaps and surfactants, commercially available agent decontamination solutions, and other Permittee-approved decontamination solutions that do not interfere with the hydrolysis process. If a decontaminant/treatment solution is used that is known to generate a false positive/negative with the Agent Monitoring System, the Permittee shall perform a post monitoring system challenge after use of the decontamination solution to demonstrate that the interferent is not causing a continued impact to the MINICAMS® and DAAMS prior to placing the monitoring system back online. The Permittee will maintain all information necessary to demonstrate decontamination solutions will not interfere with MINICAMS required for personnel monitoring in the Operating Record for the facility.

The contents of the Spent Decon Holding Tanks are a permitted waste and must be stored and managed in accordance with Part IV of this Permit.

D-5d (6) Agent Hydrolyzers

The agent hydrolyzers receive feed streams from: hot process water, MWS Wash Water Collection Tanks, ~~Spent Decon Holding Tanks,~~ mustard agent (HD/HT) from the Agent Water Separator Tanks, and sodium hydroxide (NaOH). Mustard agent (HD/HT) is neutralized by a hydrolysis reaction producing agent hydrolysate. The agent hydrolysate is a permitted waste and has the K903 hazardous waste code.

Verification that the mustard agent has been neutralized is pH > 10. This an automated measurement at a specified time. The hydrolysate is transferred to the Agent Hydrolysate Hold Tanks. The verification of mustard agent (HD/HT) concentration is discussed below.

D-5d (7) Agent Hydrolysate Hold Tanks

The Agent Hydrolysate Hold Tanks receive hydrolysate and rinsate from the agent hydrolyzer tanks, and store the hydrolysate for verification that the mustard agent has been treated. The

Enclosure 6

Proposed Revisions to *Inspection Plan,* Attachment K,

with changes depicted using "track changes"

The sump surfaces are not subject to damage from traffic (e.g., forklift traffic) and are not expected to exhibit cracking or other deterioration. The ERB sumps shall be inspected quarterly for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) to the special coating that may expose underlying coating or concrete.

The RCRA inspection criteria and frequency of inspection of the ERB are found in Table K - 6.

K-5b Agent Processing Building (APB) Sump Inspection

~~With the exception of the sumps in the Off-gas Treatment Room (APB 116) and Hydrolysate Hold Tank Room (APB 122), the c~~Carbon-steel lined sumps are considered ancillary equipment to the Spent Decon Tanks, Agent-Water Separator Tanks or MWS Wash Water Collection Tanks, and are therefore considered primary containment. PCAPP may routinely and intentionally transfer wastes to these ancillary equipment sumps[1]. For example, decontamination operations generate spent decontamination solution that flows to these sumps. These sumps have low storage capacities and short accumulation times. Each sump is equipped with level switches/alarms that identify the presence of liquids and dedicated pumps that are used to transfer the sump contents to the Spent Decon, Agent-Water Separator or MWS Wash Water Collection Tanks, which are all located in the Toxic Room (APB-120) (excluding a quantity that the sump pump cannot remove – this waste will remain in the lined sump).

The steel-lined sumps are identified by sump tag number in Table IV.A.4.d.b of this permit. Some of these sumps have an integral floor trench that is constructed similarly as the sump (i.e., designed to provide primary and secondary liquid containment) and designed to convey liquids to the sump. The secondary containment system for each trench likewise drains to the sump secondary containment system. Each lined sump has a leak detection and alarm sensor that is part of the Facility Control System (FCS) and is located between the primary containment sump liner and the secondary containment concrete sump (both the primary steel liner and the secondary concrete are coated with special coatings). The FCS is the primary system that controls, monitors and provides alarms for PCAPP processes and tank systems. As these sumps

[1] The sumps in the Off-gas Treatment Room (APB 116) and Hydrolysate Hold Tank Room (APB 122) will not be used for primary containment and hazardous waste will NOT be intentionally poured or directed to these sumps.[2] In accordance with this Inspection Plan, the sumps in the Off-gas Treatment Room (APB 116) and Hydrolysate Hold Tank Room (APB 122) are inspected daily for the presence of unexpected liquid.

are designed to function as a liquid collection and detection system, they do not require inspection for the presence of HWCs[2]. The leak detection equipment of the lined sumps is maintained quarterly in accordance with Job Plan PMI-001029. ~~Inspection of the steel liner itself shall be in accordance with the method and frequency stated in 24852-RD-30G-000-V0001, *Corrosion Monitoring Plan for RCRA Tank Systems* that is incorporated into this permit.~~ The special coatings on the top of the steel liners (ancillary sumps and associated trenches) will be inspected once per quarter for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) that exposes underlying coating or metal. Documentation of the inspections, including those conducted per 24852-RD-30G-000-V0001, *Corrosion Monitoring Plan for RCRA Tank Systems*, shall be maintained as part of the Operating Record.

The sumps in the APB that are not provided a primary liner and that are considered secondary containment, and the lined sumps in the Off-gas Treatment Room (APB 116) and Hydrolysate Hold Tank Room (APB 122), are inspected daily for the presence of unexpected liquid and quarterly for integrity of construction and the special coating. Locations of the APB sumps are found in drawing 24852-RD-P1-APB-P0030. The RCRA inspection criteria and frequency of inspection of the APB are found in Table K - 11.

K-5c 30-day Tanks, BTA, BCFTs, and BRS Containments Sump Inspection

The sumps found in the containment areas for the 30-day Tanks, BCFTs and the sumps and trenches in the BTA and BRS containments, are lined with special coatings and are in place to collect accidental releases and naturally occurring precipitation. RCRA-regulated liquid HWCs are not normally stored or managed in these sumps and trenches nor are they subject to damage from rolling stock or waste handling equipment under normal conditions. These sumps and trenches will be inspected daily for spilled HWCs and precipitation. The special coatings of these sumps shall be inspected quarterly for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) to the special coating that exposes underlying coating or concrete.

[2] In accordance with this Inspection Plan, the sumps in the Off-gas Treatment Room (APB 116) and Hydrolysate Hold Tank Room (APB 122) are inspected daily for the presence of unexpected liquid.

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 3 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Munitions Washout System (MWS) Room - APB 125 ref. dwg. 24852-RD-P1-APB-P0001 Washed Agent and Water Surge Tank (MV-B02-0101 & -0201) Washed Agent and Water Booster Pump (MP-B02-0101A & -0101B and 0201A & -0201B) Cavity Access Machine (155-mm projectiles) (MZ-B02-0101 through -0105 and MZ-B02-0201 through -0205) Cavity Access Machine (105-mm projectiles) (MZ-B02-0106 through -0110 and MZ-B02-0206 through -0210) Cavity Access Machine (4.2-inch mortars) (MZ-B02-0111 through -0115 and MZ-B02-0211 through -0215) Sump Pumps (MP-B05-0041, ~~-0042,~~ 0044, -00814~~5~~)		
Released HWCs	D	**Problem**: Presence of RCRA-regulated HWCs.
		Inspection: Inspect the floor~~area~~ for any liquids unrelated to ongoing decontamination or maintenance operations.
24-hour Storage Limit	D	**Problem**: Munitions bodies stored, except on a Munition Reject Table, for longer than 24 hours.
		Inspection: Confirm that no munition body has been stored for longer than 24 hours.
Tank condition	D	**Problem**: Damage, corrosion or other deterioration of the tank causing a failure that leads to release of HWCs.
		Inspection: Inspect the Surge Tanks for damage or corrosion that could lead to a release of HWCs.
Overfill/Spill Control Equipment	D	**Problem**: Malfunction could lead to overfilling.
		Inspection: CON Operators monitor and record Washed Agent and Water Surge Tank liquid level and volume daily.
Washed Agent and Water Booster Pumps and Sump Pumps	D	**Problem**: The pumps are leaking HWCs.
		Inspection: Inspect the pumps to confirm that there is no leakage of washed agent or spent decon.

a. D = Once per calendar day; W = Once per calendar week; M = Once per calendar month; Q = Once per calendar quarter; S = Once per six-month calendar period; A = At least once during a 12-month period ± 30 calendar days.

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 4 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Munitions Washout System Room - APB 125 ref. dwg. 24852-RD-P1-APB-P0001		
Cavity Access Machine (CAM)	D	**Problem**: Mechanical damage or deterioration could lead to leaks of HWCs.
		Inspection: Inspect the cavity access machine (CAM) and surrounding area for any liquids unrelated to ongoing decontamination or maintenance operations. Inspect the CAM for damage that could result in leaks.
Munitions Handling Robot (MHR)	M	**Problem:** PM on MHR not performed.
		Inspection: Confirm that MHR PM has been performed in accordance with PMM-M-B02-007.
Pipes, Valves and Fittings	D	**Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs.
		Inspection: Inspect the B05-SD-Spent Decon stainless steel piping and hoses, valves and fittings and the B04-AG1-Agent pipes, valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release HWCs.
Sump 42	Weekly	**Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs.
		Inspection: Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 42 travels through the trench and terminates into Sump 45 for indications of leakage, corrosion or damage that has the potential to release HWCs.
Sump 44	Weekly	**Problem**: Damage, corrosion, or other deterioration of the pipes, valves, and fittings could lead to a mechanical failure and release of HWCs.
		Inspection: Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 44 travels through the trench and terminates into the discharge piping of Surge Drum MV-B02-0101 Booster Pumps A/B for indications of leakage, corrosion or damage that has the potential to release HWCs.

		metal, wood or plastic pallets. A row of hazardous waste containers or pallet edge (if pallet used) may be placed against, or less than 28 inches from, structural walls or non-portable equipment when a minimum 28-inch aisle space is maintained to the front of the row.
Steel-lined Sumps and Trenches	Q	**Problem**: Deterioration of the special coating.
		Inspection: Inspect the special coating applied to the metal for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, peeling, or similar) that exposes underlying coating or metal.
Toxic Maintenance Area Category A Room - APB 126 **ref. dwgs. 24852-RD-P1-APB-P0002, 24852-RD-P1-APB-P0005**& 24852-RD-P1-APB-P0001 Sump Pump (MP-B05-0047)		
Released HWCs	D	**Problem**: Presence of RCRA-regulated HWCs.
		Inspection: Inspect the floor~~area~~ for any liquids unrelated to ongoing decontamination or maintenance operations.

a. D = Once per calendar day; W = Once per calendar week; M = Once per calendar month; Q = Once per calendar quarter; S = Once per six-month calendar period; A = At least once during a 12-month period ± 30 calendar days.

Table K-11 Agent Processing Building (APB) Inspection (cont'd, pg. 6 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Toxic Maintenance Area Category A Room - APB 126 **ref. dwgs. 24852-RD-P1-APB-P0002, 24852-RD-P1-APB-P0005& 24852-RD-P1-APB-P0001** Sump Pump (MP-B05-0047)		
Inventory Limits, Aisle Space, and Configuration	D	**Problem**: Waste storage out of required configuration **Inspection**: Confirm the following: • Inventory limit does not exceed 26 total waste containers of RCRA-regulated secondary waste. Two (2) 4 ft x 6 ft bin containers are allowed and no more than twenty-four (24) 55-gallons drums. Containers > 55 gallon (e.g., 85/95-gallon drum containers) shall count as two (2) 55-gallon drums. Containers ≤ 55-gallons shall count as one (1) 55-gallon drum. Combination of container types is allowed but the limit of twenty-four (24) 55-gallon drum equivalents cannot be exceeded. • That containers are stored in dedicated areas that have boundaries marked-out on the floor or otherwise delineated. • That containers are not stacked more than one high nor exceed a vertical height of five (5) feet. • That pallets if used are metal. • That drum dollies if used are metal. • That noncombustible hazardous waste items (e.g., pumps, piping, etc.) that cannot be placed in a waste container due to size, shape or weight have the required aisle space[b]. • That all noncombustible hazardous waste items are placed on a metal pallet no more than one item high, unless CDPHE provides concurrence on an alternative storage arrangement/configuration[b]. • That containers and noncombustible hazardous waste items are arranged to allow their inspection in accordance with the Inspection Plan, Attachment K of this Permit.
Pipes, Valves and Fittings	D	**Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon stainless steel piping~~pipes~~, hoses valves, and fittings for

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 9 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Toxic Maintenance Area Category B Room - APB 127 ref. dwgs. 24852-RD-P1-APB-P0002 & 24852-RD-P1-APB-P0005 Sump Pump (MP-B05-0052)		
Pipes, Valves and Fittings	D	**Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs.
		Inspection: Inspect the B05-SD-Spent Decon pipesing valves and fittings, and the Autoclave condensate stainless steel piping, valves and fittings for indications of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.
Sump Pump	D	**Problem**: The pump is leaking HWCs.
		Inspection: Inspect the pump to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.
Containment System Special Coatings	W	**Problem**: Damage to floors, ramps, anchor bolts, anchor nuts and washers mounting equipment plates, support beams, tanks, other equipment, floor/equipment interface sealant or containment curbs that could compromise the integrity of the special coatings that prevent migration of HWCs to the environment.
		Inspection: Inspect the special coating applied to the secondary containment surfaces for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) that exposes underlying coating, concrete or metal. Inspect, when present, the caulking sealant that has been applied at the interface between equipment floor plates, support beams, tanks or other equipment bolted down for gaps or holes that exposes underlying coating, concrete or metal.
Steel-lined Sump and Trench	Q	**Problem**: Deterioration of the special coating.
		Inspection: Inspect the special coating applied to the metal for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, peeling, or similar) that exposes underlying coating or metal.

a. D = Once per calendar day; W = Once per calendar week; M = Once per calendar month; Q = Once per calendar quarter; S = Once per six-month calendar period; A = At least once during a 12-month period ± 30 calendar days

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 15 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Category A Airlocks - APB 134, 136 and 118 ref. dwg. 24852-RD-P1-APB-P0001, -P0004, & -P0005 Sump Pumps (MP-B05-0046, - 0048, -0040)		
Released HWCs	D	**Problem**: Presence of HWCs on floor. **Inspection**: Inspect the floor for the presence of any liquids unrelated to ongoing decontamination or maintenance operations.
Pipes, Valves and Fittings	D	**Problem**: Damage, corrosion or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs. **Inspection**: Inspect the B05-SD-Spent Decon valves and fittings, stainless steel piping, hoses~~pipes~~, valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.
Sump Pumps	D	**Problem**: The pump is leaking HWCs. **Inspection**: Inspect each of the pumps to confirm that there is no leakage of spent decon.
Containment System Special Coatings	W	**Problem**: Damage to floors, ramps, anchor bolts, anchor nuts and washers mounting equipment plates, support beams, tanks, other equipment, floor/equipment interface sealant or containment curbs that could compromise the integrity of the special coatings that prevent migration of HWCs to the environment. **Inspection**: Inspect the special coating applied to the secondary containment floor and curb surfaces for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) that exposes underlying coating, concrete or metal. Inspect, when present, the caulking sealant that has been applied at the interface between equipment floor plates, support beams, tanks or other equipment bolted down for gaps or holes that exposes underlying coating, concrete or metal.
Steel-lined Sumps	Q	**Problem**: Deterioration of the special coating. **Inspection**: Inspect the special coating applied to the metal for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, peeling, or similar) that

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 17 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Category C Airlocks - APB 144, 147 and 112 ref. dwg. 24852-RD-P1-APB-P0001, -P0004, & -P0005		
Containment System Special Coatings	W	**Problem**: Damage to floors, ramps, anchor bolts, anchor nuts and washers mounting equipment plates, support beams, tanks, other equipment, floor/equipment interface sealant or containment curbs that could compromise the integrity of the special coatings that prevent migration of HWCs to the environment.
		Inspection: Inspect the special coating applied to the containment floor and curb surfaces for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) that exposes underlying coating, concrete or metal. Inspect, when present, the caulking sealant that has been applied at the interface between equipment floor plates, support beams, tanks or other equipment bolted down for gaps or holes that exposes underlying coating, concrete or metal.
Coated Sump	Q	**Problem**: Deterioration of the special coating or mechanical damage or deterioration of the concrete could lead to a release of HWCs.
		Inspection: Inspect the special coating applied to the containment surfaces for damage (i.e., cracks exceeding $^{1}/_{32}$-inch width, or gaps, divots, or similar) that exposes underlying coating or concrete.
Toxic Room - APB 120 ref. dwg. 24852-RD-P1-APB-P0002 Agent/water Separator Tanks (MV-B04-0001& -0002) Collected Wash Water Pumps (MP-B04-0105A & -0105B and -0205A & -0205B) Agent Concentrate Pumps (MP-B04-0002A & -0002B) Wash Water Collection Tanks (MV-B04-0104 & -0204) Wash Water Pumps (MP-B04-00001A & -00001B) Spent Decon Holding Tanks (MV-B05-0101 & -0201) Spent Decon Feed Pumps (MP-B05-0101A & -0101B ~~and -0201A & -0201B~~) Agent Hydrolyzer Tanks (MV-B04-0102 & -0202) Agent Hydrolyzer Recirculation Pumps (MP-B04-0103A & -0103B and -0203A & -0203B) Sump Pump (MP-B05-0066)		
Released HWCs	D	**Problem**: Presence of released HWCs.

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 18 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Toxic Room - APB 120 ref. dwg. 24852-RD-P1-APB-P0002 Agent/water Separator Tanks (MV-B04-0001& -0002) Collected Wash Water Pumps (MP-B04-0105A & -0105B and -0205A & -0205B) Agent Concentrate Pumps (MP-B04-0002A & -0002B) Wash Water Collection Tanks (MV-B04-0104 & -0204) Wash Water Pumps (MP-B04-00001A & -00001B) Spent Decon Holding Tanks (MV-B05-0101 & -0201) Spent Decon Feed Pumps (MP-B05-0101A & -0101B ~~and -0201A & -0201B~~) Agent Hydrolyzer Tanks (MV-B04-0102 & -0202) Agent Hydrolyzer Recirculation Pumps (MP-B04-0103A & -0103B and -0203A & -0203B) Sump Pump (MP-B05-0066)		
Tank Condition	D	**Problem**: Damage, corrosion or other deterioration of the tank causing a failure that leads to a release of HWCs.
		Inspection: • Inspect the two Agent/water Separator Tanks, the two Wash Water Collection Tanks and the two Spent Decon Holding Tanks; and their nozzles, connections, and tank anchoring systems (i.e. legs, stanchions, and bolts) for damage and corrosion that has the potential to cause a release of HWCs. • Inspect the insulation on the two Agent Hydrolyzer Tanks for damage that could indicate damage to the underlying tank and that requires additional evaluation by a subject matter expert. This damage includes missing insulation or holes in the insulation, and deep dents in the insulation. • Inspect any uninsulated nozzles or connections on the Agent Hydrolyzer Tanks and their anchoring systems (i.e. legs, stanchions, and bolts) for damage and corrosion.
Overfill/Spill Control Equipment	D	**Problem**: Malfunction could lead to overfilling.
		Inspection: CON Operators monitor and record tank liquid volume and level daily.

a. D = Once per calendar day; W = Once per calendar week; M = Once per calendar month; Q = Once per calendar quarter; S = Once per six-month calendar period; A = At least once during a 12-month period ± 30 calendar days.

Table K-11 Agent Processing Building (APB) Inspection (cont'd pg. 20 of 26)

Item 6 CCR 1007-3 §264.15(b)(1)	Frequency[a] 6 CCR 1007-3 §264.15(b)(4)	Types of Problems 6 CCR 1007-3 §264.15(b)(3)
Agent Processing Building (APB)		
Toxic Room - APB 120 ref. dwg. 24852-RD-P1-APB-P0002		
Pipes, Valves and Fittings	D	**Problem**: Damage, corrosion, or other deterioration of the pipes, valves and fittings could lead to a mechanical failure and release of HWCs.
		Inspection: Inspect the B04-AG1-Agent, ~~B04-SD-Spent Decon,~~ B04-WW-Wash Water w/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid, ~~and B05-SD-Spent Decon~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves and fittings for indications of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to cause a release of HWCs and for those pipes, valves and fittings insulated, then inspect the insulation on the piping, valve or fitting for damage that could indicate leakage, or damage to the underlying pipe or fitting and that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the insulation or jacketing and deep dents in the insulation or jacketing.
Inventory Limits and Configuration	W	**Problem**: Hazardous waste not stored per requirements.
		Inspection: Confirm that no more than 10 hazardous waste items (or a total of 550 gallons of hazardous waste) are stored in the Toxic Room. Confirm that all storage of hazardous waste must be no more than 2 items/containers wide and no more than 2 high but only when the upper container is less than 55-gallons. Confirm that a minimum of 28-inches of aisle space is maintained between stored hazardous waste items/containers and the structural walls, non-portable equipment, and other rows of hazardous waste items/containers.

a. D = Once per calendar day; W = Once per calendar week; M = Once per calendar month; Q = Once per calendar quarter; S = Once per six-month calendar period; A = At least once during a 12-month period ± 30 calendar days.

Enclosure 7

Proposed Revisions to *Inspection Plan*, Attachment K,

Appendix K-4, Inspection Forms/Sheets, with changes depicted using “track changes”

Control Room APB MWS APB-125 Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**		**Method**	**Acceptance**	**Findings** (any unsatisfactory condition requires this section to be completed)
Munitions Washout System Room - APB 125 – Cameras 3305/3306/3310/3311/3314/3331/3315/3329/3318/3316/3312/3317/3313					
• **Washed Agent and Water Surge Tank (MV-B02-0101 & -0201)** • **Washed Agent and Water Booster Pump (MP-B02-0101A, & -0101B and 0201A & -0201B)** • **Cavity Access Machine (155 mm projectiles) (MZ-B02-0101 through -0105 and MZ-B02-0201 through -0205)** • **Cavity Access Machine (105 mm projectiles) (MZ-B02-0106 through -0110 and MZ-B02-0206 through -0210)** • **Cavity Access Machine (4.2-inch mortars) (MZ-B02-0111 through -0115 and MZ-B02-0211 through -0215)** • **Sump Pumps (MP-B05-0041, ~~-0042,~~ -0044, -0081 ~~-0045~~)**					
1	Inspect the floor~~area~~ for spills or leaks of any liquids unrelated to ongoing decontamination or maintenance operations liquids.		Remote	☐ Satisfactory	☐ Unsat
2	Confirm that no munition body has been stored for longer than 24 hours.		Remote	☐ Satisfactory	☐ Unsat
3	Inspect the Surge Tanks for damage or corrosion that could lead to a release of HWCs.	MV-B02-0101	Remote	☐ Satisfactory	☐ Unsat
		MV-B02-0201		☐ Satisfactory	☐ Unsat
4	Inspect the CAM and surrounding area for evidence of spills or leaks of mustard agent or hydrolysate or unexpected liquids. Inspect the CAM for damage that could result in leaks.		Remote	☐ Satisfactory	☐ Unsat
5	CON Operators monitor and record Washed Agent and Water Surge Tank liquid level daily.	MV-B02-0101	Remote		

Control Room APB MWS APB-125 Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
		MV-B02-0201				
6	Inspect the pumps / sump pumps to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations liquids.	MP-B02-0101A	Remote	☐ Satisfactory	☐ Unsat	
		MP-B02-0101B		☐ Satisfactory	☐ Unsat	
		MP-B02-0201A		☐ Satisfactory	☐ Unsat	
		MP-B02-0201B		☐ Satisfactory	☐ Unsat	
		MP-B05-0041		☐ Satisfactory	☐ Unsat	
		~~MP-B05-0042~~		☐ ~~Satisfactory~~	☐ ~~Unsat~~	
		MP-B05-0044		☐ Satisfactory	☐ Unsat	
		MP-B05-0081		☐ Satisfactory	☐ Unsat	
7	• Inspect the B05-SD-Spent Decon stainless steel piping and hoses, valves and fittings and the B04-AG1-Agent pipes, valves, and fittings for indications of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release HWCs. **Note**: The weekly inspection of the Sump 42 and Sump 44 Spent Decon discharge hose lines that run through the trenches are inspected using PCAPP Form OPS-OAP-F124 • For those pipes, valves and fittings insulated, then inspect the insulation on the piping, valve or fitting for damage that could indicate leakage, or damage to the underlying pipe or fitting and that requires additional evaluation by a subject matter expert.		Remote	☐ Satisfactory	☐ Unsat	

Control Room APB MWS APB-125 Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	This damage includes missing insulation, impact or corrosion holes in the insulation or jacketing and deep dents in the insulation or jacketing.				
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge				**Supervisor Initials**	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Toxic Maintenance Area A, Room APB-126					
MT-B05-0047 (A)- Cameras 3334/3335					
1	Inspect the floor~~area~~ for spills or leaks of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
2	Inspect the B05-SD-Spent Decon stainless steel piping~~es~~, hoses, valves and fittings for indicators of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
3	Inspect sump pump (MP-B05-0047) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
4	Confirm the following: • That the inventory limit does not exceed 26 total waste containers of RCRA-regulated secondary waste. Two (2) 4 ft x 6 ft bin containers are allowed and no more than twenty-four (24) 55-gallon drums. Containers > 55 gallon (e.g. 85/95-gallon drum containers) shall count as two (2) 55-gallon drums. Containers ≤ 55-gallons shall count as One (1) 55-gallon drum. Combination of containers types is allowed but the limit of twenty-four (24) 55-gallon drum equivalents cannot be exceeded.	Physical or Remote	☐ Satisfactory	☐ Unsat	
	• That the twenty-four (24) 55-gallon drum (or drum equivalents) and two (2) bin containers are stored in dedicated areas that have boundaries marked-out on the floor, or otherwise delineated.		☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	• That each container is marked with a unique container tracking/identification number.		☐ Satisfactory	☐ Unsat	
4	• That the labels are legible and oriented to allow inspection using CCTV.	Physical or Remote	☐ Satisfactory	☐ Unsat	
	• That drum containers are not stacked more than one high the containers are ≤ five (5) feet vertical height from bottom to top.		☐ Satisfactory	☐ Unsat	
	• That the waste bags in a bin container do not exceed a height of five (5) feet from the bottom of the bin.		☐ Satisfactory	☐ Unsat	
	• That pallets if used are metal.		☐ Satisfactory	☐ Unsat	
	• That drum dollies if used are metal.		☐ Satisfactory	☐ Unsat	
	• Confirm that stored containers are closed, not leaking, and structurally sound without deterioration, defect or corrosion that could lead to a release/spill of its hazardous waste contents.		☐ Satisfactory	☐ Unsat	
5	Confirm the following: • No more than two (2) non-combustible hazardous waste items (e.g., pumps, piping, etc.) that cannot be placed in a waste container due to size, shape or weight have the required aisle space (twenty-eight (28) inches minimum aisle space between rows of RCRA-regulated secondary waste, waste container, or item and structural walls or non-portable equipment or steel pallets with noncombustible hazardous waste items.	Physical or Remote	☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	• That all noncombustible hazardous waste items are placed on a metal pallet no more than one item high, unless CDPHE provides concurrence on an alternative storage arrangement/ configuration.		☐ Satisfactory	☐ Unsat	
6	A row of hazardous waste containers or steel pallet(s) with noncombustible hazardous waste items (one container/item wide) may be placed against, or less than 28 inches from, structural walls or non-portable equipment when a minimum 28-inch aisle space is maintained to the front of the row).	Physical or Remote	☐ Satisfactory	☐ Unsat	
7	That hazardous waste containers and hazardous waste items are arranged to allow RCRA inspection using CCTV if physical inspection not planned.	Physical or Remote	☐ Satisfactory	☐ Unsat	
Toxic Maintenance Area Airlock-B, Room APB-137					
MT-B05-0050 (Airlock - B)- Camera 3352					
8	Inspect the area for leaks or spills of unexpected liquids.	Remote	☐ Satisfactory	☐ Unsat	
9	Inspect the B05-SD-Spent Decon pipes, valves and fittings for indicators of corrosion, leaks, or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
10	Inspect the following: • Inventory limit does not exceed five (5) waste containers and no more than five (5) 55-gallon drums, two (2) 85/95-gallon drums, five (5) five-gallon pails or other ≤ 55-gallon containers of RCRA-regulated secondary waste.	Remote	☐ Satisfactory	☐ Unsat	
	• That containers are stored in dedicated areas that have boundaries marked-out		☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	on the floor, or otherwise delineated.				
	• That containers are not stacked more than one high nor exceed a vertical height of five (5) feet.		☐ Satisfactory	☐ Unsat	
	• That pallets if used are metal.		☐ Satisfactory	☐ Unsat	
	• That drum dollies if used are metal.		☐ Satisfactory	☐ Unsat	
	• That containers and hazardous waste items are arranged to allow RCRA inspection using CCTV.		☐ Satisfactory	☐ Unsat	
10	• That non-combustible hazardous waste items (e.g., pumps, piping, etc.) that cannot be placed in a waste container due to size, shape or weight have the required aisle space (twenty-eight (28) inches minimum aisle space between rows of RCRA-regulated secondary waste, waste container, or item and structural walls or non-portable equipment or steel pallets with noncombustible hazardous waste items.	Remote	☐ Satisfactory	☐ Unsat	
	• A row of hazardous waste containers or steel pallets with noncombustible hazardous waste items (one container/item wide) may be placed against, or less than 28 inches from, structural walls or non-portable equipment when a minimum 28-inch aisle space is maintained to the front of the row).		☐ Satisfactory	☐ Unsat	
11	Inspect sump pump (MP-B05-0050) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Toxic Maintenance Area B, Room APB-127					
MT-B05-0052 (B)- Cameras 3349/3350					
12	Inspect the area for leaks or spills of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
13	Inspect the B05-SD-Spent Decon and the Autoclave condensate pipes, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
14	Visually inspect the SDU and Autoclave enclosures for leaks or indications of leakage (e.g. staining).	Remote	☐ Satisfactory	☐ Unsat	
15	Inspect sump pump (MP-B05-0052) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
16	Inspect the following • Inventory limit does not exceed four (4) total waste containers and no more than four (4) 55-gallon drums, two (2) 85/95-gallon drum, four (4) five-gallon pails or other ≤ 55-gallon container, of RCRA-regulated secondary waste.	Remote	☐ Satisfactory	☐ Unsat	
	• That Containers stored in dedicated areas that have boundaries marked-out on the floor, or otherwise delineated.		☐ Satisfactory	☐ Unsat	
	• That Containers are not stacked more than one high nor exceed a vertical height of five (5) feet.		☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	• That pallets if used are metal.		☐ Satisfactory	☐ Unsat	
	• That drum dollies if used are metal.		☐ Satisfactory	☐ Unsat	
	• That containers and hazardous waste items are arranged to allow their inspection using CCTV.		☐ Satisfactory	☐ Unsat	
16	• That noncombustible hazardous waste items (e.g., pumps, piping, etc.) that cannot be placed in a waste container due to size, shape or weight have the required aisle space (twenty-eight (28) inches minimum aisle space between rows of RCRA-regulated secondary waste, waste container, or item and structural walls or non-portable equipment or metal pallets with noncombustible hazardous waste items. the row).	Remote	☐ Satisfactory	☐ Unsat	
	• A row of hazardous waste containers or metal pallets with noncombustible hazardous waste items (one container/item wide) may be placed against, or less than 28 inches from, structural walls or non-portable equipment when a minimum 28-inch aisle space is maintained to the front of the row.		☐ Satisfactory	☐ Unsat	
	• That all noncombustible hazardous waste items are placed on a metal pallet no more than one item high, unless CDPHE provides concurrence on an alternative storage arrangement/configuration.		☐ Satisfactory	☐ Unsat	
Toxic Maintenance Area C, Room APB-128					
MT-B05-0054 (C)- Cameras 3348/3351					
17	Inspect the area for presence of any liquids.	Remote	☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
18	Confirm that there are no liquids in the sump.	Remote	☐ Satisfactory	☐ Unsat	
19	Visually inspect the SDU and Autoclave enclosures for leaks or indications of leakage (e.g. staining).	Remote	☐ Satisfactory	☐ Unsat	
20	Confirm the following: • Inventory limit does not exceed two (2) total waste containers and no more than two (2) 55-gallon drums, one (1) 85/95-gallon drums, two (2) five-gallon pails or other ≤ 55-gallon container containers of RCRA-regulated secondary waste.	Remote	☐ Satisfactory	☐ Unsat	
	• That containers are stored in dedicated areas that have boundaries marked-out on the floor, or otherwise delineated.		☐ Satisfactory	☐ Unsat	
	• That 55-gallon drum containers ≤ 24-inch diameter if placed outside of a dedicated area are located in a minimum 30-inch diameter area.		☐ Satisfactory	☐ Unsat	
	• That containers are not stacked more than one high nor exceed a vertical height of five (5) feet.		☐ Satisfactory	☐ Unsat	
	• That pallets if used are wood, plastic or metal.		☐ Satisfactory	☐ Unsat	
	• That pallets are not used for single containers; except spill pallets are allowed.		☐ Satisfactory	☐ Unsat	

Control Room APB Toxic Maintenance Area Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	• That plastic pallets not in use not stacked or leaning upon another pallet(s).		☐ Satisfactory	☐ Unsat	
	• That drum dollies if used are metal.		☐ Satisfactory	☐ Unsat	
20	• That noncombustible hazardous waste items, (e.g., pumps, piping, etc.) that cannot be placed in a waste container due to size, shape or weight has the required aisle space (twenty-eight (28) inches minimum aisle space between rows of RCRA-regulated secondary waste, waste container, or item and structural walls or non-portable equipment or steel pallets with noncombustible hazardous waste items. A row of hazardous waste containers or metal pallets with noncombustible hazardous waste items (one container/item wide) may be placed against, or less than 28 inches from, structural walls or non-portable equipment when a minimum 28-inch aisle space is maintained to the front of the row).	Remote	☐ Satisfactory	☐ Unsat	
	• That all noncombustible hazardous waste items are placed on a steel pallet no more than one item high, unless CDPHE provides concurrence on an alternative storage arrangement/configuration.		☐ Satisfactory	☐ Unsat	
	• That containers are stored in a manner to allow their inspection.		☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					

Control Room APB Toxic Maintenance Area Daily RCRA Inspections				
Shift Clerk Date Stamp, Inspection Issued on:				
Inspector's Name and Signature:				
Inspection Date and Time:				
Item No.	**Criteria**	**Method**	**Acceptance**	**Findings** (any unsatisfactory condition requires this section to be completed)
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge			**Supervisor Initials**	

Control Room APB Northwest Airlock Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Category A Airlock APB-118 – Camera 3321					
MP-B05-0040 **(A)**					
1	Inspect the floor for any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
2	Inspect the B05-SD-Spent Decon stainless steel pipinges, hoses, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
3	Inspect the sump pump (MP-B05-0040) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
Category B Airlock APB-113 – Camera 3320					
MT-B05-0065 (B)					
4	Inspect the floor for any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
5	Inspect the B05-SD-Spent Decon pipes, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
Category C Airlock APB-112 – Camera 3319					
MT-B05-0064 (C)					
6	Inspect the floor for any liquids.	Remote	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge					**Supervisor Initials**

Control Room APB Southwest Airlocks Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Category A Airlock APB-134 – Camera 3330					
MT-B05-0046 (A) and MP-B05-0046					
1	Inspect the floor for the presence of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
2	Inspect the B05-SD-Spent Decon stainless steel pipes, hoses, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
3	Inspect the sump pump (MP-B05-0046) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
Category B Airlock APB-143					
MT-B05-0069 (B)					
4	Inspect the floor for any liquids unrelated to ongoing decontamination or maintenance operations.	Physical	☐ Satisfactory	☐ Unsat	
5	Inspect the B05-SD-Spent Decon pipes, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Physical	☐ Satisfactory	☐ Unsat	
Category C Airlock APB-144					
MT-B05-0057(C)					
6	Inspect the floor for any liquids.	Physical	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge					**Supervisor Initials**

Control Room APB Southeast Airlocks Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Category A Airlock APB-136 – Camera 3333					
MT-B05-0048 (A) and MP-B05-0048					
1	Inspect the floor for the presence of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
2	Inspect the B05-SD-Spent Decon stainless steel pipes, hoses, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Remote	☐ Satisfactory	☐ Unsat	
3	Inspect the sump pump (MP-B05-0048) to confirm that there is no leakage of any liquids unrelated to ongoing decontamination or maintenance operations.	Remote	☐ Satisfactory	☐ Unsat	
Category B Airlock APB-145					
MT-B05-0049 (B)					
4	Inspect the floor for any liquids unrelated to ongoing decontamination or maintenance operations.	Physical	☐ Satisfactory	☐ Unsat	
5	Inspect the B05-SD-Spent Decon pipes, valves and fittings for indicators of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to release spent decon.	Physical	☐ Satisfactory	☐ Unsat	
Category C Airlock APB-147					
MT-B05-0058 (C)					
6	Inspect the floor for any liquids.	Physical	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge			**Supervisor Initials**		

Control Room APB TOXIC Room APB-120 Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**		**Method**	**Acceptance**	**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120 - Cameras 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3383					
Wash Water Collection Tanks • **MV-B04-0104** • **MV-B04-0204** **Wash Water Pumps** • **MP-B04-00001A** • **MP-B04-00001B**					
1	Inspect the floor for spills or leaks of any liquids unrelated to ongoing decontamination or maintenance operations liquids.		Remote	☐ Satisfactory ☐ Unsat	
2	Inspect the two Wash Water Collection tanks, and their nozzles, connections, and tank anchoring systems (i.e. legs, stanchions, and bolts) for damage and corrosion that have the potential to cause a release of HWCs.	**MV-B04-0104**	Remote	☐ Satisfactory ☐ Unsat	
		MV-B04-0204		☐ Satisfactory ☐ Unsat	
3	CON Operators monitor and record tank liquid level daily.	**MV-B04-0104**	Remote	Record Tank Levels:	
		MV-B04-0204		Record Tank Levels:	
4	Inspect the pumps to confirm that there is no	**MP-B04-00001A**	Remote	☐ Satisfactory ☐ Unsat	

Control Room APB TOXIC Room APB-120 Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	leakage of any liquids.	**MP-B04-00001B**		☐ Satisfactory	☐ Unsat	
5	Inspect the B04-AG1-Agent, ~~B04-SD-Spent Decon, B04-SD-Spent Decon,~~ B04-WW-Wash Water W/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid ~~B05-SD-Spent Decon, and B05-SD-Spent Decon~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves and fittings for indications of corrosion or damage which has the potential to release HWCs.		Remote	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT						
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments						
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge				**Supervisor Initials**		

Control Room APB TOXIC Room APB-120 ANR Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120 - Cameras 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3383						
Agent Hydrolyzer Tanks (ANRs) • **MV-B04-0102** • **MV-B04-0202** **Agent Hydrolyzer Recirculation Pumps** • **MP-B04-0103A** • **MP-B04-0103B** • **MP-B04 -0203A** • **MP-B04-0203B** **Sump Pump** • **MP-B05-0066**						
1	Inspect the floor for leaks or spills of any liquids unrelated to ongoing decontamination or maintenance operations liquids.		Remote	☐ Satisfactory	☐ Unsat	
2	Inspect any uninsulated nozzles or connections on the ANRs, and their tank anchoring systems (i.e. legs, stanchions, and bolts) for damage and corrosion that have the potential to cause a release of HWCs. Inspect the insulation on the two ANRs for damage that could indicate damage to the underlying tank and that requires additional evaluation by a subject matter expert. This damage includes missing insulation, or holes in the insulation, and deep dents in the insulation	**MV-B04-0102**	Remote	☐ Satisfactory	☐ Unsat	
		MV-B04-0202		☐ Satisfactory	☐ Unsat	
3	CON Operators monitor and record tank liquid	**MV-B04-0102**	Remote	Tank Levels:		

Control Room APB TOXIC Room APB-120 ANR Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	level and volume daily.	**MV-B04-0202**		Tank Levels:		
4	Inspect the pumps to confirm that there is no leakage of any liquids.	**MP-B04-0103A**	Remote	☐ Satisfactory	☐ Unsat	
		MP-B04-0103B				
		MP-B04-0203A		☐ Satisfactory	☐ Unsat	
		MP-B04-0203B				
5	Inspect pipes B04-AG1-Agent, ~~B04-SD-Spent Decon,~~ B04-WW-Wash Water W/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid ~~and B05-SD-Spent Decon~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves, and fittings for indications of corrosion, leaks or the indication of leaks (e.g., staining), or damage that has the potential to cause a release of HWCs and for those pipes, valves and fittings insulated, inspect the insulation on the piping, valve or fitting for damage that could indicate leakage, or damage to the underlying pipe or fitting and that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the insulation and deep dents in the insulation.		Remote	☐ Satisfactory	☐ Unsat	
6	Inspect sump pump (MP-B05-0066) to confirm that there is no leakage of any liquids.		Remote	☐ Satisfactory	☐ Unsat	
7	Inspect the following equipment for leaks or indication of leaks any liquids unrelated to	Hydrolyzer Tank Agitator	Remote	☐ Satisfactory	☐ Unsat	
		Agent Hydrolyzer Tank Agitator Seal Water Tank		☐ Satisfactory	☐ Unsat	
		Spent Decon Feed		☐ Satisfactory	☐ Unsat	

Control Room APB TOXIC Room APB-120 ANR Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
	ongoing decontamination or maintenance operations liquids:	Pump Seal Water Tank				
		Spent Decon Feed Pumps Suction Strainers		☐ Satisfactory	☐ Unsat	
		Collected Washwater Pump		☐ Satisfactory	☐ Unsat	
Control Room APB TOXIC Room APB-120 ANR Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT						
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments						
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge				**Supervisor Initials**		

Control Room APB TOXIC Room APB-120 AWS Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120 – Cameras 3336, 3337, 3338, 3339, 3340, 3341, 3342, 3343, 3344, 3345, 3346, 3347, 3383						
Agent/water Separator Tanks • **MV-B04-0001** • **MV-B04-0002** **Collected Wash Water Pumps** • **MP-B04-0105A** • **MP-B04-0105B** • **MP-B04-0205A** • **MP-B04-0205B** **Agent Concentrate Pumps** • **MP-B04-0002A** • **MP-B04-0002B**						
1	Inspect the area for spills or leaks any liquids unrelated to ongoing decontamination or maintenance operations liquids.		Remote	☐ Satisfactory	☐ Unsat	
2	Inspect the two Agent/Water Separator Tanks, and their nozzles, connections, and tank anchoring systems (i.e. legs, stanchions and bolts) for damage and corrosion that have the potential to cause a release of HWCs.	**MV-B04-0001**	Remote	☐ Satisfactory	☐ Unsat	
		MV-B04-0002		☐ Satisfactory	☐ Unsat	
3	CON Operators monitor and record tank liquid level daily.	**MV-B04-0001**	Remote	Record Tank Level:		
		MV-B04-0002		Record Tank Level:		
4	Inspect the pumps to confirm that there is no leakage of any liquids.	**MP-B04-0105A**	Remote	☐ Satisfactory	☐ Unsat	
		MP-B04-0105B		☐ Satisfactory	☐ Unsat	
		MP-B04-0205A		☐ Satisfactory	☐ Unsat	
		MP-B04-0205B		☐ Satisfactory	☐ Unsat	
		MP-B04-0002A		☐ Satisfactory	☐ Unsat	

Control Room APB TOXIC Room APB-120 AWS Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
		MP-B04-0002B		☐ Satisfactory	☐ Unsat	
5	Inspect the B04-AG1-Agent, ~~B04-SD-Spent Decon,~~ B04-WW-Wash Water W/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid, ~~and B05-SD-Spent Decon,~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves and fittings for indications of corrosion or damage which has the potential to release HWCs.		Remote	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT						
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments						
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge				**Supervisor Initials**		

Control Room APB TOXIC Room APB-120 SDS Daily RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**		**Method**	**Acceptance**	**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120 - Cameras 3336/3337/3338/3339/3340/3341/3342/3343/3344/3345/3346/3347/3383					
Spent Decon Holding Tanks • **MV-B05-0101** • **MV-B05-0201** **Spent Decon Feed Pumps** • **MP-B05-0101A** • **MP-B05-0101B** • ~~**MP-B05-0201A**~~ ~~**MP-B05-0201B**~~					
1	Inspect the floor for spills or leaks of any liquids unrelated to ongoing decontamination or maintenance operations liquids.		Remote	☐ Satisfactory ☐ Unsat	
2	Inspect the two Spent Decon Tanks and their nozzles, connections, and tank anchoring systems (i.e. legs, stanchions, and bolts) for damage and corrosion that have the potential to cause a release of HWCs.	**MV-B05-0101**	Remote	☐ Satisfactory ☐ Unsat	
		MV-B05-0201		☐ Satisfactory ☐ Unsat	
3	CON Operators monitor and record tank liquid level daily.	**MV-B05-0101**	Remote	Record Tank Level:	
		MV-B05-0201		Record Tank Level:	
4	Inspect the pumps to confirm that there is no leakage of any liquids,	**MP-B05-0101A**	Remote	☐ Satisfactory ☐ Unsat	
		MP-B05-0101B		☐ Satisfactory ☐ Unsat	
		~~**MP-B05-0201A**~~		☐ Satisfactory ☐ ~~Unsat~~	

Control Room APB TOXIC Room APB-120 SDS Daily RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
		~~**MP-B05-0201B**~~		☐ ~~Satisfactory~~	☐ ~~Unsat~~	
5	Inspect the B04-AG1-Agent, ~~B04-SD-Spent Decon,~~ B04-WW-Wash Water W/Agent, B04-HYA-Hydrolysate, B05-PE-Scrubber Liquid~~, and B05-SD-Spent Decon~~ pipes, valves and fittings; and the B04-SD-Spent Decon and B05-SD-Spent Decon stainless steel piping, hoses, valves, and fittings for indications of corrosion or damage which has the potential to release HWCs.		Remote	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT						
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments						
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge				**Supervisor Initials**		

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120						
Agent/water Separator Tanks (MV-B04-0001& -0002) **Collected Wash Water Pumps (MP-B04-0105A & -0105B and -0205A & -0205B)** **Agent Concentrate Pumps (MP-B04-0002A & -0002B)** **Wash Water Collection Tanks (MV-B04-0104 & -0204)** **Wash Water Pumps (MP-B04-00001A & -00001B)** **Spent Decon Holding Tanks (MV-B05-0101 & -0201)** **Spent Decon Feed Pumps (MP-B05-0101A & -0101B ~~and -0201A & -0201B~~)** **Agent Hydrolyzer Tanks (MV-B04-0102 & -0202)** **Agent Hydrolyzer Recirculation Pumps (MP-B04-0103A & -0103B and -0203A & -0203B)**						
1	Inspect the listed equipment and the following visible vent piping for indications of mechanical damage, wear, holes, gaps, cracks, corrosion or deterioration that could cause or lead to releases of RCRA-regulated HWCs (including vapors, gases, and hazardous waste process liquids) to the environment. For insulated vent piping inspect the insulation on the duct for damage that could indicate leakage, or damage to the underlying duct that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the	Inspect the OTS vent piping labeled **B04-VT ACS/ANS Vent**, originating from each tank in the Agent Neutralization and Collection System Tanks terminating at the header vents on the north and south wall of the TOX Room	Remote	☐ Satisfactory	☐ Unsat	
		Inspect the OTS vent piping labeled **B04-VT ACS/ANS Vent**, originating from the B05 each tank in the Agent Neutralization and Collection System Tanks terminating at the OTS header on the north wall of the TOX Room	Remote	☐ Satisfactory	☐ Unsat	

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120						
	insulation and deep dents in the insulation.					
1	Inspect the listed equipment and the following visible vent piping for indications of mechanical damage, wear, holes, gaps, cracks, corrosion or deterioration that could cause or lead to releases of RCRA-regulated HWCs (including vapors, gases, and hazardous waste process liquids) to the environment. For insulated vent piping inspect the insulation on the duct for damage that could indicate leakage, or damage to the underlying duct that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the insulation and deep dents in the insulation.	Inspect the OTS vent piping labeled **B20-VT OTS Vent Gas**, originating from the MWS Blowers termination at the header vent pipe line	Remote	☐ Satisfactory	☐ Unsat	
		Inspect the OTS vent piping labeled **B04-VT Vent Gas**, connection the north and south headers that terminates at the point where the piping passes-thru the east wall of the TOX Room (East Corridor on other		☐ Satisfactory	☐ Unsat	

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120						
		side of wall)				
1	Inspect the listed equipment and the following visible vent piping for indications of mechanical damage, wear, holes, gaps, cracks, corrosion or deterioration that could cause or lead to releases of RCRA-regulated HWCs (including vapors, gases, and hazardous waste process liquids) to the environment. For insulated vent piping inspect the insulation on the duct for damage that could indicate	Inspect the OTS piping labeled **B04-VT ACS/ANS Vent**, originating from each tank in the Agent Neutralization and Collection System Tanks terminating at the main vent entering the MWS Blower OTS header	Remote	☐ Satisfactory	☐ Unsat	

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections						
Shift Clerk Date Stamp, Inspection Issued on:						
Inspector's Name and Signature:						
Inspection Date and Time:						
Item No.	**Criteria**		**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120						
	leakage, or damage to the underlying duct that requires additional evaluation by a subject matter expert. This damage includes missing insulation, impact or corrosion holes in the insulation and deep dents in the insulation.	Inspect the OTS piping labeled **B04-VT ACS/ANS Vent**, originating from the B05 Spent Decon holding tank and terminating at the main line to the MWS Blower		☐ Satisfactory	☐ Unsat	
2	1. Inspect the special coating applied to the secondary containment surfaces for damage (i.e., cracks exceeding 1/32 inch width, or gaps, divots, or similar) that exposes underlying coating, concrete or metal.		Physical	☐ Satisfactory	☐ Unsat	
	2. Inspect the special coating applied to the anchor bolts, anchor nuts and washers mounting equipment plates, support beams, tanks, or other equipment to the floor for damage (i.e., cracks exceeding 1/32 inch width, or gaps, divots, or similar) that exposes underlying coating, concrete or metal.			☐ Satisfactory	☐ Unsat	
	3. Inspect the caulking sealant that has been applied at the interface between equipment		Physical	☐ Satisfactory	☐ Unsat	

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
TOXIC Room APB-120					
	floor plates, support beams, tanks or other equipment bolted down for gaps or holes that exposes underlying coating, concrete or metal.				
3	Confirm that no more than 10 hazardous waste items/containers (or a total of 550 gallons of hazardous waste) are stored in the Toxic Room. Confirm that all storage of hazardous waste is no more than 2 items/containers wide. Confirm that a minimum of 28 inches of aisle space is maintained between stored hazardous waste items/containers and the structural walls, non-portable equipment, and other rows of hazardous waste items/containers.	Physical	☐ Satisfactory	☐ Unsat	

Operations APB TOXIC Room APB-120 Weekly RCRA Inspections	
Shift Clerk Date Stamp, Inspection Issued on:	
Inspector's Name and Signature:	
Inspection Date and Time:	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF WEEK	
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments	
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge	**Supervisor Initials**

APB MWS Room APB-125 SDS Sump 42 and 44 Discharge Weekly RCRA Inspections					
Shift Clerk Date Stamp, Inspection Issued on:					
Inspector's Name and Signature:					
Inspection Date and Time:					
Item No.	**Criteria**	**Method**	**Acceptance**		**Findings** (any unsatisfactory condition requires this section to be completed)
Munitions Washout System Room – APB 125					
1	**Sump 42** Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 42 travels through the trench and terminates into Sump 45 for indications of leakage, corrosion or damage that has the potential to release HWCs.	Physical	☐ Satisfactory	☐ Unsat	
2	**Sump 44** Inspect the B05-SD-Spent Decon discharge hose, and hose valves and fittings, that originates from Sump 44 travels through the trench and terminates into the discharge piping of Surge Drum MV-B02-0101 Booster Pumps A/B for indications of leakage, corrosion or damage that has the potential to release HWCs.	Physical	☐ Satisfactory	☐ Unsat	
TO BE COMPLETED BY THE SUPERVISOR OR DELEGATE BY THE END OF SHIFT					
List all Service Requests/Work Order Numbers generated from this inspection sheet and additional comments					
I have reviewed this inspection sheet and found it to be complete and accurate to the best of my knowledge			**Supervisor Initials**		

Enclosure 8

Proposed Revisions to *Operations Plan,* Attachment L,

with changes depicted using “track changes”

MINICAMS®	Miniature Continuous Air Monitoring System
MSS	Monitoring support system
MRR	Munition Receiving Room
MSM	Munitions Service Magazine
MTU	Munitions Treatment Unit
MWS	Munition Washout System
NEW	net explosive weight
NRTM	Near real time monitoring
OPP	overpack pallet
OTS	Off-Gas Treatment System
PDARS	Process Data Acquisition and Recording System
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant
PCD	Pueblo Chemical Depot
PCT	Pre-concentrator tube
PLC	Programmable Logic Controller
PMD	Projectile and Mortar Disassembly (machine)
PPE	personal protective equipment
PSV	pressure safety valve
PSM	Plant Shift Manager
RCRA	Resource Conservation and Recovery Act
RTA	Receiving and Traveling Area
SDG	standby diesel generator
SDS	Spent Decontamination System
SDU	Supplemental Decontamination Unit
SRC	Single-round container
STEL	Short term exposure level
TAP	toxicological agent protective
VCR	Vapor Containment Room
VSL	Vapor Screening Level
WPL	Worker population limit
XSD	Halogen specific detector

the MWS where agent cavity access has been verified. Metal parts treated by the MTU shall be properly characterized and packaged into containers for shipment. If the MTU shuts down, the associated MWS line automatically shuts down.

The MTU pressure, off-gas flow to the OTS, and air flow to the MTU discharge end are controlled to prevent the outflow of any gases to the MTU room.

Vent gases from the MTU are discharged to the Off-Gas Treatment System (OTS) and subsequently through the Agent Filter Area (AFA).

APB Processing – Agent Neutralization

The agent water mixture from the washed agent and water surge drums is pumped to an Agent Water Separator (AWS) and the water phase collected in the MWS Wash Water Collection Tank. The ~~Agent Water Separator (~~AWS~~)~~ t~~T~~anks ~~may only~~ receive the mustard agent/wash water mixture from the surge drum tanks and ~~rinse material~~spent decon. Spent decon from 6 (out of the total 9) category A sumps within the APB will be transferred to the AWS tanks (MV-B04-0001 and/or MV-B04-0002); remaining 3 (out of total 9) category A sumps and the autoclave condensate will be transferred to t~~T~~he MWS w~~W~~ash w~~W~~ater (MWW) c~~C~~ollection t~~T~~anks (MV-B04-0104 and/or MV-B04-0204) ~~System may receive only the wash water portion from the AWS tanks and rinse material~~. In addition to the spent decon streams, wash water collection tanks will also collect wash water from the AWS tanks. The agent concentrate from AWS tanks will be diverted to Agent Hydrolyzers. Both AWS and wash water collection tanks are flow controlled into the Agent Hydrolyzers also referred as Agent Neutralization Reactors (ANRs).

Agent destruction occurs in the Agent Hydrolyzers where agent reacts with water to produce thiodiglycol and hydrochloric acid. The hydrolyzers are operated in a batch mode. Normal hydrolyzer batches consist of agent concentrate (HD or HT) from the Agent Water Separator Tank System, hot process water, steam, MWS wash water and/or spent decon from the MWS Wash Water collection tank system, ~~spent decontamination solution from the Spent Decon Tank System,~~ and sodium hydroxide solution ~~and possibly failed hydrolysate~~. Failed hydrolysate may be routed back to Agent Hydrolyzers for additional treatment.

After transfer to the agent hydrolysate hold tank, each batch is sampled and analyzed for agent concentration and must be below the detection limits (BDL) with a maximum method detection limit (MDL) ≤ 20 ppb for HD and ≤ 200 ppb for HT for the batch to pass and be transferred to the 30 day tanks. Failed batches are reprocessed in the hydrolyzer.

No more than 6 batches of hydrolysate may be produced per day by the Agent Hydrolyzer Tank system, based on a monthly average (30 consecutive days), and no more than 42 batches per week.

Treatment of mustard agent shall not occur within an Agent Hydrolyzer Tank unless storage capacity equal to the volume of hydrolysate to be produced from the Agent Hydrolyzer Tank is available in at least one Hydrolysate Hold Tank.

The amount of mustard agent concentrate from the Agent Water Separator Tank System per batch shall not exceed 8.6% by weight.

Hot process water, MWS wash water and/or spent decon shall be added to the Agent Hydrolyzer Tank and mixed using the recirculation pump.

The solution must be stable at a pH of at least 10, for a minimum of 30 minutes, prior to transfer to the hold tanks.

Process-generated liquid streams, such as spent decon resulting from equipment or personnel decon, are processed in the ANR. Condensate produced from the OTS is sent to the spent decon tanks for processing in the ANS.

APB Processing – Spent Decon Collection, Storage and Processing

The Spent Decon System (SDS) Tanks may receive only the following waste streams: spent decontamination/rinsate solutions from the Category B and C areas in the APB, from the ERB, and the medical facility; condensate from ~~APB~~ air handling units, steam lines, and hot process water~~, and autoclave~~; blowdown from the OTS scrubber; process liquids, including hydrolysate, that are generated during laboratory and other~~operations~~ sampling activities, maintenance, repair, and decontamination activities; cleanup after incidental spills, fire suppression discharges; ~~of~~ and fluids from industrial equipment in the immediate area of a spent decon ~~system~~ sump (e.g., propylene glycol, or lubricating fluids from the ~~metering~~ pumps). ~~in the Tox Room.).~~

The quantity of the liquids entering the category B and C sumps from incidental spills from industrial equipment during maintenance activities will be maintained to be one gallon or less.

The quantity of hydraulic fluid entering the lined category A sumps from spills from industrial equipment will be 50 gallons or less. The quantity of other liquids entering the lined category A sumps from spills from industrial equipment will be one gallon or less.

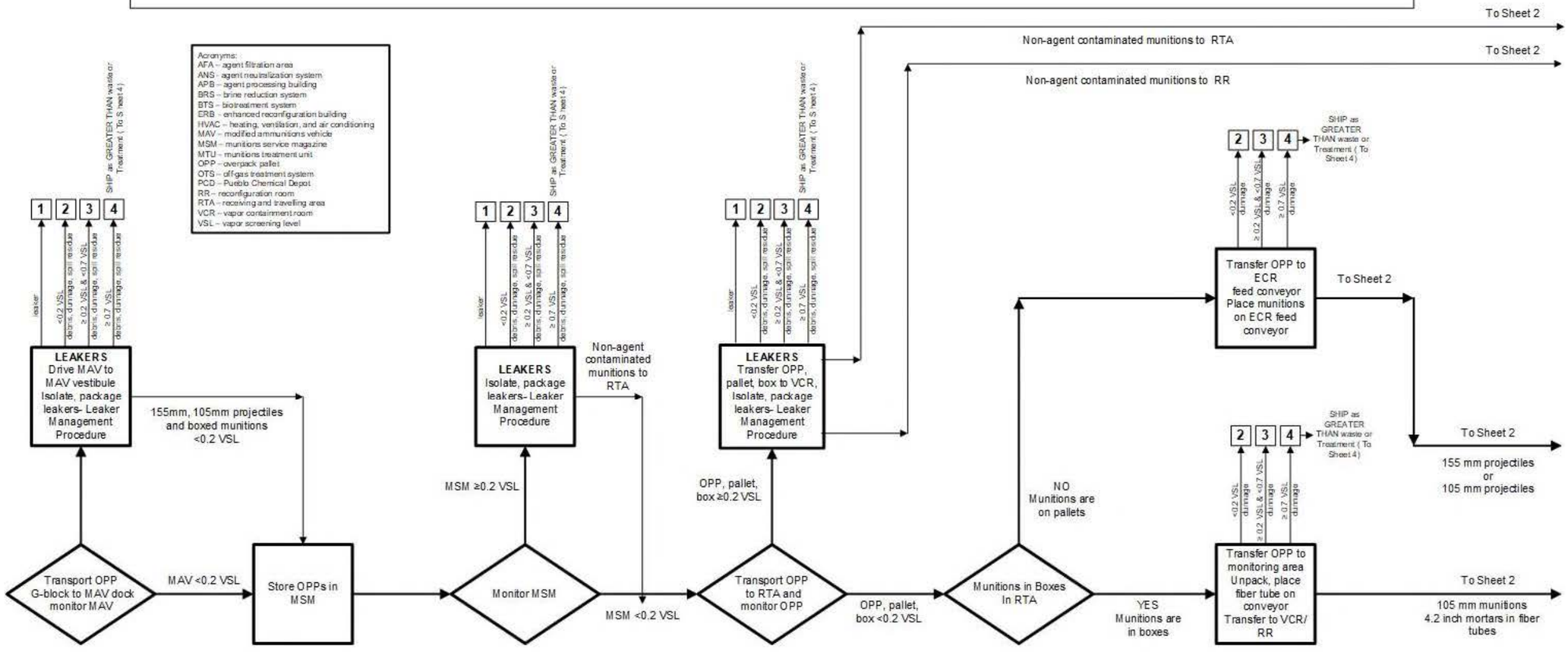
The primary decontamination solution for use at PCAPP is water supplied through the site water system. Other decontamination materials may be employed in the ERB and APB to augment the decontamination capabilities. Those materials include the use of surfactants, commercially available decontamination solutions, steam, and other Permittee-approved decontamination solutions that do not interfere with the hydrolysis process. If a decontaminant/treatment solution is used that is known to generate a false positive/negative with the Agent Monitoring System, the Permittee shall perform a post-monitoring system challenge after use of the decontamination solution to demonstrate that the interferent is not causing a continued impact to the MINICAMS® and DAAMS prior to placing the monitoring system back online.

Tank systems cannot be drained or flushed into the lined category B and C decon system sumps without prior evaluation of engineering controls and material compatibility in accordance with Section D-5d(5) of the Waste Analysis Plan, Attachment D of this Permit.~~Tank systems cannot be drained or flushed into the decon system sumps without prior evaluation of engineering controls and material compatibility, and Colorado Department of Public Health and Environment (CDPHE) approval of a permit modification submitted in accordance with 6 CCR-1007-03 §100.63.~~

APB Processing – Agent Hydrolyzer Tanks and Agent Hydrolysate Hold Tanks

The agent hydrolyzer tanks may receive only the following waste streams: hot process water, waste from the MWS w~~W~~ash w~~W~~ater c~~C~~ollection t~~T~~anks, Agent Water Separator (AWS tanks), and sodium hydroxide (NaOH). MWS wash water tanks receive influent from spent decon holding tanks, category A sumps (3 out of total 9) and condensate from autoclave. Further, spent decon holding tanks receive decon fluids from personnel and equipment decon activities in Category B and C areas and condensate from Agent Processing Building (APB) air handling units (which drain to the sumps). ~~and the Spent Decon Holding Tanks, mustard agent (HD/HT) from the Agent Water Separator Tanks, and sodium hydroxide (NaOH).~~

PCAPP WASTE FLOWCHART – 1 OF 5



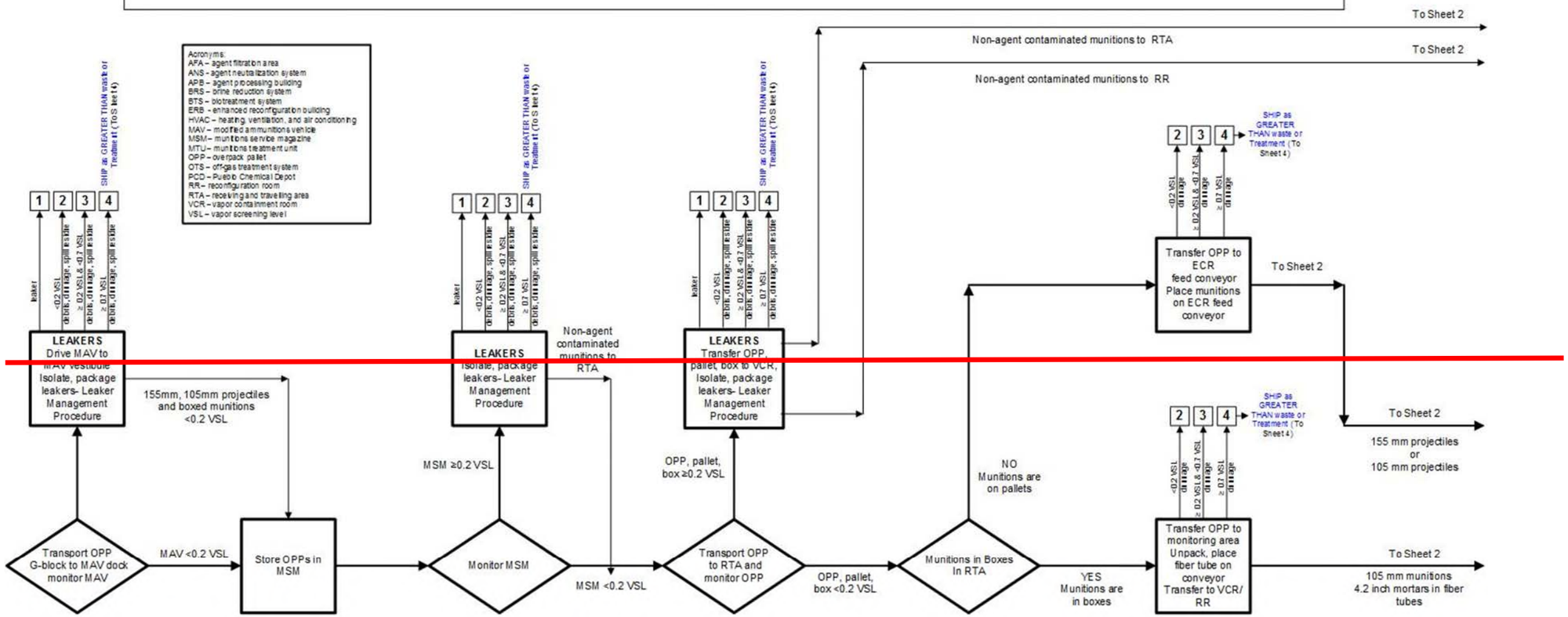
GENERAL NOTES:

Spent decon solution is collected in the Toxic Storage and Spent Decon System and processed in the Agent Neutralization System. Spent decon solution is not identified in the flowchart.
Agent contaminated oversized dunnage, such as pallets, is dismantled or reduced in size by another means to create pieces that can be fit into containers.

NUMBERED NOTES:

1. Leakers and rejects are managed in accordance with the Leaker and Reject Management Procedure, 248252-SOP-B00-W0001. The leakers are containerized in SRCs, placed in storage and transported to PCD for treatment
2. Dunnage and debris for example PPE, packaging materials, rags, wipes, absorbents, etc. either from leaker cleanups, inspections and/or monitoring that is <0.2 VSL and free of visible evidence of liquid agent is classified as non-agent contaminated and carries no agent K codes. The waste is characterized, drummed, stored and shipped off-site for treatment. (Debris – non-agent contaminated, Dunnage – non-agent contaminated) (Spill residue)
3. Dunnage and debris, for example, PPE, packaging materials, rags, wipes, absorbents, etc. either from leaker cleanups, inspections and/or monitoring that is ≥0.2 VSL or that has visible evidence of liquid agent is classified as agent contaminated and carries the agent K codes. If the waste is also <0.7 VSL, it is characterized, drummed, the drums monitored, stored and shipped off-site for treatment. (Debris – agent contaminated) (Dunnage – agent contaminated) (Spill residue)
4. Waste that is ≥0.7 VSL is classified as agent contaminated and carries the agent K codes as well as the D003 code. The waste may be decontaminated as part of the generation process or may be drummed and the drums are monitored prior to onsite treatment or transport offsite for treatment, or both. Onsite treatment to remove agent contamination or to reduce agent contamination levels may be performed in the SDU or autoclave for treatment in accordance with the requirements of the Supplemental Decontamination Unit (SDU) procedure 24852-SOP-B24-W0001 or the Autoclave Procedure 24852-SOP-B24-W0002 and the PCAPP SDU Autoclave Waste Sorting Guide 24852-RD-M5-B24-B0006, or in accordance with Part V of this Permit. Prior to shipment off-site for treatment, the drums are monitored and the waste is characterized. After treatment, the waste that has been treated by a permitted treatment process to reduce agent contamination levels shall be assigned an applicable K code per Section D-2b in the Waste Analysis Plan, and if ≥0.7 VSL shall also be assigned a D003 hazardous waste code.

PCAPP WASTE FLOWCHART – 1 OF 5



GENERAL NOTES:

~~Stream waste codes are provided in the Waste Analysis Plan Table D-1 – PCAPP Waste Stream Summary and can be referenced using the stream name in the flowchart.~~

Spent decon solution is collected in the Toxic Storage and Spent Decon System and processed in the Agent Neutralization System. Spent decon solution is not identified in the flowchart.

Agent contaminated oversized dunnage, such as pallets, is dismantled or reduced in size by another means to create pieces that can be fit into containers.

NUMBERED NOTES:

1. Leakers and rejects are managed in accordance with the Leaker and Reject Management Procedure, 248252-SOP-B00-W0001. The leakers are containerized in SRCs, placed in storage and transported to PCD for treatment
2. Dunnage and debris for example PPE, packaging materials, rags, wipes, absorbents, etc. either from leaker cleanups, inspections and/or monitoring that is <0.2 VSL and free of visible evidence of liquid agent is classified as non-agent contaminated and carries no agent K codes. The waste is characterized, drummed, stored and shipped off-site for treatment. (Debris – non-agent contaminated, Dunnage – non-agent contaminated) (Spill residue)
3. Dunnage and debris, for example, PPE, packaging materials, rags, wipes, absorbents, etc. either from leaker cleanups, inspections and/or monitoring that is ≥0.2 VSL or that has visible evidence of liquid agent is classified as agent contaminated and carries the agent K codes. If the waste is also <0.7 VSL, it is characterized, drummed, the drums monitored, stored and shipped off-site for treatment. (Debris – agent contaminated) (Dunnage – agent contaminated) (Spill residue)
4. Waste that is ≥0.7 VSL is classified as agent contaminated and carries the agent K codes as well as the D003 code. The waste may be decontaminated as part of the generation process or may be ~~is~~ drummed and the drums are monitored prior to onsite treatment or transport offsite for treatment, or both. ~~and are EITHER transported to~~ Onsite treatment to remove agent contamination or to reduce agent contamination levels may be performed in the SDU or autoclave for treatment in accordance with the requirements of the Supplemental Decontamination Unit (SDU) procedure 24852-SOP-B24-W0001 or the Autoclave Procedure 24852-SOP-B24-W0002 and the PCAPP SDU Autoclave Waste Sorting Guide 24852-RD-M5-B24-B0006, or in accordance with Part V of this Permit. ~~OR stored and sent off-site for treatment.~~ Prior to shipment off-site for treatment, the drums are monitored and the waste is characterized. After treatment, the waste that has been treated by a permitted treatment process to reduce agent contamination levels shall be assigned an applicable K code per Section D-2b in the Waste Analysis Plan, and if ≥0.7 VSL shall also be assigned a D003 hazardous waste code.

PPE selection is based on the procedures Personal Protective Equipment, 24852-SAF-SAP-W0022, and Toxic Chemical Agent Safety program, (24852-SAF-SAP-W0011. Final selection of PPE will be made as part of the Pre-Entry Briefing or the Pre-Job Planning.

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
40	MX-B02-0211 1500/9500 psig hydraulic power unit – line 2	B02 - MX-B02-0211 1500/9500 psig hydraulic power unit – line 2 – air cooler discharge – temperature – high	<115ºF	B02-TAH-0785	Continuous	1
41	MX-B02-0111 1500/9500 psig hydraulic power unit – line 1	B02 - MX-B02-0111 1500/9500 psig hydraulic power unit – line 1 – reservoir level – high	<80%	B02-LAH-0774	Continuous	1
42	MX-B02-0211 1500/9500 psig hydraulic power unit – line 2	B02 - MX-B02-0211 1500/9500 psig hydraulic power unit – line 2 – reservoir level – high	<80%	B02-LAH-0784	Continuous	1
43	MX-B02-0111 1500/9500 psig hydraulic power unit – line 1	B02 - MX-B02-0111 1500/9500 psig hydraulic power unit – line 1 – in reservoir filter – differential pressure – high	< 6 psid	B02-PDAH-0771DA	Continuous	1
44	MX-B02-0211 1500/9500 psig hydraulic power unit – line 2	B02 - MX-B02-0211 1500/9500 psig hydraulic power unit – line 2 – in reservoir filter – differential pressure – high	< 6 psid	B02-PDAH-0781DA	Continuous	1
45	MP-B02-0101A Washed agent and water booster pump – 0101A – line 1 MP-B02-0101B Washed agent and water booster pump – 0101B – line 1	B02 – Washed agent and water booster pumps 0101A and 0101B – line 1 - (both pumps) – motive air – pressure – low	>30 psig	B02-PAL-0704A	Continuous	1
46	MP-B02-02101A Washed agent and water booster pump – 0201A – line 2 MP-B02-02101B Washed agent and water booster pump – 0201B – line 2	B02 – Washed agent and water booster pumps 0201A and 02101B – line 2 - (both pumps) – motive air – pressure – low	>30 psig	B02-PAL-0704B	Continuous	1
47	MV-B02-0101 Washed agent and water surge drum outlet filters PY0101A and PY0101B (either filter) - line 1	B02 - MV-B02-0101 Washed agent and water surge drum outlet filters PY0101A and PY0101B (either filter) - line 1 – differential pressure - high	<1 psid	B02-PDAH-0705A		1
48	MV-B02-0201 Washed agent and water surge drum outlet filters PY0201A and PY0201B (either filter) - line 1	B02 - MV-B02-0201 Washed agent and water surge drum outlet filters PY0201A and PY0201B (either filter) - line 1 – differential pressure - high	<1 psid	B02-PDAH-0705B	Continuous	1
49	MP-B02-0101A Washed agent and water booster pump 0101A – line 1 MP-B02-0101B Washed agent and water booster pump 0101B – line 1	B02 – Washed agent and water booster pumps 0101A and 0101B (Both pumps) discharge pressure – low low	>5 psig	B02-PALL-0703A	Continuous	1
50	MP-B02-0201A Washed agent and water booster pump 0201A – line 2 MP-B02-0201B Washed agent and water booster pump 0201B – line 2	B02 – Washed agent and water booster pumps 0201A and 0201B (Both pumps) discharge pressure – low low	>5 psig	B02-PALL-0703B	Continuous	1
51	MP-B02-0001A High pressure washout water pump “A” strainer PY8756	B02 - MP-B02-0001A High pressure washout water pump “A” strainer PY8756 – differential pressure – high high	<4 psid	B02-PDAH-0747A	Continuous	1
52	MP-B02-0001B High pressure washout water pump “B” strainer PY8759	B02 - MP-B02-0001B High pressure washout water pump “B” strainer PY8759 – differential pressure – high high	<4 psid	B02-PDAH-0747B	Continuous	1
53	MP-B02-0001C High pressure washout water pump “C” strainer PY8762	B02 - MP-B02-0001C High pressure washout water pump “C” strainer PY8762 – differential pressure – high high	<4 psid	B02-PDAH-0747C	Continuous	1
54	MZ-B02-0101 Cavity access machine 0101	B02 - MZ-B02-0101 Cavity access machine 0101 – munition rotation speed – low low	>15 rpm	B02-SALL-0681AAC	Continuous	1
55	MZ-B02-0102 Cavity access machine 0102	B02 - MZ-B02-0102 Cavity access machine 0102 – munition rotation speed – low low	> 15 rpm	B02-SALL-0681ABC	Continuous	1
56	MZ-B02-0103 Cavity access machine 0103	B02 - MZ-B02-0103 Cavity access machine 0103 – munition rotation speed – low low	>15 rpm	B02-SALL-0681ACC	Continuous	1

AGENT COLLECTION AND NEUTRALIZATION -B04

PACKAGE CONTENTS

The information is presented in the sections listed below:

I. SYSTEM DESCRIPTION

1.1. GENERAL DESCRIPTION

The agent water mixture from the munitions washout system (MWS) is pumped into one of the two Agent Neutralization System (ANS) agent-water separators. These vessels (one operating, one standby) receive HD/wash water or HT/wash water mixtures from MWS lines 1 and 2.

The agent washout mixture is allowed to separate into a heavier agent phase and a lighter wash water phase in the agent-water separator. During normal operations, the agent phase is transferred to the agent hydrolyzers and the separated wash water is pumped to the MWS wash water collection tanks.

Two agent hydrolyzers are used for agent hydrolysis. The process stream that exits the ANS is hydrolysate. After determination that the hydrolysate does not contain agent at a concentration above the performance based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing. ~~When the hydrolysis reaction is complete, the hydrolysate is transferred from the agent hydrolyzers to the hydrolysate hold tank. Agent hydrolysate is held in the agent hydrolysate hold tank, where it is sampled to confirm agent destruction. Agent hydrolysate that is cleared for release is pumped to the thirty-day storage tanks where it is stored prior to feeding to the immobilized cell bioreactors (ICBs).~~

Agent hydrolysate that is not cleared is pumped back to the hydrolyzers for reprocessing.

1.2. MAJOR COMPONENTS – AGENT COLLECTION

1.2.1 Agent-Water Separators

The two agent-water separators receive HD/wash water or HT/wash water mixtures from MWS lines 1 and 2 and spent decon from B05 system category A sumps (MT-B05-0040, -0041, 0042, -0044, -0045, -0046).

Agent has a higher density than water; therefore, the agent collects in the lower section and is pumped out by the agent concentrate pumps. Water (being of lower density) collects in the upper section of the separators ~~-~~and is pumped out by the wash water pumps.

The effectiveness of the agent and water separation is indicated by the coriolis-type density monitors that are installed on the discharge lines of the wash water pump and the agent concentrate pump.

Agent Concentrate Pumps are piston-operated double-diaphragm metering pumps that provide agent concentrate feed from the agent-water separators to the agent hydrolyzer tanks. Parallel simplex strainers are provided on the pump suction line. The pump discharge lines include pressure indication controls and alarms and agent density monitoring using a coriolis meter.

Wash Water Pumps are air-operated double-diaphragm pumps that transfer wash water from the agent-water separators to the MWS washwater collection tanks. The pump discharge lines include pressure indication controls and alarms and wash water density monitoring using a coriolis meter.

1.2.2 MWS Wash Water Collection Tanks, MV-B04-0104, -0204

The MWS wash water collection tanks receive wash water from the agent-water separators, spent decon from spent decon holding tanks (MV-B05-0101 and/or MV-B05-0201), category A sumps (MT-B05-0047, -0048, -0066) and condensate from autoclave.

MWS wash water collection tanks (containing wash water and/or spent decon) ~~is~~ are pumped to feed the agent hydrolyzers intermittently according to the requirements of the hydrolyzer recipe. Simultaneously, part of the wash water is recirculated through agitating nozzles provided at the tank bottoms to keep the tank well mixed.

Each tank is vented via a common header directly to the ANS vent header system. Pressure in the tank is controlled by the vent gas header pressure, which is maintained slightly below atmospheric pressure by the OTS blowers.

~~Collected Wash Water Pumps are transfer MWS wash water to the agent hydrolyzers.~~A flow totalizer measures the amount of agent hydrolyzer feed that is pumped from the wash water collection tanks ~~that is transferred to the agent hydrolyzers~~. When the batch quantity is reached, flow to the hydrolyzer is stopped by a control valve.

1.3. MAJOR COMPONENTS – AGENT NEUTRALIZATION

1.3.1 Agent Hydrolyzers

Two agent hydrolyzers operate in a batch sequence that is controlled by the FCS. The agent hydrolyzers treat the agent according to a recipe consisting of agent, hot process water, MWS wash water and/or spent decon, and sodium hydroxide (NaOH)~~, and spent decon~~. Liquid level indicators in the agent hydrolyzer tanks signal shutdown of the pumps and the inlet valves, as required.

Feed streams enter the hydrolyzer as follows:

- One nozzle for the MWS wash water (MWS wash water and/or spent decon)
- One nozzle for failed hydrolysate batches that are returned to the hydrolyzers for reprocessing.
- Agent concentrate is fed directly to the in-line static mixers on the parallel recirculation loops.

The recirculation loops contain the in-line static mixers, in-line steam mixers, pH metering, and a control valve that is closed at the end of the reaction sequence. The recirculation return nozzles, each of which includes a dip leg that discharges liquid tangentially near the agitator bottom blade, are located on the side of the hydrolyzer.

1.3.2 Agent Hydrolyzer Mixers, Agitators, and Pumps

Agent Hydrolyzer Tank Agitators are used in conjunction with the in-line static mixers to achieve agent droplet breakup to facilitate the hydrolysis process.

Agent Hydrolyzer Recirculation and Transfer Pumps provide flow to the reactor recirculation loops and are used when emptying the reactor at the end of the reaction sequence.

In-line Static Mixers introduce agent concentrate by way of a nozzle connection to the agent hydrolyzers. The in-line static mixers, in conjunction with the agent hydrolyzer tank agitators, maintain the agent droplet size and pressure drop across the in-line static mixers within operating parameters.

In-line Steam Mixers remain in place but are not normally used. Hot process water is used to achieve temperature in the hydrolyzers.

1.3.3 Agent Hydrolysate Hold Tanks

When the hydrolysis reaction is complete, the hydrolysate is transferred from the agent hydrolyzers to the hydrolysate hold tank. When the tank contains hydrolysate, contents are agitated using mixing nozzles installed at the bottom of the tank.

Three sample draw-off nozzles are provided at three different heights above the bottom tangent. Each nozzle extends into the tank at different lengths to allow a representative sample of the tank contents to be taken.

The sampling system is closed loop drawing equal volumes of hydrolysate from each of three sample nozzles and discharging the sample into a common line. The hydrolysate circulates through a glove box, within which the sample is drawn, and back to the agent hydrolysate hold tank.

Hydrolysate that has been cleared for release is pumped to the thirty-day storage tanks by Agent Hydrolysate Pumps. Hydrolysate that is not cleared is transferred back to the hydrolyzers through separate lines by the Agent Hydrolysate Pumps.

1.3.4 Thirty-day Storage Tanks

A table of process and compliance information for operation of the ANS, based on the SOP, is provided in Attachment B04 – 2 – Agent Collection and Neutralization System Compliance Table.

V. DECONTAMINATION INFORMATION

~~The process stream that exits the ANS is hydrolysate. After determination that the hydrolysate does not contain agent at a concentration above the performance based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing.~~
~~The~~ ~~P~~potential exists to generate agent-contaminated liquid and cleanup materials. Decontamination solutions may be collected in the room sumps and pumped to the spent decon holding tanks, agent water separators, MWS wash water collection tanks~~system~~ or to containers for transfer and treatment.

Secondary waste from decontamination activities will include but not be limited to contaminated PPE, DPE suits, TAP gear, and items used for clean-ups. The ≥ 0.7 VSL secondary wastes may be decontaminated as an integral part of the waste generation process, may be treated in accordance with Part V of the Permit, or may be treated in the Secondary Decontamination Unit/Autoclave. Alternatively, the waste may be packaged and shipped offsite for treatment and/or disposal. The treated waste will be classified as either greater than or less than 0.7 VSL and sent off-site for treatment.

Equipment and parts that no longer meet operating requirements may become hazardous waste generated from maintenance activities. These items may be decontaminated in the SDU or Autoclave following the steps for the Secondary Waste Treatment system – B24.

Stationary equipment, structural elements, piping, conduit and other fixed items that become contaminated with agent are decontaminated by operators performing entries. Decontamination is performed following the procedure Equipment and Building Decontamination, 24852-SOP-B00-W0037.

The primary decontamination solution provided for use in the APB is water supplied through the site water system. Other decon materials may be employed (independently of the site water system) in the APB and other areas of the plant to augment the decontamination capabilities provided by water. These materials include the use of surfactants, commercially available decontamination solutions, and steam. Before PCAPP uses any surfactants or commercially available decontamination solutions in areas monitored via the Agent Monitoring System, PCAPP will evaluate the materials to ensure that they are not an interfering material.

VI. HAZARD ANALYSIS, HEALTH AND SAFETY REQUIREMENTS, PPE

The Job Hazard Analysis for operation of the ANS is provided at the end of the standing operating procedure which is provided in digital format as a standalone document. The scope of the Job Hazard Analysis excludes entries into toxic areas since the operation of the ANS and the data monitoring of the ANS is conducted in the Control Room.

PPE selection is based on the procedures Personal Protective Equipment, 24852-SAF-SAP-W0022, and Toxic Chemical Agent Safety program, 24822-SAF-SAP-W0011. Final selection of PPE will be made as part of the Pre-Entry Briefing or the Pre-Job Planning.

L - 6 - AGENT COLLECTION AND NEUTRALIZATION SYSTEM COMPLIANCE TABLE (B04)

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
1	MV-B04-0001/0002 Agent water separators	High level alarm – agent	<4.33 feet	B04-LAH-0961AA/BA	Continuous	1
2	MV-B04-0001/0002 Agent water separators	High level alarm – agent	<4.33 ft 83.2%	B04-LIT-0961AA-BB	Continuous	1
3	Agent w MV-B04-0001/0002 Agent water separators	High high level – water	<12'-8" alarm	B04-LAHH-0973A/B	Continuous	2
4	MV-B04-0001/0002 Agent water separators	High high level – water	<11.33 ft 88.5%	B04-LAHH-0973A/B	Continuous	2
5	MV-B04-0001/0002 Agent water separators	High level – water	<12'-2"	B04-LAH-0973A/B	Continuous	1
6	MV-B04-0001/0002	High level – water	<10.83 ft 84.5%	B04-LAH-0973A/B	Continuous	1
7	Agent water separators	Level – water	72-84%	B04-LI-0973A/B	Continuous	1
8	MV-B04-0001/0002 Agent water separators	Low level – water	>9.21 ft	B04-LAL-0973A/B	Continuous	1
9	MV-B04-0001/0002 Agent water separators	Low level – water	>9.21 ft 71.6%	B04-LAL-0973A/B	Continuous	1
10	MV-B04-0001/0002 Agent water separators	Low low level – water	>8.96 ft	B04-LALL-0973A/B	Continuous	2
11	MV-B04-0001/0002 Agent water separators	Low low level – water	>8.96 ft 69.7%	B04-LALL-0973A/B	Continuous	2
12	MV-B04-0001/0002 Agent water separators	Organic vapor pressure	<76.6 kPa	Calculation[a]	Permit Condition IV.L.3.b.i. [a]	1
13	MV-B04-0001/0002 Agent water separators	Agent wash water flow	>0.5 gpm	B04-FIT-0966	Continuous	1
14	MV-B04-0001/0002 Agent water separators	Agent Concentrate flow	>0.2 gpm	B04-FIT-0976AA/AB/BB/BA	Continuous	1
15	MV-B04-0001/0002 Agent water separators	Agent Concentrate density	>1.25 (SG)	B04-DIT-0976 AA/AB/BB/BA	Continuous	1
16	MV-B04-0001/0002 Agent water separators	Washwater density	<1.02 gpm	B04-DIT-0981	Continuous	1
17	MV-B04-0001/0002 Agent water separators	Washwater flow	>0.5 gpm	B04-FIT-0981	Continuous	1
18	MV-B04-0001/0002 Agent water separators	AWS headspace pressure	-1 to 5 psig	B04-PI-0962A/B	Continuous	1
19	MV-B04-0104/0204 MWS wash water collection tanks	High high level	<11 feet	B04-LAHH-7003AA/AB	Continuous	2
20	MV-B04-0104/0204 MWS wash water collection tanks	High high level	<14 ft	B04-LAHH-7003AA/BB	Continuous	2
21	MV-B04-0104/0204 MWS wash water collection tanks	High level – switch closes inlet valve on one and opens on another	<10' 9"	B04-LSH-0973	Continuous	1
22	MV-B04-0104/0204 MWS wash water collection tanks	High level	<13 ft 76.79%	B04-LIT-7003AA/AB	Continuous	1
23	MV-B04-0104/0204 MWS wash water collection tanks	Low low level	>1.21 ft 7.1 %	B04-LALL-7003	Continuous	2
24	MV-B04-0104/0204 MWS wash water collection tanks	Organic vapor pressure	<76.6 kPa	Calculation[a]	Permit Condition IV.L.3.b.i. [a]	1
25	MP-B04-0105A/B Wash Water Pump	Seal pot low level	>13.876 inches	B04-LAL-7014	Continuous	1
26	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Gallons of agent[b]	Typical 0 - 212	B04-FQIS-0976	1 per batch	1
27	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Gallons of wash water and/or spent decon[b]	Typical 0 - 3275	B04-FQIS-7062	1 per batch	1
~~28~~	~~MV-B04-0101/0201~~ Agent hydrolyzers	~~Gallons of spent decon[b]~~	~~Typical 0 - 3275~~	~~B04-FQIS-7042~~	~~1 per batch~~	~~1~~
289	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Gallons of caustic[b]	Typical 200 - 428	B04-FQIS-7175	1 per batch	1
2930	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Gallons of process water[b]	Typical 0 - 2835	B04-FQI-7181	1 per batch	1
301	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	3.2-96%	B04-LIT-0961A	Continuous	1

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
312	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	8.0-96%	B04-LIT-0961B	Continuous	1
323	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	>0.42 ft (8.0%)	B04-LALL-0961B	Continuous	1
334	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	>0.5 ft (11.2%)	B04-LAL-0961B	Continuous	1
345	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	>0.17 ft (3.2%)	B04-LALL-0961A	Continuous	1
356	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	>0.33 ft (6.4%)	B04-LAL-0961~~B~~A	Continuous	1
367	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	<4.33 ft	B04-LAH-0961	Continuous	1
378	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent level in separator	<5 ft	B04-LAHH-0961	Continuous	2
389	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Water level in wash water collection tank	7.1-82.6%	B04-LI-7003	Continuous	1
3940	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Level in spent decon storage tank	2.21-10.22 ft	B04-LI-0827	Continuous	1

AGENT COLLECTION AND NEUTRALIZATION SYSTEM COMPLIANCE TABLE (B04)

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frenquency of Monitoring	Response Level
1	MV-M16-0001 Hot Process Water Tank	Low temperature	185-210°F	M16-TIT-5403	Continuous	1
2	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Low low level	>0.75 ft	B04-LALL-7089	Continuous	1
3	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Low low level	>0.75 ft 5.4%	B04LIT-7089AA/AB/BA/BB	Continuous	1
4	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Low level	>6.91 ft	B04-LAL-7089	Continuous	1
5	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Low level	>6.91 ft 49.4%	B04-LIT-7089AA/AB/BA/BB	Continuous	1
6	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	High level alarm	< 6'8"	B04-LAH-7089	Continuous	1
7	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	High level alarm	<10.17 ft 72.6%	B04-LIT-7089AA/AB/BA/BB	Continuous	1
8	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	High high level	≤7'-4" alarm	B04-LIT-7089	Continuous	1
9	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	High high level	≤10.83 ft 77.4%	B04-LIT-7089AA/AB/BA/BB	Continuous	1
10	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Average batches per day	≤6	Operator log	Monthly (30-day average)	3
11	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Maximum batches per week	≤42	Operator log	Weekly	3
12	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	ANR reactor temperature	170ºF- 250ºF (see Note h)	TIT-7091	Continuous	1
13	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent concentration	≤8.6% wt	Batch worksheet	1 per batch	3
14	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Batch pH[(c)]	Either stable at ≥10 or the conditions identified in permit condition IV.D.4.iv.(F) have been met	B04- KQI-0709A-A	After Na OH addition, pH adjustment	1
15	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Organic vapor pressure	<76.6 kPa	Calculation[(a)]	Permit Condition IV.L.3.b.i. [(a)]	1
16	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Washwater recirculation flow	>175 gpm	B04-FIT-7004	Continuous	1
17	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent hydrolyzer pH	≥10 or the conditions identified in permit condition IV.D.4.iv.(F) have been met	B04-AI-7108	After Na OH addition, pH adjustment	1
18	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agent Concentrate flow totalizer	Set by CRO	B04-FQIS-0976	Continuous	1
19	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	ANR headspace pressure	<40 psig	B04-PIC -7085	Continuous	2
20	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Agitator speed	≤77 rpm	B04-SIC-7087	Continuous	2
21	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Recirculation time with agent	30 minutes	B04-KQI-0708A	Per batch	1
22	MV-B04-0102/0202 ~~MV-B04-0101/0201~~ Agent hydrolyzers	Recirculation time water only	100 minutes (spent decon, wash water) 200 minutes (failed batch)	B04-KQI-0708A	Per batch	1
23	MP-B04-0103A/B Agent Hydrolyzer Recirculation Pumps	Seal pot low level	>13.876 inches	B04-LAL-7114	Continuous	1
24	MP-B04-0103A/B Agent Hydrolyzer Recirculation Pumps	Seal pot air pressure	>75 psig	B04-PSL-7115A/AB	Continuous	1
25	MP-B04-0103A/B Agent Hydrolyzer Recirculation Pumps	Pump speed (prior to to batch transfer)	<1700 rpm	B04-SIT-7105AA/AB/BA/BB	Continuous	1
26	MV-B04-0103/0203 Agent hydrolysate hold tanks	Low low alarm	>1.08 ft	B04-LALL-7127	Continuous	1
27	MV-B04-0103/0203 Agent hydrolysate hold tanks	Low low alarm	>1.08 ft 6.8%	B04-LIT-7127AA/BB	Continuous	1
28	MV-B04-0103/0203 Agent hydrolysate hold tanks	Low level alarm	>5.0 ft	B04-LAL-7127	Continuous	1

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
29	MV-B04-0103/0203 Agent hydrolysate hold tanks	Low level alarm	>1.92 ft 12.0%	B04-LIT-7127AA/BB	Continuous	1
30	MV-B04-0103/0203 Agent hydrolysate hold tanks	High level alarm	<12.5 ft 78.5%	B04-LIT-7127AA/BB	Continuous	1
31	MV-B04-0103/0203 Agent hydrolysate hold tanks	High high level	≤10'3" alarm	B04-LAHH-7127	Continuous	2
32	MV-B04-0103/0203 Agent hydrolysate hold tanks	High high level	<14 ft 88%	B04-LIT-7127AA/BB	Continuous	2
33	MV-B04-0103/0203 Agent hydrolysate hold tanks	Hold tank pressure	≤45 psig	B04-PV-7126	Continuous	2
34	MV-B04-0103/0203 Agent hydrolysate hold tanks	Organic vapor pressure	<76.6 kPa	Calculation[a]	Permit Condition IV.L.3.b.i. [a]	1
35	Glovebox	Glovebox differential pressure	<-0.25 in w.c.	B04-PDI - 7191	Each sampling event	1
36	MV-B04-0103 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190A-A	Each sampling event	None[g]
37	MV-B04-0103 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190A-B	Each sampling event	None[g]
38	MV-B04-0103 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190A-C	Each sampling event	None[g]
39	MV-B04-0203 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190B-A	Each sampling event	None[g]
40	MV-B04-0203 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190B-A	Each sampling event	None[g]
41	MV-B04-0203 Agent hydrolysate hold tank sample lines	Flow in sample line	Periodic positive values for flowrate	B04-FI-7190B-A	Each sampling event	None[g]
42	Glovebox	Blow down pressure	10.5-13.5 psig	B04-PI - 7199	Each sampling event	1
43	Glovebox	Sample temperature	<140ºF	B04-TI-7199	Each sampling event	1
44	Glovebox	Sample container MINICAMs reading	<0.20 VSL	B04-AIT-3376	Each sampling event	1
45	Glovebox	Waste MINICAMs reading	<0.20 VSL	B04-AIT-3376	Each sampling event	1
46	MV-B04-0103/0203 Agent hydrolysate hold tanks	Concentration of agent in the contents of hydrolysate hold tank.	After determination that the hydrolysate does not contain agent at a concentration above the performance based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing.	Mustard Agent in HD/HT Water Hydrolysate 24852-GPP-GGL-00204	Once per batch	2
47	MV-B04-0103/0203 Agent hydrolysate hold tanks	pH	>10 as reported on Laboratory form GPP-GGL-00204-F001	Determination of pH 24852-GPP-GGL-00101	1 per batch	1
48	MV-B04-0301/0201/0101 30-day tanks	High high level	≤23 feet Above tank bottom LSHH – 7160 is 20.5 ft above LIT 7154 tap which is 2.5 ft above tank bottom	B04 - LSHH-7160A/B/C LSHH – will auto shut off feed LSHH – will open inlet valve to next tank	Continuous	2
49	MV-B04-0301/0201/0101	High level	≤20 Feet	B04-LAH-7154A/B/C	Continuous	1
50	30-day tanks	High level	≤20 Feet 93%	B04-LIT-7154AA/AB/BA/BB	Continuous	1
51	MV-B04-0301 30-Day Tank - 0301	ANS - 30-Day Tank - 0301 - level - tag AA – low low	2.33 ft. (10.9%)	B04-LALL-7154AA	Continuous	1
52	MV-B04-0301 30-Day Tank - 0301	ANS - 30-Day Tank - 0301 - level - tag AB – low low	2.33 ft. (10.9%)	B04-LALL-7154AB	Continuous	1
53	MV-B04-0201 30-Day Tank - 0201	ANS - 30-Day Tank - 0201 - level - tag BA – low low	2.33 ft. (10.9%)	B04-LALL-7154BA	Continuous	1
54	MV-B04-0201 30-Day Tank - 0201	ANS - 30-Day Tank - 0201 - level - tag BB – low low	2.33 ft. (10.9%)	B04-LALL-7154BB	Continuous	1
95	MV-B04-0101 30-Day Tank – 0101	ANS - 30-Day Tank - 0101 - level - tag BA – low low	2.33 ft. (10.9%)	B04-LALL-7154CA	Continuous	1
56	MV-B04-0101 30-Day Tank - 0101	ANS - 30-Day Tank - 0101 - level - tag BB – low low	2.33 ft. (10.9%)	B04-LALL-7154CB	Continuous	1

Line Number	Equipment Number and Description	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
57	MV-B04-0101 30-Day Tank - 0101	Low low temperature	40ºF	B04-TIT-7198	Continuous	2
58	MV-B04-0101 30-Day Tank - 0101	High high temperature	110ºF	B04-TIT-7198	Continuous	2
59	MV-B04-0101	Liquid specific gravity	≤1.27 (SG)	Grab sample Determination of Specific Gravity in a Hydrolysate Matrix 24852-GPP-GGL-00113	Annually or Campaign Change	1
60	MV-B04-0301/0201/0101 30-day tanks	Organic vapor pressure	≤5.2kPa	Calculation[a]	Permit Condition III.M.1.B.i.[a]	1
61	MP-B04-0106A/B MP-B04-0206A/B MP-B04-0306A/B Bioreactor Transfer Pumps	Temperature	100-105ºF	B04-TIT-7198	Once per shift	1
62	MP-B04-0106A/B MP-B04-0206A/B MP-B04-0306A/B Bioreactor Transfer Pumps	Discharge pressure	38*45 psig	B04-PI - 7158	Once per shift	1
63	MP-B04-0106A/B MP-B04-0206A/B MP-B04-0306A/B Bioreactor Transfer Pumps	Inlet strainer pressure drop	< 2 psi	B04-PDI - 7197	Once per shift	1
64	MP-B04-0106A/B MP-B04-0206A/B MP-B04-0306A/B Bioreactor Transfer Pumps	Discharge hydrolysate duplex filter differential pressure	< 15 psi	B04-PDI – 7156	Once per shift	1
65	MV-B04-0103/0203 Agent hydrolysate hold tanks	Concentration of agent in the contents of hydrolysate hold tank. (Monitored during Failed Hydrolysate Batch Operations)	After determination that the hydrolysate does not contain agent at a concentration above the performance based method detection limit not to exceed 20 parts per billion (ppb) for HD and ≤ 200 ppb for T, the hydrolysate is transferred to the 30-Day Storage Tanks. Hydrolysate that does not meet the clearance criteria is pumped back to the agent hydrolyzers for re-processing.	Mustard Agent in HD/HT Water Hydrolysate 24852-GPP-GGL-00204	Once per batch	1
66	MV-B04-01021/02021 Agent hydrolyzers	Gallons of agent (Monitored during Failed Hydrolysate Batch Operations)	0	B04-FQIS - 0976	Once per batch	1
67	MV-B04-01021/02021 Agent hydrolyzers	Gallons of wash water and/or spent decon (Monitored during Failed Hydrolysate Batch Operations)	0	B04-FGQIS-7062	Once per batch	1
~~68~~	~~MV-B04-0101/0201 Agent hydrolyzers~~	~~Gallons of spent decon (Monitored during Failed Hydrolysate Batch Operations)~~	~~0~~	~~B04-GQIS-7042~~	~~Once per batch~~	~~1~~
680	MV-B04-01021/02021 Agent hydrolyzers	Gallons of caustic (Monitored during Failed Hydrolysate Batch Operations)	As needed if necessary, to adjust pH to ≥ 10.	B04-FGQIS-7175	Once per batch	1

Notes:

a. The vapor pressure is calculated based on the sum of the vapor pressures from the concentrations of the individual components in the liquid phase.
b. The gallons of agent, wash water, spent decon and caustic are subject to change based on the batch recipe.
c. The initial pH of the batch will be acidic due to the production of HCl from the hydrolysis. The final stable pH≥10 will occur when NaOH is added to the batch.
d. Reserved
e. Reserved
f. Reserved
g. No response level is assigned to this operating parameter because the response to no indication of flow is to notify the Control Room Supervisor. Positive flow must be present prior to collecting sample for verification of hydrolysate treatment.
h. Temperature range presented is for agent concentration batches. For other batch types (wash water and/or spent decon, failed batch), the temperature range is ambient to 195 ^{0}F.

TOXIC STORAGE AND SPENT DECON – B05

PACKAGE CONTENTS

The information is presented in the sections listed below:

I. SYSTEM DESCRIPTION

1.1. GENERAL DESCRIPTION

The Spent Decon Tank system collects the following waste streams: spent decontamination (and rinse) solutions from the decontamination of personnel, equipment, and building features in the APB, ERB, and medical facility; fire suppression discharges collected in Category ~~A,~~ B, and C areas within the APB; ~~autoclave condensate from the Autoclave Condensate Drum Tank,~~ condensate from the APB air handling units, steam lines, and Hot Water Process; blowdown from the OTS scrubber; ~~condensate from the Autoclave,~~ process liquids generated during maintenance and repair activities, including flushing and draining of process equipment and tank systems during maintenance, repair, and decontamination activities; sample returns; and cleanup after spill of fluids from industrial equipment (e.g., propylene glycol and lubricating fluids). ~~These waste streams are collected from sumps located in Category A, B, and C rooms of the APB that are pumped to the spent decon holding tanks.~~

The contents of the two spent decon holding tanks (MV-B05-0101/0201) are transferred to the MWS wash water collection tanks. MWS wash water collection tanks comingle wash water with other fluids from Category A sumps (MT-B05-0047, -0048, -0066) and with condensate from autoclave. ~~agent hydrolyzers for processing.~~ Comingled spent decon and wash water mixture is flow controlled to ~~Aggregation and intermediate storage in the spent decon tanks~~ provide~~s~~ a more uniform solution for the agent hydrolyzer batch feed.

1.2. MAJOR COMPONENTS

Major components of the spent decon tank system include the following:

- Sumps
- Sump pumps
- Spent decon holding tanks
- Spent decon feed pumps

1.2.1 Sumps

Equipment numbers and locations for the sumps are shown on process flow diagrams (PFDs) 24852-RD-M5-B05-B0004 and –B0005.

Transfer of spent decon waste streams from the following category B and C sumps (identified by pump number) are transferred to Spent Decon Tank #1 (MV-B05-0101) and #2 (MV-B05-0201).

- Sump pumps MP-B05-0049 and -0050 (TMA airlock)
- Sump pump MP-B05-0051 (Off-gas Treatment Room)
- Sump pump MP-B05-0052 (TMA Category B Room)
- Sump pump MP-B05-0053 (Glove Box Vestibule)
- Sump pump MP-B05-0054 (TMA Category C Room)
- Sump pump MP-B05-0055 (MWS Washout Water Storage Room)
- Sump pumps MP-B05-0056 and -0074 (MTU Room)
- Sump pump MP-B05-0057 (MWS Room Airlock)
- Sump pump MP-B05-0058 (TMA Air Lock)
- Sump pumps MP-B05-0059 and -0060 (Munitions Receiving and Traveling Area)
- Sump pump MP-B05-0061 (Agent Hydrolysate Tank Room)
- Sump pump MP-B05-0062 (East Corridor)
- Sump pump MP-B05-0063 (West Corridor)
- Sump pumps MP-B05-0064, -0065, and -0069 (MWS Room Air Lock)
- Sump pump MP-B05-0070 (Off-gas Treatment Room)
- Sump pump MP-B05-0075 (South Corridor)

Offgas Treatment System (OTS) scrubber blowdown is also transferred through a header to the Spent Decon Tanks.

Sumps located in areas that could potentially store agent-containing waste are lined and have leak detection probes between the liner and the sump walls (e.g., category A sumps ~~MT-B05-0051 located within the curb surrounding the venture scrubber~~). Sumps located in areas that do not have the potential to store agent-containing waste are unlined.

Contents of lined category A sumps are transferred to the following vessels:

- MT-B05-0040, -0041, -0042, -0044, -0045 and -0046 (these constitute the MWS washout and MWS room decon airlock sumps) are transferred to Agent Water Separators (MV-B04-0001/0002)
- MT-B05-0047, -0048, -0066 (these constitute TMA decon airlock, TMA and Toxic Room sumps) are transferred to MWS wash water collection tanks (MV-B04-0104/0204).

Spent decon waste from category A, B, and C sumps is transferred to the MWS wash water collection tanks directly, via the Agent Water Separators, or via the Spent Decon Tanks.

1.2.2 Sump Pumps

Equipment numbers for the sump pumps are shown on PFDs 24852-RD-M5-B05-B0004 and –B0005.

Equipment numbers for the sump pumps are shown on PFDs 24852-RD-M5-B05-B0004 and –B0005.

When placed in automatic control, level switches in the sumps control the pumps. When placed in manual control, the sump pumps may be started locally or remotely. High liquid level in the sump automatically starts the pump; low liquid level in the sump stops the pump.

1.2.3 Spent Decon Holding Tank

The spent decon holding tanks receive spent decon from category B and C sumps and receive OTS scrubber blowdown, which is then transferred to MWS wash water collection tanks (MV-B04-0104/0204). ~~waste from multiple sources for collection, mixing, and then feed to the hydrolyzer tanks.~~

The FCS system provides continuous, sequential, and manual control of the spent decon storage system. Operation of the FCS for this system is performed by a control room operator.

~~The spent decon tank system is designed to manage liquids containing minor traces of agent. If wastes containing greater percentages of agent are received in the spent decon tank system, the recipe at the hydrolyzer will be adjusted to receive additional volume of spent decon waste or a special reactor batch consisting of only spent decon solution may be processed in the hydrolyzer. At this time, the amount of agent in the spent decon system that will trigger adjustment of the hydrolyzer recipe has not been determined. In the event that abnormal conditions have occurred that could cause elevated concentrations of agent to be present in the spent decon, an analysis of the events will be performed to estimate the amount of agent in the spent decon. Based on the analysis, the amount of agent in the next batch will be decreased or the spent decon will be processed as a wash water and spent decon batch. Since the processed batch must meet the criteria that the agent concentration be below detection limits, all of the agent from the spent decon system will be destroyed.~~

1.2.4 Spent Decon Feed Pumps

Fluid from the spent decon tank is drawn from the tank and ~~either recirculated back to the tank, or~~ is transferred to ~~the agent hydrolyzers for treatment.~~ the MWS wash water collection tanks. pH monitoring is conducted on the suction side of the spent decon feed pumps as an indicator of the pH of the waste being transferred through the piping upstream and downstream of the spent decon tanks. A low low alarm of pH ≤ 6.0 for greater than 30 continuous minutes will initiate a corrosion assessment of the carbon steel piping through which the spent decon waste had been transferred.

1.3 GENERAL DESCRIPTION – SPENT DECON STORAGE SYSTEM

The Spent Decon Storage System is operated in accordance with SOP 24852-SOP-B05-W0001.

II. SYSTEM SCHEMATIC

A schematic for the Toxic Storage and Spent Decon System is provided in Attachment B05 - 1 – Toxic Storage and Spent Decon Schematic.

III. WASTE CHARACTERIZATION

The wastes managed in and generated from the B05 system are characterized based on process knowledge derived from the generation process, manufacturer information, industry standards, and, if applicable, verified with sampling and analysis and agent monitoring in accordance with the Waste Analysis Plan and the table in section IV.B.1 of the Permit.

See WAP Table D-5-1 - PCAPP Waste Stream Summary for waste streams generated by the B05 system.

IV. COMPLIANCE TABLE

A table of process and compliance information for operation of the Toxic Storage and Spent Decon System, based on the SOP, is provided in Enclosure 5F - Attachment 2 – Spent Decon Storage System Compliance Table.

V. DECONTAMINATION INFORMATION

Streams potentially contaminated with agent are collected in the Toxic Storage and Spent Decon System. These streams are processed in the B04 system hydrolyzers to destroy the agent by hydrolysis.

~~The p~~Potential exists to generate agent-contaminated liquid and cleanup materials. Decontamination solutions may be collected in the room sumps and pumped to the spent decon holding tanks, agent water separators, MWS wash water collection tanks~~system~~ or to containers for transfer and treatment.

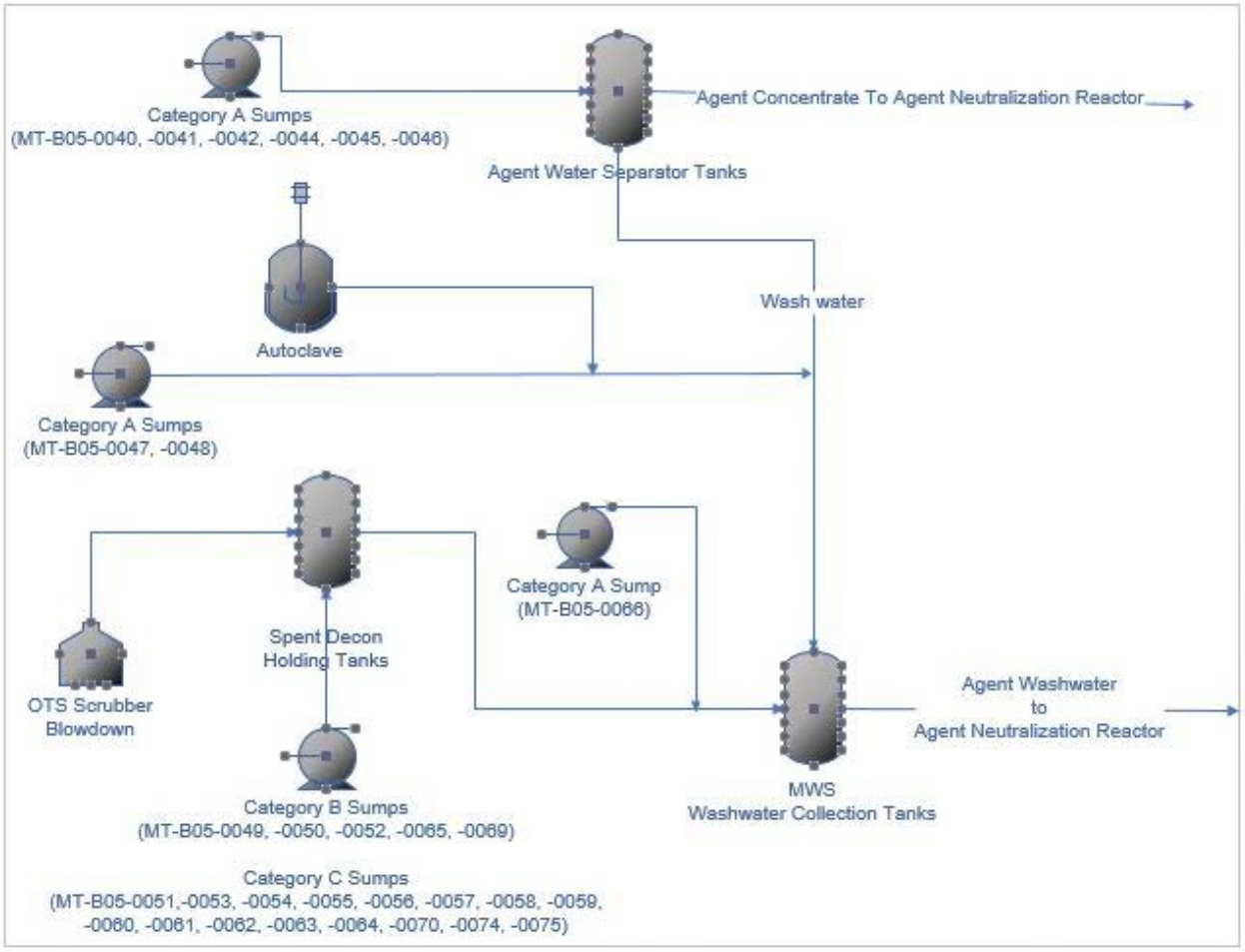
Secondary waste from decontamination activities will include but not be limited to contaminated PPE, DPE suits, TAP gear, and items used for clean-ups. The ≥ 1 VSL secondary wastes may be decontaminated as an integral part of the waste generation process, may be treated in accordance with Part V of the Permit, or may be treated in the Secondary Decontamination Unit/Autoclave. Alternatively, the waste may be packaged and shipped offsite for treatment and/or disposal. The treated waste will be classified as either greater than or less than 0.7 VSL and sent off-site for treatment.

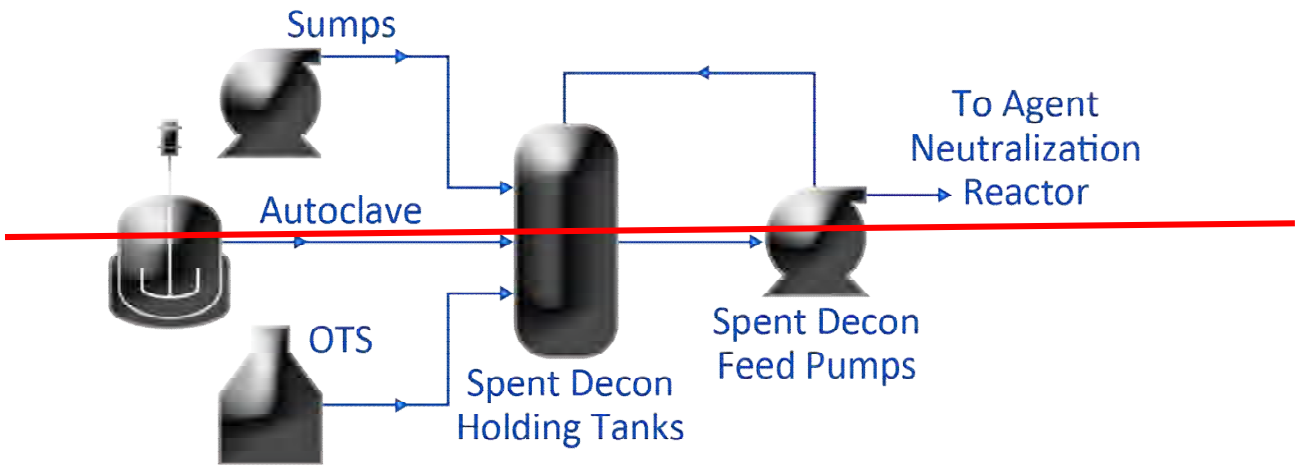
Equipment and parts that no longer meet operating requirements may become hazardous waste generated from maintenance activities. These items may be decontaminated in the SDU or Autoclave following the steps for the Secondary Waste Treatment system – B24.

Stationary equipment, structural elements, piping, conduit and other fixed items that become contaminated with agent are decontaminated by operators performing entries. Decontamination is performed following the procedure Equipment and Building Decontamination, 24852-SOP-B00-W0037.

The primary decontamination solution provided for use in the APB is water supplied through the site water system. Other decon materials may be employed (independently of the site water system) in the APB and other areas of the plant to augment the decontamination capabilities provided by water. These materials include the use of surfactants, commercially available decontamination solutions, and steam. Before PCAPP uses any surfactants or commercially available decontamination solutions in areas monitored via the Agent Monitoring System, PCAPP will evaluate the materials to ensure that they are not an interfering material.

Figure L-7-Toxic Storage and Spent Decon Schematic





L – 7 - SPENT DECON STORAGE SYSTEM COMPLIANCE TABLE (B05)

Line Number	Equipment Number and Description(1)	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
1	MP-B05-0101~~0~~A/B ~~MP-B05-0201A/B~~ Spent Decon Feed Pump and Spare MV-B05-0101/0201~~10102~~ Spent Decon Holding Tanks	Spent decon low low level	>0.53 ft	B05-LSLL-0828A/B	Continuous	2
2	MP-B05-0101~~0~~A/B ~~MP-B05-0201A/B~~ Spent Decon Feed Pump and Spare MV-B05-0101/0201~~10102~~ Spent Decon Holding Tanks	Spent decon pump discharge pressure	>17.7 psig	B05-PALL-0841A/B	Continuous	1
3	MV-B05-0101/~~10102~~ Spent Decon Holding Tanks	High high level	~~<8'9"~~<10.22 ft	B05-LSHH-0826A	Continuous	2
4	MV-B05-0201~~0101/10102~~ Spent Decon Holding Tanks	High high level	<10.22 ft	B05-LSHH-0826B	Continuous	2
5	MV-B05-0101/0201~~10102~~ Spent Decon Holding Tanks	Organic vapor pressure(3)	<76.6 kPa	Calculation(2)	Permit Condition IV.L.3.b.i (2)	1
6	MP-B05-0040 RM-APB-118 Sump Pump MWS Room Decon Airlock (A)	Low level alarm	>0.5 ft	B05-LSL-6701	Continuous	1
7	MP-B05-0040 RM-APB-118 Sump Pump MWS Room Decon Airlock (A)	High level alarm	<1.71 ft	B05-LSH-6701	Continuous	1
8	MP-B05-0040 RM-APB-118 Sump Pump MWS Room Decon Airlock (A)	High high level alarm	<2.375 ft	B05-LSHH-6701	Continuous	2
9	MP-B05-0040 RM-APB-118 Sump Pump MWS Room Decon Airlock (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6703	Continuous	1
10	MP-B05-0040 Sump pump	SDS - Sump - APB - 118 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6700	Continuous	3
11	MP-B05-0041 Rm APB-125 Sump pump MWS Room NW (A)	Low level alarm	>0.5 ft.	B05-LSL-6706	Continuous	1
12	MP-B05-0041 Rm APB-125 Sump pump MWS Room NW (A)	High level alarm	<1.73 ft.	B05-LSH-6706	Continuous	1
13	MP-B05-0041 Rm APB-125 Sump pump MWS Room NW (A)	High high level alarm	<2.396 ft.	B05-LSHH-6706	Continuous	2
14	MP-B05-0041 Rm APB-125 Sump pump MWS Room NW (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6708	Continuous	1
15	MP-B05-0041 Sump pump	SDS - Sump - APB - 125(NW) - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6705	Continuous	3
16	MP-B05-0044 Rm APB-125 Sump pump MWS Room SW (A	Low level alarm	>0.5 ft.	B05-LSL-6721	Continuous	1
17	MP-B05-0044 Rm APB-125 Sump pump MWS Room SW (A	High level alarm	<1.81 ft.	B05-LSH-6721	Continuous	1
18	MP-B05-0044 Rm APB-125 Sump pump MWS Room SW (A	High high level alarm	<2.479 ft.	B05-LSHH-6721	Continuous	2
19	MP-B05-0044 Rm APB-125 Sump pump MWS Room SW (A	Motive air pressure for sump pump	10-110 psig	B05-PIT-6723	Continuous	1
20	MP-B05-0044 Sump pump	SDS - Sump - APB - 125(SW) - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6720	Continuous	3
21	MP-B05-0081~~45~~ Rm APB-125 Sump pump MWS Room NE (A)	Low level alarm	>0.5 ft.	B05-LSL-6726	Continuous	1

Line Number	Equipment Number and Description(1)	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
22	MP-B05-008145 Rm APB-125 Sump pump MWS Room NE (A)	High level alarm	<1.73 ft.	B05-LSH-6726	Continuous	1
23	MP-B05-008145 Rm APB-125 Sump pump MWS Room NE (A)	High high level alarm	<2.396 ft.	B05-LSHH-6726	Continuous	2
24	MP-B05-008145 Rm APB-125 Sump pump MWS Room NE (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6728	Continuous	1
25	MP-B05-008145 Sump pump	SDS - Sump - APB - 125(NE) - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6725	Continuous	3
26	MP-B05-0046 Rm APB-134 Sump Pump MWS Room Decon Airlock (A)	Low level alarm	>0.5 ft.	B05-LSL-6731	Continuous	1
27	MP-B05-0046 Rm APB-134 Sump Pump MWS Room Decon Airlock (A)	High level alarm	<1.83 ft.	B05-LSH-6731	Continuous	1
28	MP-B05-0046 Rm APB-134 Sump Pump MWS Room Decon Airlock (A)	High high level alarm	<2.500 ft.	B05-LSHH-6731	Continuous	2
29	MP-B05-0046 Rm APB-134 Sump Pump MWS Room Decon Airlock (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6733	Continuous	1
30	MP-B05-0046 Sump pump	SDS - Sump - APB - 134 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6730	Continuous	3
31	MP-B05-0048 Rm APB-136 Sump pump TMA Decon Airlock (A)	Low level alarm	>0.5 ft.	B05-LSL-6741	Continuous	1
32	MP-B05-0048 Rm APB-136 Sump pump TMA Decon Airlock (A)	High level alarm	<2.00 ft.	B05-LSH-6741	Continuous	1
33	MP-B05-0048 Rm APB-136 Sump pump TMA Decon Airlock (A)	High high level alarm	<2.670 ft	B05-LSHH-6741	Continuous	2
34	MP-B05-0048 Rm APB-136 Sump pump TMA Decon Airlock (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6743	Continuous	1
35	MP-B05-0048 Sump pump	SDS - Sump - APB - 136 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6740	Continuous	3
36	MP-B05-0066 Rm APB-120 Sump pump Toxic Room (A)	Low level alarm	>0.5 ft	B05-LSL-2806	Continuous	1
37	MP-B05-0066 Rm APB-120 Sump pump Toxic Room (A)	High level alarm	<2.00 ft	B05-LSH-2806	Continuous	1
38	MP-B05-0066 Rm APB-120 Sump pump Toxic Room (A)	High high level alarm	<2.670 ft	B05-LSHH-2806	Continuous	2
39	MP-B05-0066 Rm APB-120 Sump pump Toxic Room (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-2807	Continuous	1
40	MP-B05-0066 Sump pump	SDS - Sump - APB - 120 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-2805	Continuous	3
41	MP-B05-0047 Rm APB-126 Sump pump toxic maintenance (A)	Low level alarm	>0.5 ft	B05-LSL-6736	Continuous	1
42	MP-B05-0047 Rm APB-126 Sump pump toxic maintenance (A)	High level alarm	<1.90 ft	B05-LSH-6736	Continuous	1
43	MP-B05-0047 Rm APB-126 Sump pump toxic maintenance (A)	High high level alarm	<2.563 ft	B05-LSHH-6736	Continuous	2

Line Number	Equipment Number and Description(1)	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
44	MP-B05-0047 Rm APB-126 Sump pump toxic maintenance (A)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6738	Continuous	1
45	MP-B05-0047 Sump pump	SDS - Sump - APB - 126 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6735	Continuous	3
46	MP-B05-008042 Rm APB-125 Sump MWS Room SE (A) ~~Pumped by MP-B05-0047~~	Low level alarm	>0.5 ft	B05-LSL-6711	Continuous	1
47	MP-B05-008042 Rm APB-125 Sump MWS Room SE (A) ~~Pumped by MP-B05-0047~~	High level alarm	<2.00 ft	B05-LSH-6711	Continuous	1
48	MP-B05-008042 Rm APB-125 Sump MWS Room SE (A) ~~Pumped by MP-B05-0047~~	High high level alarm	<2.670 ft	B05-LSHH-6711	Continuous	2
49	MP-B05-008042 Sump pump	SDS - Sump - APB - 125(SE) - Liquid in lined sump interstitial space - high	No signal	B05-LAH-6710	Continuous	3
50	MP-B05-0049 Rm APB-145 Sump TMA Airlock (B)	Low level alarm	>0.5 ft	B05-LSL-6746	Continuous	1
51	MP-B05-0049 Rm APB-145 Sump TMA Airlock (B)	High level alarm	<2.00 ft	B05-LSH-6746	Continuous	1
52	MP-B05-0049 Rm APB-145 Sump TMA Airlock (B)	High high level alarm	<2.670 ft	B05-LSHH-6746	Continuous	2
53	MP-B05-0049 Rm APB-145 Sump TMA Airlock (B)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6748	Continuous	1
54	MP-B05-0050 Rm APB-137 Sump TMA Airlock (B)	Low level alarm	>0.5 ft	B05-LSL-7351	Continuous	1
55	MP-B05-0050 Rm APB-137 Sump TMA Airlock (B)	High level alarm	<2.00 ft	B05-LSH-7351	Continuous	1
56	MP-B05-0050 Rm APB-137 Sump TMA Airlock (B)	High high level alarm	<2.670 ft	B05-LSHH-7351	Continuous	2
57	MP-B05-0050 Rm APB-137 Sump TMA Airlock (B)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6623	Continuous	1
58	MP-B05-0050 Sump pump	SDS - Sump - APB - 137 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-7350	Continuous	3
59	MP-B05-0052 Rm APB-127 Sump TMA Airlock (B)	Low level alarm	>0.5 ft	B05-LSL-7346	Continuous	1
60	MP-B05-0052 Rm APB-127 Sump TMA Airlock (B)	High level alarm	<2.00 ft	B05-LSH-7346	Continuous	1
61	MP-B05-0052 Rm APB-127 Sump TMA Airlock (B)	High high level alarm	<2.670 ft	B05-LSHH-7346	Continuous	2
62	MP-B05-0052 Rm APB-127 Sump TMA Airlock (B)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6630	Continuous	1
63	MP-B05-0052 Sump pump	SDS - Sump - APB - 127 - Liquid in lined sump interstitial space - high	No signal	B05-LAH-7345	Continuous	3
64	MP-B05-0065 Rm APB-113 Sump NW Airlock (B)	Low level alarm	>0.5 ft	B05-LSL-7341	Continuous	1

Line Number	Equipment Number and Description(1)	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
	Sump MTU Room (C) Pumped by MP-B05-0056					
90	MP-B05-0056 Rm APB-133 Sump MTU Room (C) Pumped by MP-B05-0056	High level alarm	<2.00 ft	B05-LSH-6781	Continuous	1
91	MP-B05-0056 Rm APB-133 Sump MTU Room (C) Pumped by MP-B05-0056	High high level alarm	<2.670 ft	B05-LSHH-6781	Continuous	2
92	MP-B05-0056 Rm APB-133 Sump MTU Room (C) Pumped by MP-B05-0056	Motive air pressure for sump pump	10-110 psig	B05-PIT-6783	Continuous	1
93	MP-B05-0057 Rm APB-130 Sump South Corridor (C)	Low level alarm	>0.5 ft	B05-LSL-6786	Continuous	1
94	MP-B05-0057 Rm APB-130 Sump South Corridor (C)	High level alarm	<2.00 ft	B05-LSH-6786	Continuous	1
95	MP-B05-0057 Rm APB-130 Sump South Corridor (C)	High high level alarm	<2.670 ft	B05-LSHH-6786	Continuous	2
96	MP-B05-0057 Rm APB-130 Sump South Corridor (C)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6788	Continuous	1
97	MP-B05-0058 Rm APB-147 Sump TMA Airlock (C)	Low level alarm	>0.5 ft	B05-LSL-6791	Continuous	1
98	MP-B05-0058 Rm APB-147 Sump TMA Airlock (C)	High level alarm	<2.00 ft	B05-LSH-6791	Continuous	1
99	MP-B05-0058 Rm APB-147 Sump TMA Airlock (C)	High high level alarm	<2.670 ft	B05-LSHH-6791	Continuous	2
100	MP-B05-0058 Rm APB-147 Sump TMA Airlock (C)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6793	Continuous	1
101	MP-B05-0059 Rm APB-114 Sump Munitions Receiving Room W (C)	Low level alarm	>0.5 ft	B05-LSL-6796	Continuous	1
102	MP-B05-0059 Rm APB-114 Sump Munitions Receiving Room W (C)	High level alarm	<2.00 ft	B05-LSH-6796	Continuous	1
103	MP-B05-0059 Rm APB-114 Sump Munitions Receiving Room W (C)	High high level alarm	<2.670 ft	B05-LSHH-6796	Continuous	2
104	MP-B05-0059 Rm APB-114 Sump Munitions Receiving Room W (C)	Motive air pressure for sump pump	10-110 psig	B05-PIT-6798	Continuous	1
105	MP-B05-0060 Rm APB-114 Sump Munitions Receiving Room SE (C)	Low level alarm	>0.5 ft	B05-LSL-7301	Continuous	1
106	MP-B05-0060 Rm APB-114 Sump Munitions Receiving Room SE (C)	High level alarm	<2.00 ft	B05-LSH-7301	Continuous	1
107	MP-B05-0060 Rm APB-114 Sump Munitions Receiving Room SE (C)	High high level alarm	<2.670 ft	B05-LSHH-7301	Continuous	2
108	MP-B05-0061 Rm APB-122 Sump Hydrolysate Tank Room (C) ~~P~~	Low level alarm	>0.5 ft	B05-LSL-7306	Continuous	1
109	MP-B05-0061 Rm APB-122 Sump Hydrolysate Tank Room (C) ~~P~~	High level alarm	<2.00 ft	B05-LSH-7306	Continuous	1
110	MP-B05-0061 Rm APB-122 Sump Hydrolysate Tank Room (C) ~~P~~	High high level alarm	<2.670 ft	B05-LSHH-7306	Continuous	2
111	MP-B05-0061 Rm APB-122 Sump Hydrolysate Tank Room (C) ~~P~~	Motive air pressure for sump pump	10-110 psig	B05-PIT-7308	Continuous	1

Line Number	Equipment Number and Description(1)	Operating Parameter	Normal Operating Range	Method for Monitoring	Frequency of Monitoring	Response Level
	Rm South Corridor (C)					
135	MP-B05-0075 Rm APB-130 Rm South Corridor (C)	High high level alarm	<2.670 ft	B05-LSHH-7331	Continuous	2
136	MP-B05-0075 Rm APB-130 Rm South Corridor (C)	Motive air pressure for sump pump	10-110 psig	B05-PIT-7334	Continuous	1
137	MV-B05-0101/~~1~~0201 Spent decon holding tank	Level	2.21-10.22 feet	B05-LIT-0827A/B	Continuous	1
~~138~~	~~MV-B05-010/10201 Spent decon holding tank~~	~~High high level~~	~~<10.22 feet~~	~~B05-LSHH-0826A/B~~	~~Continuous~~	~~2~~
13~~8~~9	MV-B05-0101 Spent decon holding tank	SDS - spent decon holding tank - 0101 vent header – pressure - high	<10 psig	B05-PAH-0833A	Continuous	3
139~~40~~	MV-B05-0201 Spent decon holding tank	SDS - spent decon holding tank - 0201 - vent header – pressure - high	<10 psig	B05-PAH-0833B	Continuous	3
140~~1~~	MP-B05-0101A/B Spent decon pump inlet strainer	Pressure drop across strainer	3-15 psid	B05-PDIT-0847A/B	Continuous	1
141~~2~~	MP-B05-0101A/B Spent decon feed pump	Discharge pressure	17.7-44.6	B05-PIT-0841A/B	Continuous	1
142	MP-B05-0101A/B Spent Decon Feed Pump	pH low alarm	>6.5 pH	B05-AAL-0848 AA/AB	Continuous	1
143	MP-B05-0101A/B Spent Decon Feed Pump	pH Low-Low	>6 pH	B05-AIT-0848A/B	Continuous	2(3)

Notes:

1. The lined sumps and lined trenches are ancillary equipment to the Toxic Storage and Spent Decon System (B05) and to the Agent Collection and Neutralization System (B04). They are ~~and~~ not secondary containment. ~~These primary containment sumps also function as secondary containment for other equipment, and the sudden and unexpected rise of liquid within these sumps could indicate leakage or spills in the area.~~
2. The vapor pressure is calculated based on the sum of the vapor pressures from the concentrations of the individual components in the liquid phase.
3. A low low alarm of pH ≤ 6.0 for greater than 30 continuous minutes duration will initiate an investigation and a corrosion assessment of the carbon steel piping through which the spent decon waste had been transferred.

Enclosure 9

Document Change Notice “Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-M6N-B05-M0047)

Document Change Notice (DCN) “Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-M6N-B05-M0047) has been redacted because it contains Export Control/International Traffic Arms Regulations Information.

A copy of DCN “Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-M6N-B05-M0047) with appropriate Export Control markings will be submitted to the Division in a separate letter (Chron20-02250).

Enclosure 10

Operations Change Document “Sump MT-B05-0042 Immersion Pump (MP-B05-M0080)”
(24852-RD-OCD-B05-00006)

	OPERATION CHANGE DOCUMENT			
	OCD No:	24852-RD-OCD-B05-00006		Page 1 of 6
	Title:	SUMP MT-B05-0042 IMMERSION PUMP(MP-B05-M0080)		
	Date Submitted:	07JUL2020	Preauthorized OCD:	☐Yes, Auth. Code: N/A ☒No
	Requested Response Date:	14JUL2020		

PART A — Originator

SYSTEM NUMBER:	B05	Work Order No.:	5450122
LOCATION/AREA:	MWS Room/Sump	Prior Change Document	24852-RD-M6N-B05-M0047

Reference Document No.	Rev. No.	Reference Document No.	Rev. No.
24852-RD-M6-B05-M0024	008		
24852-RD-M6-B05-M0025	010		

EXISTING CONDITION:

DCN 25852-RD-M6N-B05-M0047 provides extensive changes to the B05 system. As stated on page 6 of the DCN, "the design of sump pump MP-B05-0080 is not mature a will be the subject of a future design change." This OCD is the design change document for completion of the sump pump MP-B05-0080. Furthermore, DCN 25852-RD-M6N-B05-M0047 routes the discharge of MP-B05-0080 to the discharge piping of washed agent and booster pumps (MP-B02-0201A/B), which is not practical for a pump performance prospective (See appendix A, pages 25 and 26 of the DCN). Finally, there is no isolation valve for the tie-in of sump MT-B05-0066 to the discharge piping of the MWS wash water pumps (MP-B04-0001A/B).

DESCRIPTION OF CHANGE (included affected WO steps and attach marked up drawings or photos):

This OCD selects pump MP-B05-0080 for the submersible, corrosive service and provides changes to route the discharge of the pump to sump MT-B05-0045.

The long description of the pump is as follows and cut sheets including pump curve can be found in Appendix B of this OCD:

> Submersible corrosive service dewatering pump, Tsurumi model 50SFQ2.75, 316 SS wetted components, 1 HP 3/460/60 motor, semi open impeller, 0.236" diameter solids handling, SiC mechanical seal, Viton elastomers, free standing, nominal 2 inch NPT discharge connection, built in motor protector, PVC sheath AWG 16/4-32ft power cable, pump dry weight = 49 lbs.

P&ID markups for implementation of this pump, rerouting of B05 piping, and addition of isolation valve can be found in Appendix A. Notable piping equipment changes are as follows:

24852-RD-M6-B05-M0024

- Deletion of strainer (PY-B05-8902)
- Addition of 2"x1 ½" bushing at the new pumps discharge
- Inclusion of the total dynamic head for the rated flow of 20 gpm
- Deletion of Note 16

24852-RD-M6-B05-M0025

- Addition of flexible hose (PY-B05-9020) routing to sump MT-B05-0045
- Deletion of check valve PV-B05-1342 and ball valve PV-B05-1343

24852-RD-M6-B04-M0010

- Addition of isolation ball valve PV-B05-1343

JUSTIFICATION FOR CHANGE:

The Tsurumi model 50SFQ2.75 fully submersible pump is appropriate for this application: it is composed of the appropriate wetting materials for the service (316 SS, Viton elastomers, SiC seal faces), easy to install and service with a 49 lbs dry weight, has the appropriate pump curve, can easily be accommodated in the sump with a low height profile (less than 16 inches), proven rugged and reliable for mining industry dewatering applications in severe service including pumping solids.

The rerouting of the pump discharge piping to sump MT-B05-0045 makes for a more practical application for pump selection. The addition of a globe valve on the discharge side of the new pump is for the purpose of throttling back the flow to achieve the rated flow condition of 20 gpm. Higher rates of flow are achievable should the need become necessary.

The addition of the isolation valve PV-B05-1343 for maintainability of the inline components and calibration of instrument (PIT 0987).

	OPERATION CHANGE DOCUMENT			
	OCD No:	24852-RD-OCD-B05-00006		Page 2 of 6
	Title:	SUMP MT-B05-0042 IMMERSION PUMP(MP-B05-M0080)		
	Date Submitted:	07JUL2020	Preauthorized OCD:	☐Yes, Auth Code:_N/A____ ☒No
	Requested Response Date:	14JUL2020		

CONDITIONAL RELEASE			
Conditional Release Request: ☐ Yes, ☒ No	CS-APE Approval: N/A (Name/Signature/Date)		
Conditional Release Limits (included accepted risk if any): N/A			
QC WO step verification: N/A		Environmental: N/A	
Safety: N/A			
Originator: John Zukowski	Signature:	Date: 07 JULY 2020	
CSE: Eric Benson	Signature:	Date: 07 July 2020	
Ops Manager:	Signature:	Date: 07 July 2020	

	OPERATION CHANGE DOCUMENT			
Pueblo Chemical Agent-Destruction Pilot Plant	OCD No:	24852-RD-OCD-B05-00006		Page 3 of 6
	Title:	SUMP MT-B05-0042 IMMERSION PUMP(MP-B05-M0080)		
	Date Submitted:	07JUL2020	Preauthorized OCD:	☐Yes, Auth. Code:__N/A___ ☒No
	Requested Response Date:	14JUL2020		

PART B — Engineer of Record			
DESIGN ENGINEERING DISPOSITION:	☐Rejected	☒Approved w/Changes	☐Approved

REJECTED OCD

N/A

Rejection Notification:

N/A	Date & Time: N/A

NCR No.: N/A

ACCEPTED WITH CHANGES

Description of Changes:

Excluded from the scope of this OCD as with DCN 24852-M6N-B05-M0047 but will be part of future DCN 24852-RD-E1N-B05-E0001 are the following discipline related deliverables:

- Electrical:
- Raceway plans
- Single lines
- Loads

Instrumentation and Controls (I&C)

- I/O lists
- Logic diagrams

The design changes in the scope of this OCD are provided in detail in the following appendices:

Appendix A - P&ID markups for implementation of this OCD are as follows (Changes in RED are additions, strikeout ~~Green~~ are deletions, and Blue text are comments from PART A):

24852-RD-M6-B05-M0024

1. Deletion of strainer (PY-B05-8902)
2. Addition of 2"x1 ½" bushing at the new pump's discharge
3. Inclusion of the ~~total dynamic head~~ rated delta P of 21 psi for the rated flow of 20 gpm
4. Deletion of Note 16
5. Addition of hand switch MCC LOCAL/REMOTE 6714 –B
6. Change local hand switch HOA to a JOG/STOP with tag number change to 6714 –A.
7. Added globe valve PV-B05-1400 on the discharge of pump MP-B05-0080.
8. Change the symbol for pump MP-B05-0080 from a sump vertical pump (A-1D4A14) to a submersible vertical pump (A-1D4A15)
9. Change off sheet connector label to read "TO SUMP 45 VIA TRENCH"

24852-RD-M6-B05-M0025

1. ~~Addition of flexible hose (PY-B05-9020) routing to sump MT-B05-0045~~
2. Deletion of check valve PV-B05-1342 and ball valve PV-B05-1343

24852-RD-M6-B04-M0010

- Addition of isolation ball valve ~~PV-B05-1343~~ PV-B04-1333

24852-RD-M6-B05-M0002

- Addition of flex hose PY-B05-1919

Appendix B – Submersible pump specifications, pump curve, and other information for MP-B05-0080. Added sectional view drawing and evaluated the pump curve to determine design pressure (25 psi) and operating pressure (21 psi) of the discharge piping.

Information added to this OCD that was absent from Part A:

Appendix C - PFD changes

Appendix D – Isometrics

Appendix E – System B05 Mechanical Lists (Equipment, Line, Valve, Specialty, and Configuration Items)

Appendix F – System B04 Mechanical Lists (Valve and Configuration Items)

Appendix G – System B05 Operational Spare Parts Lists

Appendix H – System B04 Operational Spare Parts Lists

Appendix J – Pipe Specification R

Justification of Changes:

Design engineering concurs with the pump selection and piping routing as detailed in Part A. The materials of construction are appropriate for long term exposure to the corrosive conditions. The pump is light weight, robust, and is capable of pumping solids. The justifications for the additional changes are as follows:

- Pump hand switches are added for consistency with other motorized pumps in the toxic areas. The configuration allows equipment maintainability and remote operation.
- The additional flex hose is not necessary and thus it is removed from the scope of this OCD.
- From the pump curve shown in Appendix C (page 3 of 7), the total dynamic head (TDH) at a zero-flow condition is 52.5 ft and at a rated flow of 20 gpm TDH equals 47 ft. At a specific fluid weight of 63 lbf/ft^3, the rated delta P equals 21 psi. given the suction pressure for this submersible is for all practical purposed atmospheric, the operating pressure is 21 psig. Adding 10% margin to the calculated ΔP for a block valve closure and using the same methodology, a design pressure of 25 psig is determined. On the discharge side of the globe valve, for conservatism, the design and operating pressures are retained. Noteworthy regarding the pump's

capacity, a high rated flow of 60 gpm via throttle adjustment to globe valve PV-B05-1400 is achievable.

- Clerical changes as denoted

The additional information is Appendices C through J are for configuration purposes.

ACCEPTED

Justification of Acceptance:

N/A

IMPACTS

List Design Document(s) Affected by the OCD:
(Include documents noted above and add additional documents. as required.)

CER 7/27/2020

Document No.	Rev No.	OCD Affects Document		Incorporation Required	
		Yes	No	Yes	No
~~24852-RD-M6N-B05-M0047~~	~~000~~	☒	☐	☐	☒
24852-RD-M6-B05-M0024	008	☒	☐	☒	☐
24852-RD-M6-B05-M0025	010	☒	☐	☒	☐
24852-RD-M6-B04-M0010	007	☒	☐	☒	☐
24852-RD-M5-B05-B0004	P02	☒	☐	☒	☐
24852-RD-30X-B05-M0001	001	☒	☐	☒	☐
24852-RD-30X-B05-M0002	002	☒	☐	☒	☐
24852-RD-30X-B05-M0003	002	☒	☐	☒	☐
24852-RD-30X-B05-M0004	001	☒	☐	☒	☐
24852-RD-30X-B05-M0006	002	☒	☐	☒	☐
24852-RD-30X-B05-M0007	000	☒	☐	☒	☐
24852-RD-30X-B04-M0003	004	☒	☐	☒	☐
24852-RD-30X-B04-M0006	002	☒	☐	☒	☐
24852-RD-30X-B04-M0007	000	☒	☐	☒	☐
24852-RD-3PS-000-P0001	013	☒	☐	☒	☐

	OPERATION CHANGE DOCUMENT			
	OCD No:	24852-RD-OCD-B05-00006		Page 6 of 6
	Title:	SUMP MT-B05-0042 IMMERSION PUMP(MP-B05-M0080)		
	Date Submitted:	07JUL2020	Preauthorized OCD:	☐Yes, Auth. Code:_N/A____ ☒No
	Requested Response Date:	14JUL2020		

Mech Inspec Updated:	☒Yes, ☐No	3D Model Affected:	☒Yes, ☐No
SetRoute Updated:	☐Yes, ☒No	I&C Inspec Updated:	☐Yes, ☒No
Programming Impacted:	☐Yes, SWCR No._____ ☒No	PCP Updated:	☐Yes, ☒No
Potential Lessons Learned:	☐ Yes, ☒ No	OCD Trend Code:	C.1

Affected	Discipline	Name	Signature	Date
☒	Mech/Process	John Zukowski	John Zukowski	7/16/2020
☒	Plant Design	Linda Dea	Linda Dea	7-16-2020
☐	Electrical			
☐	CSA			
☒	I&C	Brendan Flaherty	Brendan Flaherty	7/16/2020
☐	Automation			

FINAL ACCEPTANCE (Signature, Date)

Design Engineer: John Zukowski, John Zukowski, 7/16/2020	Checker:
CSE Acceptance: ERIC BENSON 07/16/2020	Safety Acceptance:
Cyber Security Acceptance: N/A	QC Acceptance:
Surety/Security Acceptance:	Other Acceptance: N/A
Environmental Acceptance: See Attached Email	Permit Mod Required: ☒Yes, ☐No / **Prior CDPHE Approval Required:** ☒Yes, ☐No
D-APE Acceptance:	PEM Acceptance (Optional):

008 REV | 24852-RD-M6-B05-M0024 DWG. NO.

24852-RD-OCD-B05-00006, APPENDIX A
PAGE 1 of 4

THIS OCD

MT-B05-0042
SUMP A
LENGTH : 36 IN
WIDTH : 36 IN
HEIGHT : 36 IN
CAPACITY : 200 GAL

MT-B05-0047
SUMP A
LENGTH : 36 IN
WIDTH : 36 IN
HEIGHT : 36 IN
CAPACITY : 200 GAL

MP-B05-0047
SUMP PUMP
RATED ~~LOW~~ FLOW: 20 GPM
RATED ~~HIGH~~ FLOW: 60 GPM
RATED DELTA P ~~25 PSI~~ TBD

MP-B05-0080
SUMP PUMP
RATED FLOW 20 GPM
RATED DELTA P ~~TBD~~ 21 PSI

GENERAL NOTES CONTINUED:

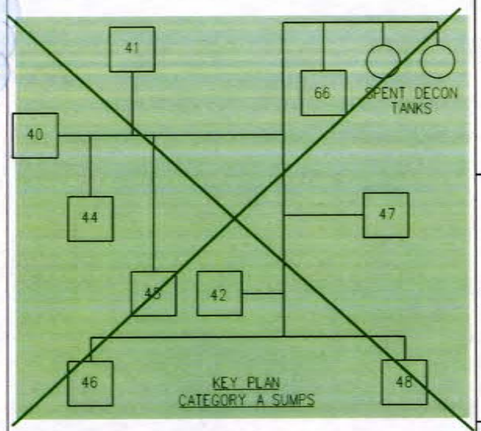
14. LUBRICATOR FUNCTIONALITY NO LONGER REQUIRED. REMAINS IN PLACE FOR AIR LINE INTEGRITY.

15. SET REGULATOR PRESSURE EQUAL TO HIC 0979 SET POINT READ FROM PIT-0979 --- (SEE P&ID RD-M6-B04-M0010). RATED FLOW OF 20 GPM IS APPROXIMATE.

~~16. MP-B05-0080 DESIGN WILL BE THE SUBJECT OF A FUTURE DCN. THE RATED DELTA P WILL BE EQUAL TO OR GREATER THAN 55 PSI AT THE RATED FLOW CONDITIONS.~~

GENERAL NOTES:

1. FOR SYMBOLS & LEGENDS SEE DRAWINGS: 24852-RD-M6-M00-M0001 THROUGH M0008.
2. AIR FILTER-REGULATOR
3. DELETED.
4. REFERENCE CIVIL DRAWING 24852-RD-DB-APB-S0034002 FOR SLOPE & DUMP DETAILS.
5. PUMP SUCTION PIPE TO BE TERMINATED 2 INCHES ABOVE LOWEST POINT OF SUMP BOTTOM.
6. DELETED
7. DELETED.
8. LEAK DETECTION PROBE INSTALLED BETWEEN INNER AND OUTER LININGS ON LOW SIDE OF LINED SUMPS.
9. AREA ABOVE SUMP GRATING TO BE MAINTAINED CLEAR OF OBSTRUCTIONS.
10. LEVEL SWITCH TO BE LOCATED AT LOWEST POINT OF SUMP BOTTOM.
11. LUBRICATOR
12. ABANDON IN PLACE
13. PUMP EQUIPPED WITH INTEGRATED AIR EXHAUST MUFFLER.



AGENT BOUNDARIES LABELED AND IDENTIFIED.

FINAL - OPSEC Review Completed 4/23/2018

APB

No.	DATE	REVISIONS	BY	CHKD	EOR	PEM
008		DOESN'T INCORPORATE 24852-RD-M6N-B05-M0043. INCORPORATED 24852-RD-3DR-CHX-H0015, CR 07607. RE-ISSUED FOR USE.				
007	06/30/18	REVISED TO INCORPORATE DCN 24852-RD-M6N-000-M0008, M6N-B05-M0027, AND 3PN-000-P0030. RE-ISSUED FOR USE	AJM	PRM	JDV	N/A
006	09/17/14	REVISED TO INCORPORATE DCN 24852-RD-M6N-B05-M0024 AND SCR-B05-00004. RE-ISSUED FOR USE	AJH	WS	PAW	CCC

QUALITY: [X] Q [ ] NON Q [ ] N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025

TITLE PIPING & INSTRUMENT DIAGRAM
SPENT DECON STORAGE SYSTEM
CATEGORY A SUMP (APB)

SCALE NONE | DWG. NO. 24852-RD-M6-B05-M0024 | REV 008

22X34 'D' SIZE
6/27/2020 1:00:59 PM \m6b05m024.pid

M6B05M024.pid 06/27/20

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010 REV | 24852-RD-M6-B05-M0025 DWG. NO.

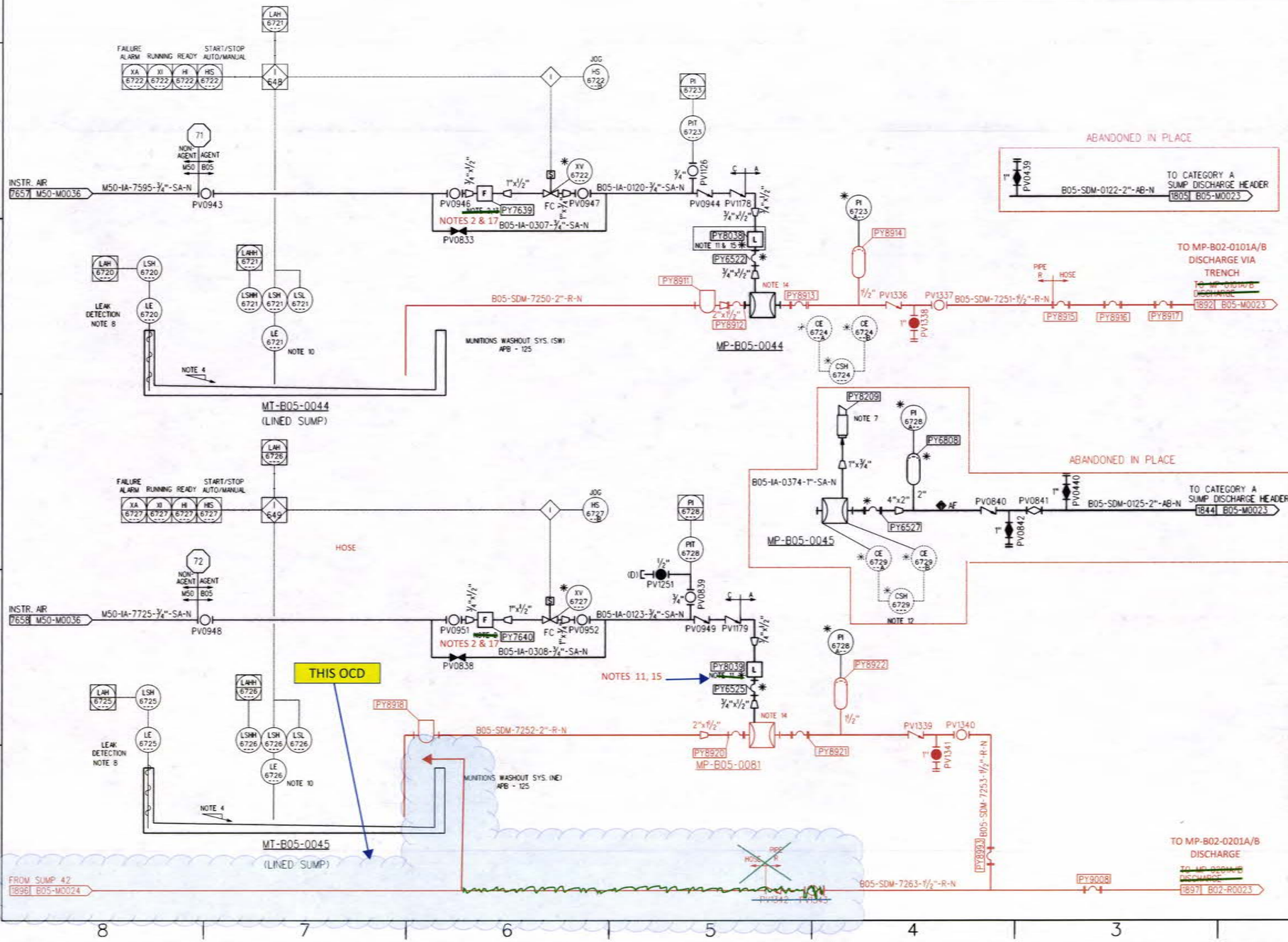
MT-B05-0044
SUMP A
LENGTH : 36 IN
WIDTH : 36 IN
HEIGHT : 36 IN
CAPACITY : 200 GAL

MP-B05-0044
SUMP PUMP
RATED FLOW : 20 GPM
RATED DELTA P : ~~9 PSI~~ TBD

MT-B05-0045
SUMP A
LENGTH : 36 IN
WIDTH : 36 IN
HEIGHT : 36 IN
CAPACITY : 200 GAL

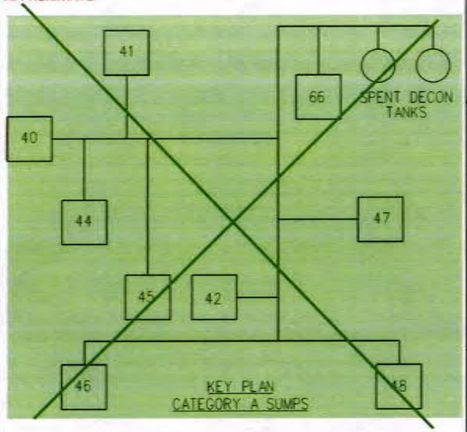
MP-B05-0045
SUMP PUMP
RATED LOW FLOW : 20 GPM
RATED HIGH FLOW : 60 GPM
RATED DELTA P : 26 PSI
ABANDONED IN PLACE

~~MP-B05-0081~~
SUMP PUMP
RATED ~~FLOW~~ FLOW : 20 GPM
~~RATED HIGH FLOW : 60 GPM~~
RATED DELTA P : TBD



GENERAL NOTES:

1. FOR SYMBOLS & LEGEND SEE DRAWINGS: 24852-RD-M6-M00-M0001 THROUGH M0008.
2. AIR FILTER-REGULATOR
3. DELETED.
4. REFERENCE CIVIL DRAWING 24852-RD-DB-APB-S0034002 FOR SLOPE & SUMP DETAILS.
5. PUMP SUCTION PIPE TO BE TERMINATED 2 INCHES ABOVE LOWEST POINT OF SUMP BOTTOM.
6. DELETED
7. DELETED.
8. LEAK DETECTION PROBE INSTALLED BETWEEN INNER AND OUTER LININGS ON LOW SIDE OF LINED SUMPS.
9. AREA ABOVE SUMP GRATING TO BE MAINTAINED CLEAR OF OBSTRUCTIONS.
10. LEVEL SWITCH TO BE LOCATED AT LOWEST POINT OF SUMP BOTTOM.
11. LUBRICATOR
12. ABANDON IN PLACE
13. ~~SET AT 10 PSIG PER 24852-RD-M6N-P0E-M0043~~ DELETED
14. PUMP EQUIPPED WITH INTERGRATED AIR EXHAUST MUFFLER.
15. LUBRICATOR FUNCTIONALITY NO LONGER REQUIRED. REMAINS IN PLACE FOR AIR LINE INTEGRITY.
17. SET REGULATOR AT 55 PSIG. RATED FLOW OF 20 GPM IS APPROXIMATE.



AGENT BOUNDARIES LABELED AND IDENTIFIED.

NO FIELD WORK REQUIRED

FINAL - OPSEC Review Completed 4/23/2018

APB

NO.	DATE	REVISIONS	BY	CHKD	EDS	PE'd
010		DOES NOT INCORPORATE DCN 24852-RD-M6N-B05-M0043. INCORPORATED DCN: 24852-RD-M6N-B05-M0042. RE-ISSUED FOR USE.	SIGNATURES ON FILE			
009	08/20/19	DOES NOT INCORPORATE DCN 24852-RD-M6N-B05-M0042 AND M6N-B05-M0043. INCORPORATED 24852-RD-30R-GHR-M0015, CR 07607. RE-ISSUED FOR USE.				

QUALITY: [X] Q [ ] NON Q [ ] N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025

TITLE: PIPING & INSTRUMENT DIAGRAM SPENT DECON STORAGE SYSTEM CATEGORY A SUMP (APB)

SCALE: NONE | DWG. NO.: 24852-RD-M6-B05-M0025 | REV: 010

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M6B05M025.pid 06/27/20

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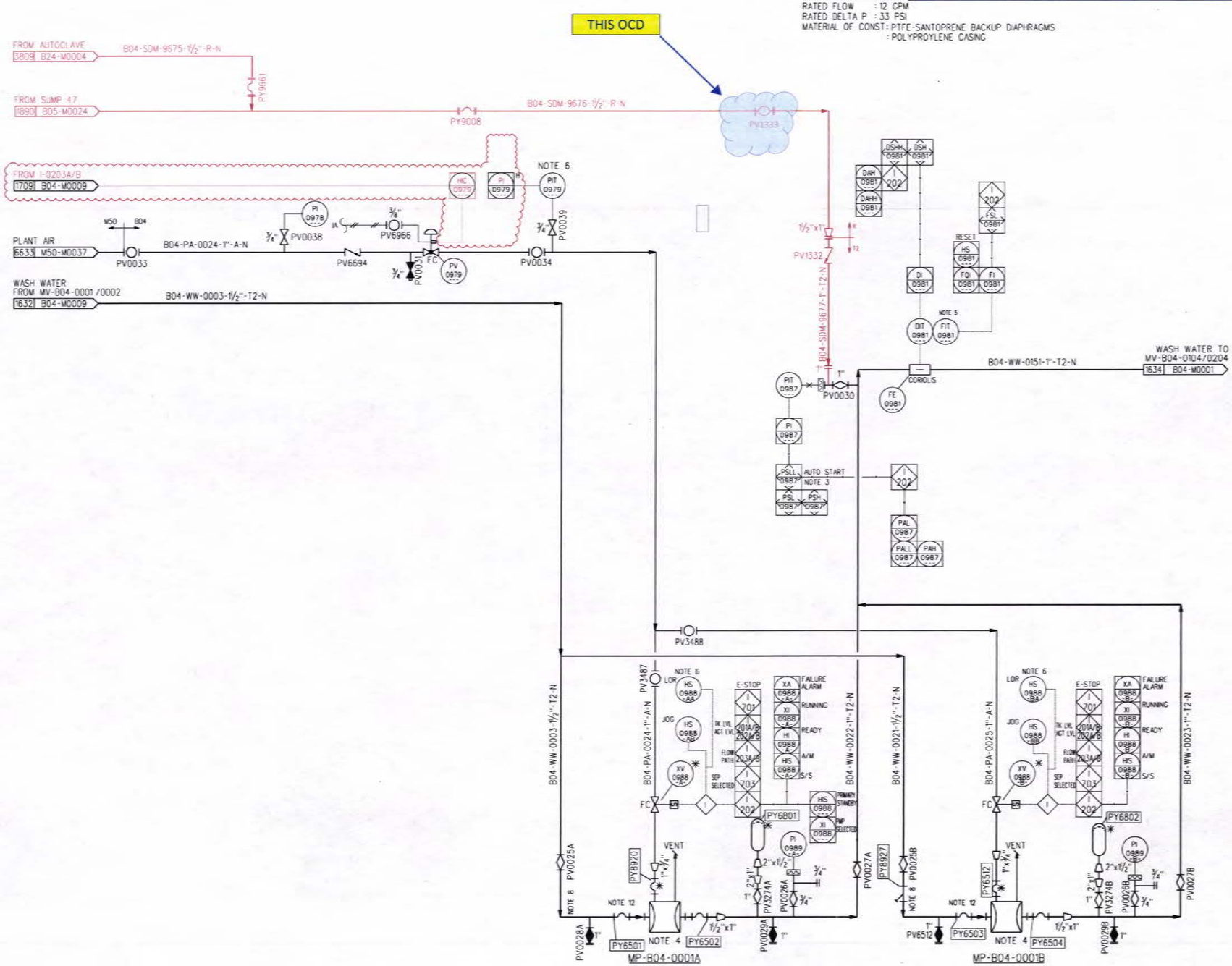
007 REV | 24852-RD-M6-B04-M0010 DWG. NO.

24852-RD-OCD-B05-00006, APPENDIX A
PAGE 3 of 4

THIS OCD

MP-B04-0001A/B
WASH WATER PUMP & SPARE
RATED FLOW : 12 GPM
RATED DELTA P : 33 PSI
MATERIAL OF CONST: PTFE-SANTOPRENE BACKUP DIAPHRAGMS
: POLYPROYLENE CASING



GENERAL NOTES:

1. FOR SYMBOLS AND LEGEND, SEE DRAWINGS RD-M6-M00-M0001 TO-M0008.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED "B04" UNLESS OTHERWISE NOTED. ACL VALVE TAG NUMBERS WILL HAVE SYSTEM NO. "B04" BETWEEN "PV" AND THE SEQUENCE NO. (e.g. PV0001A IS OFFICIALLY PV-B04-0001A).
3. IF THE PUMP DICHARGE PRESSURE FALLS BELOW NORMAL FOR MORE THAN 5 SECONDS WHILE THE "LEAD" PUMP IS RUNNING, THE "STANDBY" PUMP WILL AUTOMATICALLY START. ONCE THE "STANDBY" PUMP HAS STARTED AND IF PRESSURE RETURNS TO NORMAL WITHIN 5 SECONDS, THE "LEAD" PUMP WILL STOP. IF THE PRESSURE DOES NOT RETURN TO NORMAL WITHIN 5 SECONDS, BOTH THE "LEAD" AND "STANDBY" PUMPS WILL STOP. IF THE "LEAD" PUMP BECOMES DEENERGIZED, THE STANDBY" PUMP WILL AUTOMATICALLY START, WITHOUT WAITING FOR PRESSURE TO FALL BELOW NORMAL.
4. DELETED
5. DELETED
6. LOCATE TRANSMITTERS AND HAND SWITCHES OUTSIDE OF CATEGORY "A" AREAS.
7. PIPING DESIGN SHALL ELIMINATE DEAD LEGS TO PREVENT AGENT ENTRAPMENT.
8. STRAINERS FOR STARTUP. REMOVE SCREEN PRIOR TO OPERATION.
9. SIZES OF PIPING CONNECTIONS AT EQUIPMENT WILL BE CONFIRMED AFTER RECEIPT OF FINAL VENDOR DATA.
10. DELETED
11. DELETED.
12. EITHER TITANIUM OR TEFLON LINED FLANGES ARE ACCEPTABLE AT THE COLLECTED WASH WATER PUMPS MP-B04-0001A/B.

ALL COMPONENTS CONTAIN AGENT OR HAVE THE POTENTIAL TO CONTAIN AGENT.

FINAL - OPSEC Review Completed 07/10/2019

APB

			SIGNATURES ON FILE			
007	12/23/19	INCORPORATED 24852-RD-3DR-GHX-H0015, CR 07590. RE-ISSUED FOR USE.				
006	11/18/16	REVISED TO INCORPORATE DCN 24852-RD-MEN-B04-M0061, MEN-B04-M0067, MEN-B04-M0068, AND MEN-B04-M0072. RE-ISSUED FOR USE.	DP	BC	JMB	CCC
005	4/18/15	REVISED TO INCORPORATE DCN 24852-RD-J3N-B04-J0002. RE-ISSUED FOR USE.	WS	CQ	PAW	CCC
NO.	DATE	REVISIONS	BY	CHKD	EOS	PEW

QUALITY: ☒ Q ☐ NON Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025

TITLE PIPING & INSTRUMENT DIAGRAM AGENT COLLECTION & NEUTRALIZATION WASH WATER PUMPS

SCALE NONE | DWG. NO. 24852-RD-M6-B04-M0010 | REV 007

22X34 'D' SIZE

M0B04M010.pid 06/26/20

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6/26/2020 2:34:16 PM \m6b04m010.pid

PCAPP_bdr dgn, bdr

008 REV | 24852-RD-M6-B05-M0002 DWG. NO.

MV-B05-0102A/B
SPENT DECON FEED PUMP SEAL POT, PLAN 53A
WORKING VOLUME : 2 GAL
DESIGN PRESSURE : 450 PSI
DESIGN TEMPERATURE : 200 °F
MATERIAL OF CONST : CS
ABANDON IN PLACE

MP-B05-0101A/B
SPENT DECON FEED PUMP
CAPACITY : 55 GPM
RATED HEAD : 94 FT
MOTOR HP : 5 HP
NOTE 10

24852-RD-OCD-B05-00006, APPENDIX A
PAGE 4 of 4

GENERAL NOTES:

1. FOR SYMBOLS & LEGENDS, SEE DRAWINGS: 24852-RD-M6-M00-M0001 THROUGH -M0008.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED "B05" UNLESS OTHERWISE NOTED. ALL VALVE TAG NUMBERS WILL HAVE SYSTEM NO. "B05" BETWEEN "PV" AND THE SEQUENCE NO. (e.g.PV0001A IS OFFICIALLY PV-B05-0001A).
3. DELETED.
4. NOT IN USE.
5. DELETED.
6. API SEAL PLAN 53A BY PUMP VENDOR, FOR SEAL RESERVOIR DETAILS AND PUMP GENERAL ARRANGEMENT, SEE 24852-VIA-MPCO-1059s01.
7. DELETED.
8. BLOCK AND BLEED VALVE.
9. DELETED.
10. SPEND DECON FEED PUMPS OPERATE IN SERVICE/SPARE CONFIGURATION.

ENTIRE DRAWING IS WITHIN AGENT BOUNDARY WITH EXCEPTION OF PROCESS COOLING WATER.

FIELD WORK REQUIRED

FINAL - OPSEC Review Completed 04/23/2018

APB

NO.	DATE	REVISIONS	BY	CHKD	EDS	PEM
008		DOESN'T INCORPORATE 24852-RD-M6N-B05-M0043. INCORPORATED 24852-RD-3DR-CHX-H0015, CR 07607. RE-ISSUED FOR USE.				
007	6/28/18	REVISED TO INCORPORATE DCN 24852-RD-M6N-B05-M0027, RD-3PN-000-P0030, RD-P3N-B04-P0032, REMOVED HOLD 1 AND REVISED NOTE 10. RE-ISSUED FOR USE	AJH	PRM	JDV	N/A
006	9/30/14	REVISED TO INCORPORATE DCN 24852-RD-M6N-B05-M0026 AND SCR-B05-00009. RE-ISSUED FOR USE	AJH	WS	PAW	CCC

QUALITY: ☒ Q ☐ NON Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025

TITLE: PIPING & INSTRUMENT DIAGRAM
SPENT DECON STORAGE SYSTEM
SPENT DECON FEED PUMPS

SCALE NONE | DWG. NO. 24852-RD-M6-B05-M0002 | REV. 008

6/10/2020 5:14:18 PM \m6b05m002.pid 22x34 "D" SIZE

M0B05M002.pid 06/10/20

THIS OCD

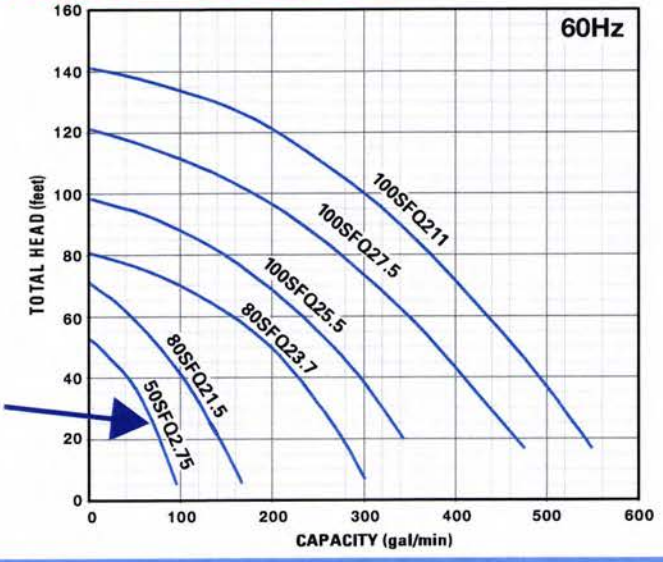
SFQ/SQ Stainless Steel pumps

SFQ

Material

Impeller:	316 Stainless Steel
Casing:	316 Stainless Steel
Mechanical Seal:	Silicon Carbide
Motor Frame:	316 Stainless Steel
Shaft:	316 Stainless Steel
Fasteners:	316 Stainless Steel
Cable:	PVC Sheath, Chloroprene Sheath

Performance Curves

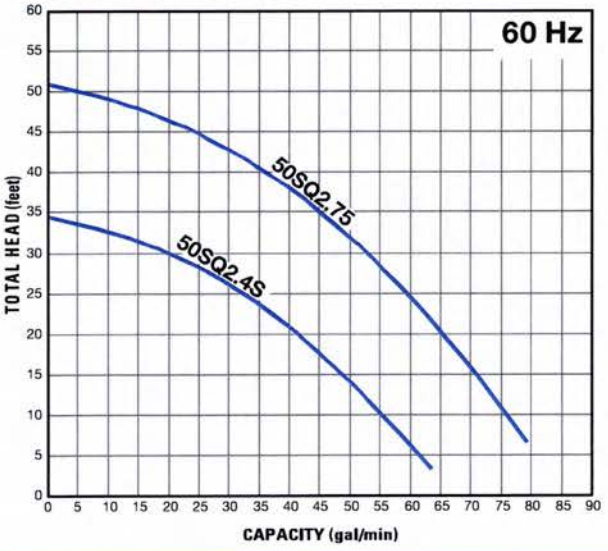


SQ

Material

Impeller:	304 Stainless Steel
Casing:	304 Stainless Steel
Mechanical Seal:	Silicon Carbide
Motor Frame:	304 Stainless Steel
Shaft:	304 Stainless Steel
Fasteners:	304 Stainless Steel
Cable:	PVC Sheath

Performance Curves



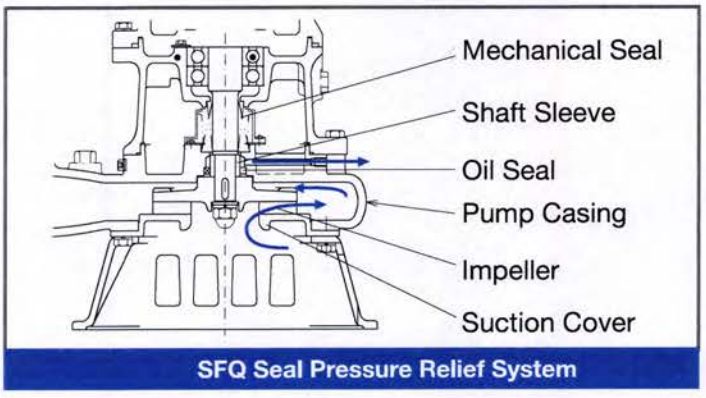
Stainless steel pumps are rust free and corrosive resistant!

Features: SFQ Series

- All wetted components are 316 Stainless Steel
- Viton elastomers
- Dual inside mechanical seals with Silicon Carbide faces, operate in an oil filled chamber and are protected by an exclusionary lip seal, providing the most durable seal available.
- Optional 316 SS Guide rail system is available for models from 7.5 - 15hp.
- Built in motor protector senses excess heat and amperage draw built up in the motor.
- Seal pressure relief system features an independent chamber separate from the oil casing in which the mechanical seal is housed. (From 7.5 - 15hp)

Features: SQ Series

- All components including motor frame are made of SS 304 Stainless Steel.
- Non-toxic white mineral oil is used as the lubricant.
- The flow-through design and heat resistant Silicon Carbide Mechanical Seals assist in cooling in the event of run-dry situations.
- Built in motor protector senses excess heat and amperage draw built up in the motor.
- Semi-vortex, stainless steel impeller passes solids and stringy material without clogging and increases wear resistance when pumping abrasive particles.



SFQ Seal Pressure Relief System

MODEL	MOTOR SPECIFICATIONS								RPM	Discharge Size (inch)	DIMENSION		Max. Solids Dia. (inch)	Continuous Running Water Level (in.)	Pump Weight (lbs.)
	Motor Output (HP)	Phase	Rated Current (A)								Diameter (in.)	Height (in.)			
			Single phase		Three phase										
			115V	230V	208V	230V	460V	575V							
50SFQ2.75	1	Three	—	—	3.5	3.1	1.6	1.4	3430	2	9 15/16	15 11/16	0.236	14 1/8	49
80SFQ21.5	2	Three	—	—	6.9*	6.7	3.4	2.7	3450	3	12 15/16	19 1/16	0.236	16 3/8	79
80SFQ23.7	5	Three	—	—	13.8*	12.8	6.4	5	3410	3	14 1/8	21 5/16	0.591	19 1/2	115
100SFQ25.5	7.5	Three	—	—	19.3*	18.2	9.4	7.5	3545	4	25 3/8	33 1/4	0.787	27 1/8	278
100SFQ27.5	10	Three	—	—	26.0*	24.4	12.2	9.5	3545	4	25 3/8	33 1/4	0.787	27 1/8	276
100SFQ211	15	Three	—	—	37.0*	35.2	17.6	13.9	3525	4	25 3/8	35 1/8	0.906	28	320

* 208 & 230V same motor

MODEL	MOTOR SPECIFICATIONS								RPM	Discharge Size (inch)	DIMENSION		Max. Solids Dia. (inch)	Continuous Running Water Level (in.)	Pump Weight (lbs.)
	Motor Output (HP)	Phase	Rated Current (A)								Diameter (in.)	Height (in.)			
			Single phase		Three phase										
			115V	230V	208V	230V	460V	575V							
50SQ2.4S	1/2	Single	6.5	3.4	—	—	—	—	3376	2	7 1/16	14 5/16	0.236	2 3/8	28
50SQ2.75	1	Three	—	—	3.5*	3.4	1.6	1.3	3349	2	7 1/16	15 1/8	0.236	2 3/8	31

* 208 & 220V same motor

Oct. 11

60-PC-SFQ-03

TSURUMI PUMP

SFQ - SERIES
ALL 316 SS- DEWATERING PUMPS

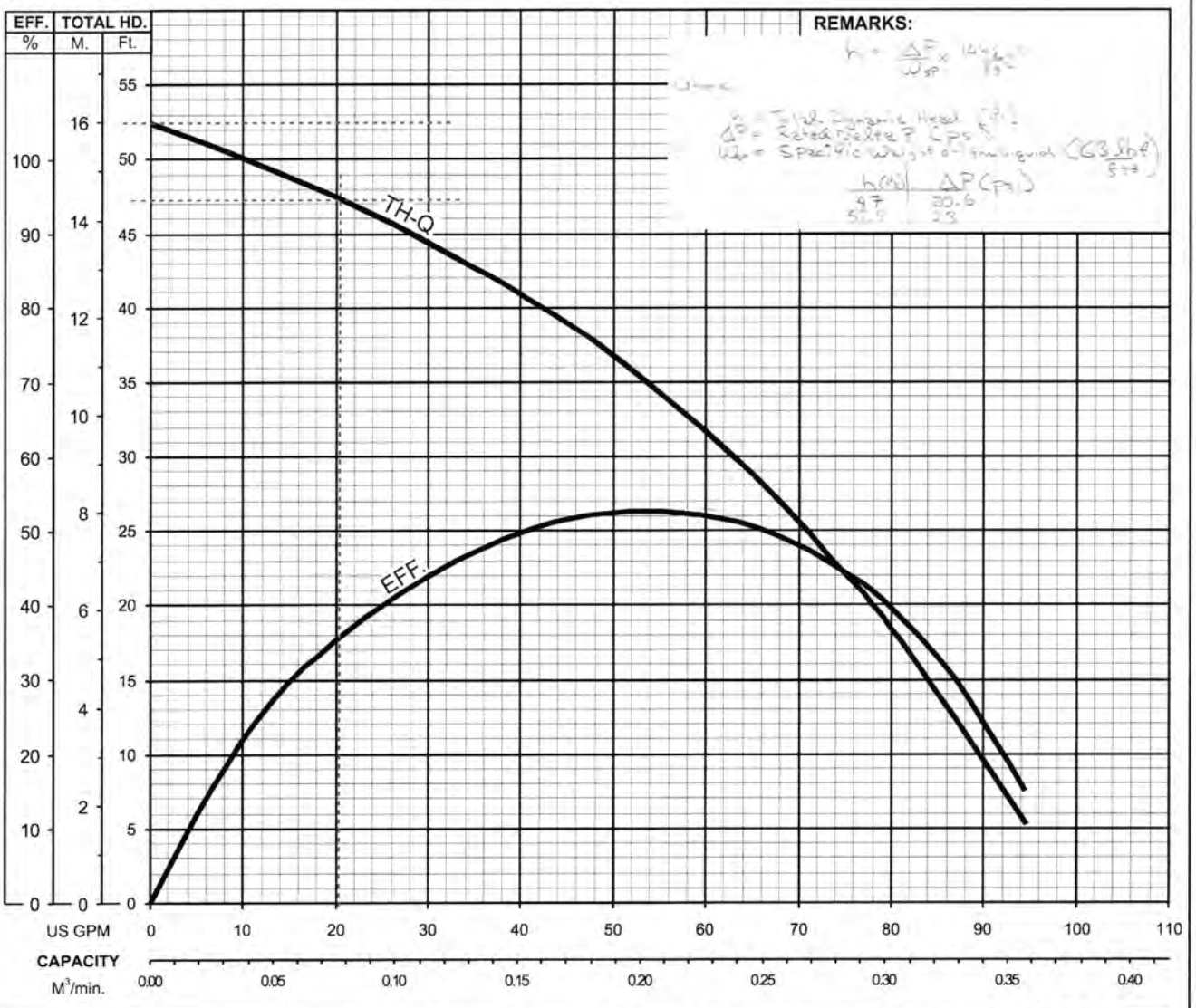
PERFORMANCE CURVE

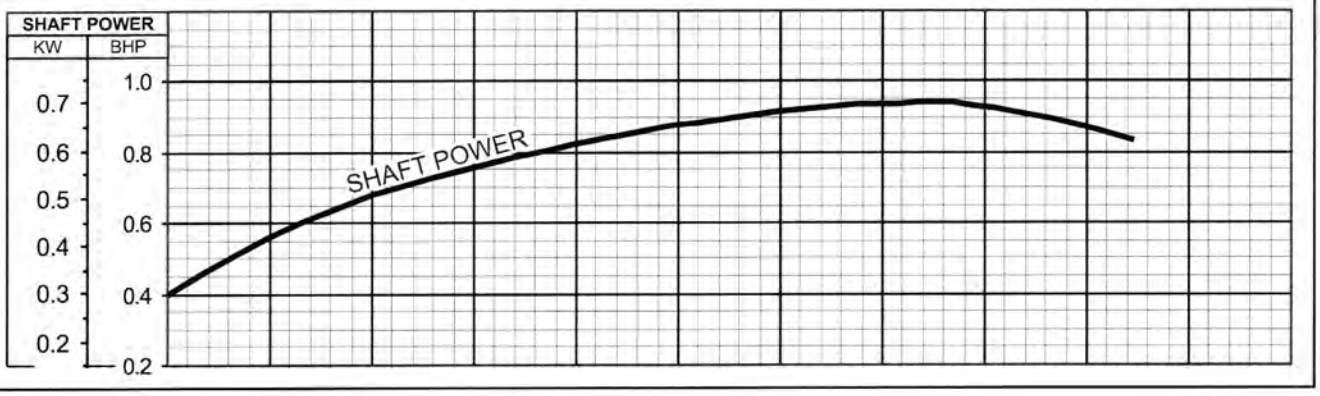
MODEL	BORE	HP	KW	RPM	SOLIDS DIA	LIQUID	SG.	VISCOSITY	TEMP.
50SFQ2.75 -62	2" / 50mm	1	0.75	3430	0.236" / 6mm	Water	1.0	1.123 cSt.	60°F

PUMP TYPE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
All 316 SS - Dewatering Pumps	3	208-230 / 460 / 575	3.5-3.1 / 1.6 / 1.4	60	Direct On Line	E

CURVE No.	DATE	PHASE	VOLTAGE	AMPERAGE	HZ	STARTING METHOD	INS. CLASS
-	-	-	-	-	-	-	-

REMARKS:





Oct. 11

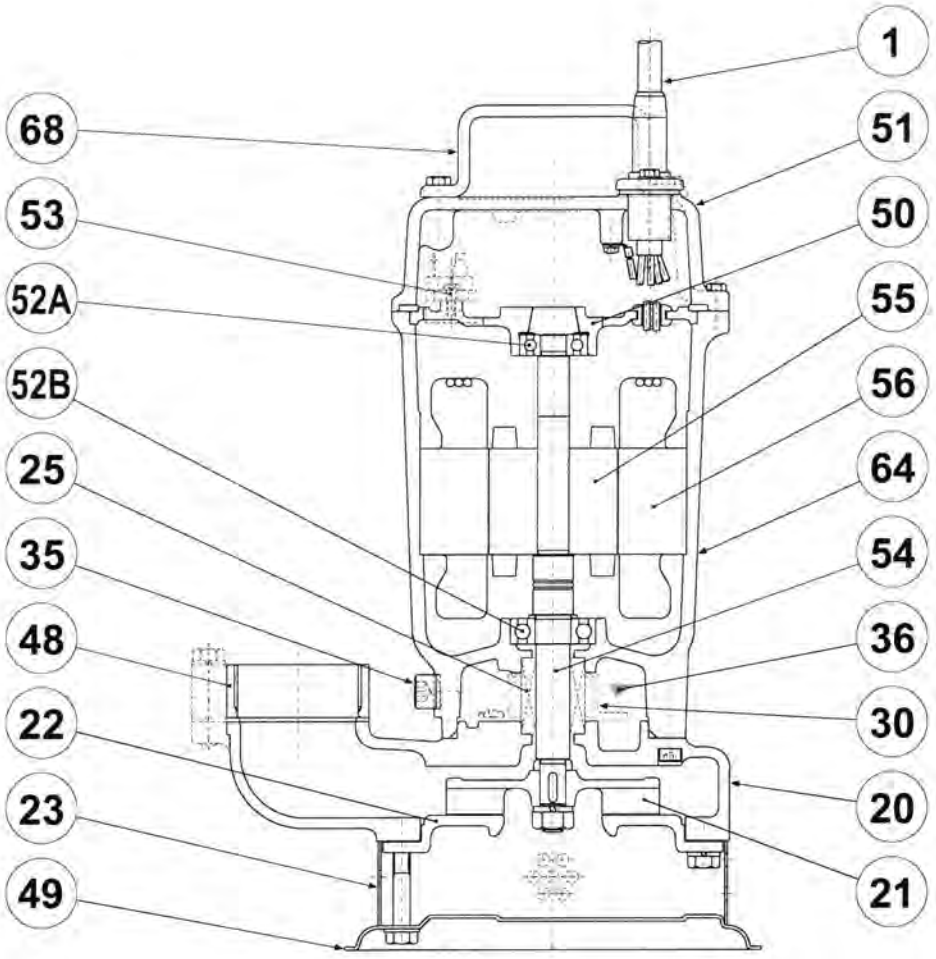
F-SEC-SFQ-02

TSURUMI PUMP

SFQ - SERIES
ALL31655- DEWATERING PUMPS

SECTIONAL VIEW

50SFQ2.75-62



PART#	DESCRIPTION	MAIN MATERIAL / NOTE	ASTM, AISI CODE	RELATED DIN CODE	QTY
1	Power Cable	PVC Sheath AWG16/4-32ft			1
20	Pump Casing	Stainless Steel Casting	A743 CF-8M	GX5CrNiMo 19-11-2	1
21	Impeller	Stainless Steel Casting	A743 CF-8M	GX5CrNiMo 19-11-2	1
22	Suction Cover	Stainless Steel Casting	A743 CF-8M	GX5CrNiMo 19-11-2	1
23	Suction Strainer	Stainless Steel	S 31600	1.4401	1
25	Mechanical Seal	Silicon Carbide / X-16W			1
30	Oil Lifter	PBT Plastic w/(GF+MD)40			1
35	Oil Plug	Stainless Steel / M10x20L	AISI 316	17440 X 5 CrNiMo 17122	1
36	Lubricant	Turbine Oil ISO VG32 or SAE10W/20W			
48	Companion Flange	Stainless Steel Casting / NPT 2"	A743 CF-8M	17445 G-X 6 CrNiMo 1810	1
49	Bottom Plate	Stainless Steel	S 31600	1.4401	1
50	Motor Bracket	Cast Iron	A48M Class 25B	EN 1561 GJL-150	1
51	Motor Head Cover	Stainless Steel Casting	A743 CF-8M	GX5CrNiMo 19-11-2	1
52A	Upper Bearing	#6201ZZC3			1
52B	Lower Bearing	#6203ZZC3			1
53	Motor Protector				1
54	Shaft	Stainless Steel	S 31600	1.4401	1
55	Rotor				1
56	Stator				1
64	Motor Housing	Stainless Steel Casting	A743 CF-8M	GX5CrNiMo 19-11-2	1
68	Handle	Stainless Steel	S 31600	1.4401	1

TSURUMI PUMP

MODEL **50SFQ2.75-62**

PARTS LIST		CORROSION RESISTANT PUMP				9/1/2016
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES
1	001-803-20	Cabtyre Cable Set (32') 60Hz(USA)	1	VCT4Cx1.25mm2	LBT	
2	003-190-10	Gland	1		SUS316	
3	140-018-24	Hex.Bolt	2	M5x15	SUS316	
4	142-125-34	Plain Washer	2	M5	SUS316	
5	068-191-12	Handle	1	4/8-CL2	SUS316	
6	140-032-24	Hex.Bolt	2	M6x15	SUS316	
7	051-171-14	Motor Head Cover	1		SCS14	
8	140-021-20	Hex.Bolt	4	M5x20	SUS316	
9	009-001-06	Earth Terminal	1Set	1.25mm2x80L		
10	143-085-21	Pan Screw (w/Spring Washer)	1	M4x6	SWRM	
11	143-126-38	Pan Screw (w/Spring Washer/Plain Washer)	2	M4x12	SWRM	
12	053-267-14	Motor Protector 460V-60Hz(USA)	1	KA311-DAXL63	(T)	
13	016-100-13	Lead Wire Protection Bush	1	S-400(E)	NBR	
14	050-245-17	Motor Bracket	1		FC	
15	121-252-10	Packing	1	d127.3xd144.8x3.5t	NBR	*
16	056-006-99	Stator 460V-60Hz(USA)	1Set			
17	142-192-16	Wave Washer	1	6201(D=32,t=0.4)	SK5	
18	142-451-16	Wave Washer	1	6201(D=32,t=0.25)	SUP	
19	052-100-15	Bearing	1	6201ZZC3		
20	055-002-24	Rotor	1Set	w/Bearing		
21	147-035-15	Impeller Key	1	4x4x13.5L	SUS316	
22	052-102-17	Bearing	1	6203ZZC3		
23	064-330-13	Motor Frame	1		SCS14	
24	121-387-15	Packing	1	d10.3xd16x3t	PE	*
25	035-117-12	Oil Plug	1	M10x20	SUS316	
26	025-189-14	Mechanical Seal	1	X-16W	SiC	
27	143-070-23	Pan Screw	2	M5x6	SWRM	
28	030-157-19	Oil Lifter	1	W-14HL	Resin	
29	122-129-23	O-Ring	1	G-90(89.4xd3.1)	VITON	*
30	020-000-99	Pump Casing(for Oil Lifter)	1	50SFQ2.4/.75-51/61(Oil Lifter)	SCS14	
31	140-249-26	Hex.Socket Cap Bolt	3	M6x15	SUS316	
32	071-105-19	Shaft Sleeve	1	4-CLS	SUS316	
33	040-114-15	Impeller Shim		d12.2xd17x0.3t	SUS316	
34	021-933-19	Impeller (60Hz)	1	50SFQ2.75-62	SCS14	
35	142-164-22	Spring Washer	1	M10	SUS316	
36	141-006-22	Hex.Nut	1	M10	SUS316	
37	120-131-19	Packing (S.Cover)		d125xd159x0.3t	PE	
38	022-304-18	Suction Cover	1	4-CL	SCS14	

* Indicates items included in set

TSURUMI PUMP

MODEL **50SFQ2.75-62**

PARTS LIST		CORROSION RESISTANT PUMP				9/1/2016
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES
39	142-163-21	Spring Washer	3	M8	SUS316	
40	140-052-20	Hex.Bolt	3	M8x16	SUS316	
41	023-122-13	Strainer	1	4-CL	SUS316	
42	049-125-16	Bottom Plate	1	4-CL	SUS316	
43	142-127-36	Plain Washer	3	M8	SUS316	
44	140-060-21	Hex.Bolt	3	M8x50	SUS316	
45	140-058-26	Hex.Bolt	2	M8x40	SUS316	
46	142-163-21	Spring Washer	2	M8	SUS316	
47	048-188-14	Screwed Flange	1	NPT-2(P.C.84)	SCS14	
48	121-149-13	Packing	1	P.C.84xd55	Cork	*
28A	030-116-29	Oil Ring	1	LB	Resin	
30A	020-581-15	Pump Casing	1	4/8-CL2	SCS14	
	173-279-14	**Packing O-Ring Set**	1Set	(Marked by *)		
15	121-252-10	Packing (M.Bracket/Head Cover)	1	d127.3xd144.8x3.5t	NBR	*
24	121-387-15	Packing (Oil Plug)	1	d10.3xd16x3t	PE	*
29	122-129-23	O-Ring (M.Frame/P.Casing)	1	G-90(89.4xd3.1)	VITON	*
48	121-149-13	Packing (Screwed Flange)	1	P.C.84xd55	Cork	*
		Lubricant		Turbine Oil VG32 125ml		

* Indicates items included in set

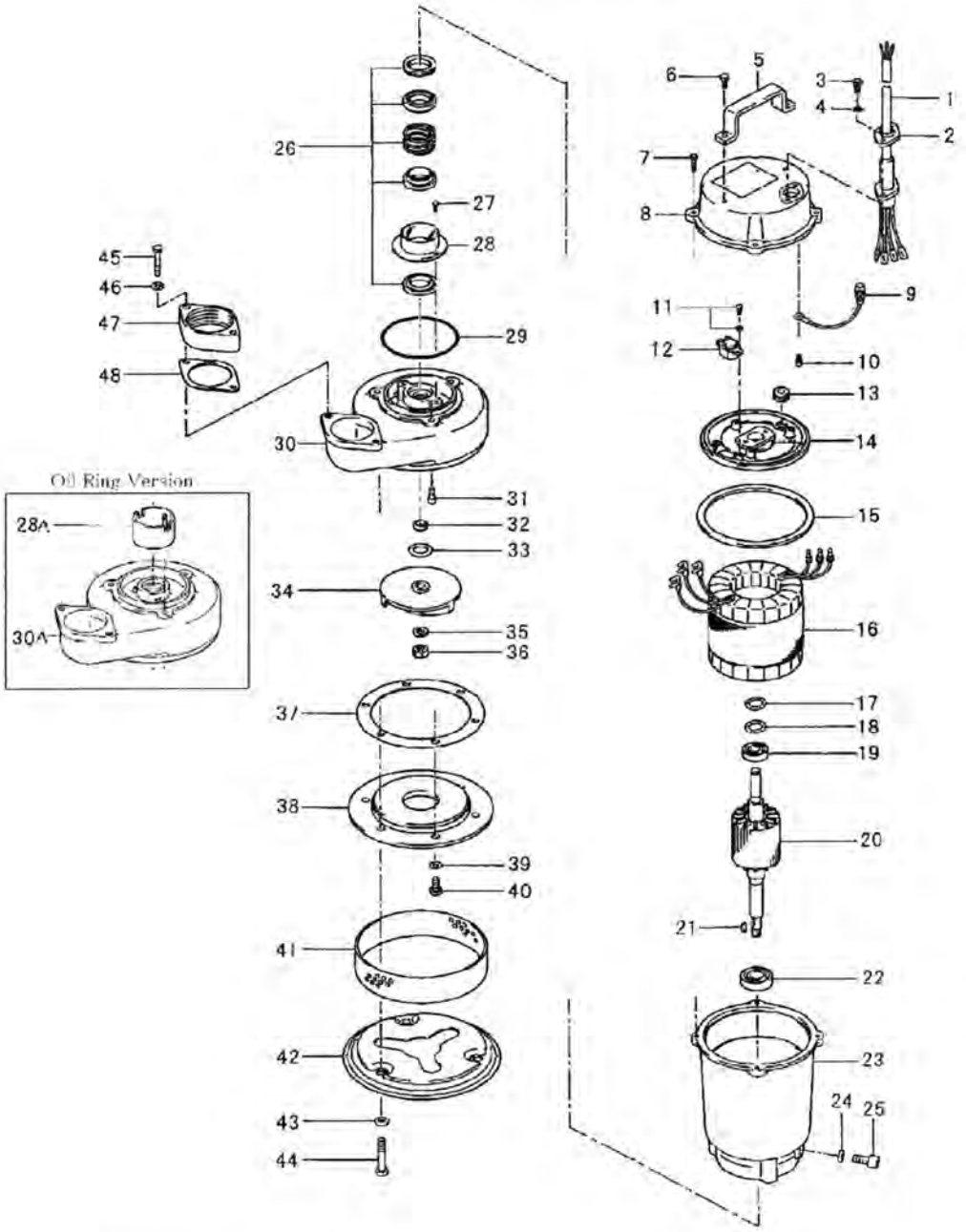
TSURUMI PUMP

MODEL **50SFQ2.75-62**

PARTS LIST		CORROSION RESISTANT PUMP				9/1/2016
ITEM	PART No.	DESCRIPTION	QTY	SIZE	MATERIAL	NOTES

EXPLODED VIEW

50SFQ2. 75-52/62



C-00223-1

* Indicates items included in set

DWG. NO. 24852-RD-M5-B05-B0004 REV 003

MP-B05-0052 THRU 0056, MP-B05-0061, 0074
SUMP PUMP
LOW FLOW: 20 GPM
HIGH FLOW: 150 GPM
RATED DELTA P: 28 PSI

MP-B05-0040, 0041, 0042, -0044, 0045, 0080, 0081
SUMP PUMP
RATED FLOW: 20 GPM
RATED DELTA P: ~~TBD~~ AS DENOTED ON P&IDs

MP-B05-0049, 0050, 0057, 0058, 0065, 0069, 0080, 0081
SUMP PUMP
LOW FLOW: 20 GPM
HIGH FLOW: 60 GPM
RATED DELTA P: 26 PSI

MT-B05-0049, MT-B05-0053 THRU 0058, MT-B05-0065, 0069, 0074
SUMP B, C
DIMENSIONS: 36"L X 36"W X 36"D
CAPACITY: 200 GAL.

MT-B05-0040 THRU 0042, MT-B05-0044, 0045, MT-B05-0050, 0052, 0061
SUMP A, B, C
DIMENSIONS: 36"L X 36"W X 36"D
CAPACITY: 200 GAL.
LINED W/ LEAK DETECTION

M5-B05-B0005
MT-B05-0046 SUMP A
MWS RM DECON
AIRLOCK APB-134

THIS OCD

CONTROL ROOM

(NOTE 2 & 3)
PCV PLANT AIR
FC
(TYPICAL PUMP SET-UP) NOTE 6
LSH

MP-B05-0040 — MT-B05-0040 SUMP A, MWS RM DECON AIRLOCK APB-118
MP-B05-0041 — MT-B05-0041 SUMP A, MUNITIONS WASHOUT SYSTEM RM (NW) APB-125
MP-B05-0044 — MT-B05-0044 SUMP A, MUNITIONS WASHOUT SYSTEM RM (SW) APB-125
MP-B05-0081 — MT-B05-0045 SUMP A, MUNITIONS WASHOUT SYSTEM RM (NE) APB-125
(NOTE 4 & 5 TYP) MP-B05-0080 — MT-B05-0042 SUMP A, MUNITIONS WASHOUT SYSTEM RM (SE) APB-125

MAX. FLOW 150 GPM

(NOTE 1) M5-B04-B0001 AGENT WATER SEPARATORS
(NOTE 1) M5-B05-B0005 CATEGORY B AREA SUMP
(NOTE 1) M5-B05-B0005 CATEGORY C AREA SUMP

MP-B05-0049 — MT-B05-0049 SUMP B, TOXIC MAINTENANCE AREA AIRLOCK APB-145
MP-B05-0069 — MT-B05-0069 SUMP B, MWS RM AIRLOCK APB-143
MP-B05-0050 — MT-B05-0050 SUMP B, TOXIC MAINTENANCE AREA AIRLOCK APB-137
MP-B05-0052 — MT-B05-0052 SUMP B, TOXIC MAINTENANCE AREA APB-127
MP-B05-0065 — MT-B05-0065 SUMP B, MWS RM AIRLOCK APB-113

MP-B05-0055 — MT-B05-0055 SUMP C, MWS WASHOUT WATER STORAGE ROOM APB-132
MP-B05-0056 — MT-B05-0056 SUMP C, MTU ROOM (W) APB-133
MP-B05-0074 — MT-B05-0074 SUMP C, MTU ROOM (E) APB-133
MP-B05-0057 — MT-B05-0057 SUMP C, MWS ROOM AIRLOCK APB-144
MP-B05-0058 — MT-B05-0058 SUMP C, TOXIC MAINTENANCE AREA AIRLOCK APB-147
MP-B05-0053 — MT-B05-0053 SUMP C, GLOVE BOX VESTIBULE APP-129
MP-B05-0054 — MT-B05-0054 SUMP C, TOXIC MAINT AREA APB-128
MP-B05-0061 — MT-B05-0061 SUMP C, HYDROLYSATE TANK ROOM APB-122

GENERAL NOTES:
1. AVERAGE SPENT DECON PRODUCTION FROM ALL SUMPS, FOR MATERIAL BALANCE SEE 24852-RD-M5-B05-B0001.
2. LOCAL PUMP START/STOP IS PROVIDED FOR PUMP TESTING.
3. PUMP CAN BE STARTED AND PLANT AIR PRESSURE REGULATED FROM THE CONTROL ROOM TO CONTROL PUMP FLOW RATE FROM REGULAR CONDITION (DECON) TO MAXIMUM FLOW (FIRE SPRINKLER DISCHARGE).
4. SUMP BOTTOM WILL BE SLOPED 1:12 TO ALLOW MAXIMUM LIQUID PUMP OUT.
5. PUMP SUCTION PIPE WILL BE LOCATED AT 2" ABOVE THE LOWEST POINT OF THE SUMP BOTTOM.
6. LEVEL SWITCH TO BE LOCATED ON LOW SIDE OF PUMP.

LEGENDS
LINED SUMP
UN-LINED SUMP

REFERENCES
1. FLOW DIAGRAM, COMPRESSED AIR SYSTEM, 24852-RD-M5-M50-M0001 & M0002.

FINAL-OPSEC REVIEW COMPLETED 11/28/18

REV	DATE	REASON FOR REVISION	SIGNATURES BY	CHKD	COG	PCM	ON FILE
P02	12/06/18	DOES NOT INCORPORATE DCN's 24852-RD-M6N-B05-M0036 AND M6N-B05-M0042. INCORPORATED DCN's 24852-RD-AIN-ACV-A0001 AND M5N-B05-B0001. RE-ISSUED FOR USE.					
P01	12/17/09	ISSUED FOR CONSTRUCTION					
P00	12/17/09	ISSUED FOR USE					

QUALITY: ☒ Q ☐ NON-Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO
CONTRACT NO. DAAA09-02-D-0025

TITLE
FLOW DIAGRAM
SPENT DECON STORAGE
APB SPENT DECON SUMPS

SCALE NONE | DWG. NO. 24852-RD-M5-B05-B0004 | REV 003

22X34 D SIZE

6/30/2020 1:08:35 PM ...\m5b05b0004.dgn

BNI/SF-CADD 03/11/03 D_BDR.dgn

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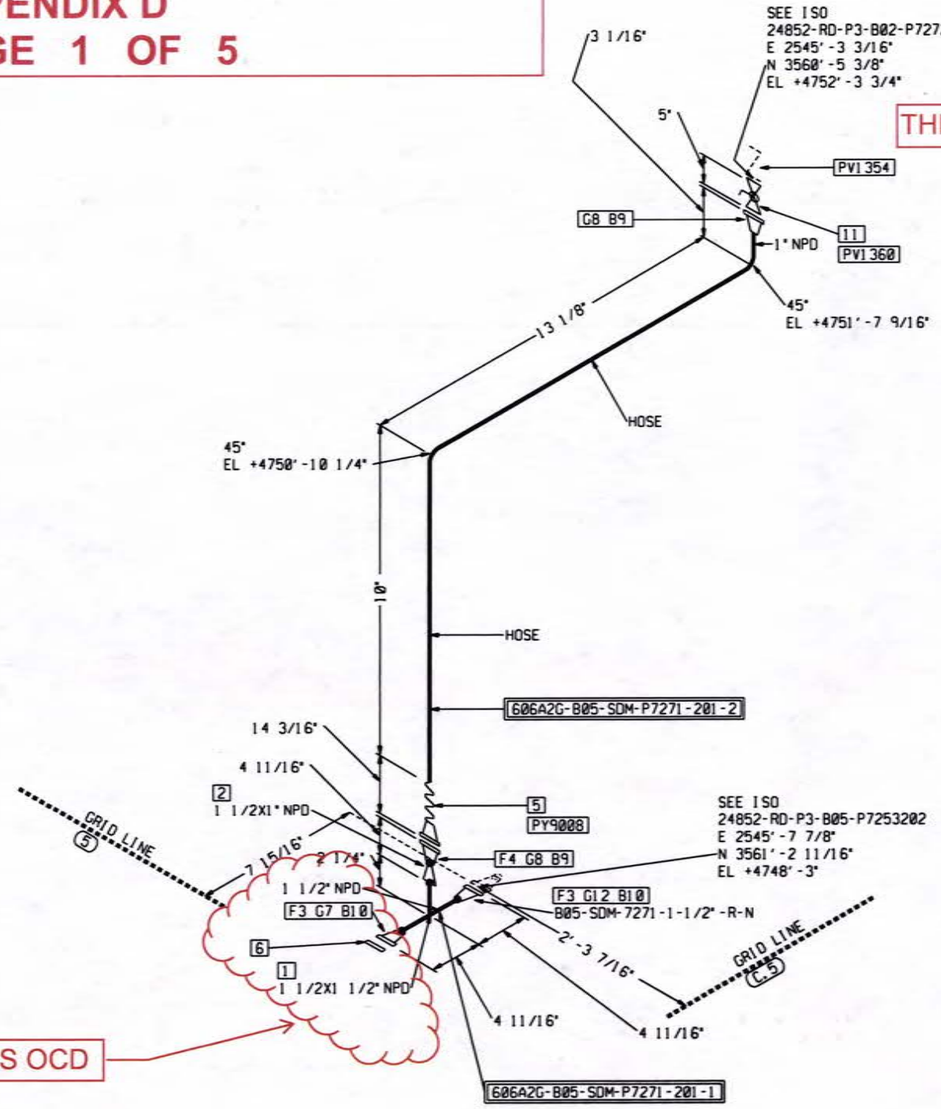
OCD 24852-RD-OCD-B05-00006
APPENDIX D
PAGE 1 OF 5



THIS OCD

SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	TE, BW, A403WP316•, SCH40S	1 1/2X1 1/2	PFCTV60GIC03	1
2	REDCON, BW, A403WP316•, SCH40S	1 1/2X1	PFCRV60GIE0B	1
3	FLGWN, A182-F316•, CL150, SCH40S, RF, STDF, B16.5	1 1/2	PFFWX71G0204	2
4	FLGWN, A182-F316•, CL150, SCH40S, RF, STDF, B16.5	1	PFFWX71G0202	1

FIELD MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
5	SEE PCAPP PIPING SPECIALTY INDEX	1	PY9008	1
6	FLGBLND, A182-F316•, CL150, RF, STDF, B16.5	1 1/2	PFFBX7100L04	1
7	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	1 1/2	PGGC2V100983	1
8	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	1	PGGC3NI01T02	2
9	BOLT, STDBLT, A193B6/6, 2.75" BOLT LENGTH	1/2	FBBS7D000003	8
10	BOLT, STDBLT, A193B6/6, 3.0" BOLT LENGTH	1/2	FBBS7D000004	8
11	VLV-BAL, TENTFB, A182-F316•, CL150, RF, B16.34, 3168&SR, LO	1	PVVBX7100Z0E	1
12	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	1 1/2	PGGC3NI01T03	1

PIECE MARKS

606A2G-B05-SDM-P7271-201-1 606A2G-B05-SDM-P7271-201-2

FIELD TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION

FIELD WORK REQUIRED

	THREADED	SHOP WELD	FIELD WELD	FIELD FIT WELD	PIPE SUPPORT	SOCKETWELDED	EXISTING
	—	●	✕	✕FFW	=	—	----

FOR GENERAL NOTES SEE DWG 24852-RD-P3-000-P0001001

MODEL NUMBER: B05PPB10

☐ PIPING STRESS EVALUATED FOR COMPLIANCE WITH ASME CODE B31.3.

1. PIPING FLEXIBILITY IS ADEQUATE TO PREVENT PIPING OVERSTRESS AND SUPPORT OVERLOAD DUE TO THERMAL EXPANSION. SUPPORT SPACING IS ADEQUATE TO CONTROL PIPE THERMAL DISPLACEMENTS IN PREVENTING LEAKAGE AT JOINTS, AND INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
2. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO DEAD WEIGHT OF PIPE, ITS CONTENT, AND INLINE COMPONENTS.
3. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO A SEISMIC EVENT OR DUE TO WIND PRESSURE TO CONTROL THE PIPE DISPLACEMENTS IN PREVENTING INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.

☐ PIPING STRESS RIGOROUSLY ANALYZED FOR COMPLIANCE WITH ASME B31.3 CODE AND DOCUMENTED PER PROJECT PROCEDURE REQUIREMENTS.

P&ID NO.:		PIPE CLASS:	R									
FLUID CODE:	SDM	FABRICATION:	SHOP									
DESIGN TEMP. °F:		PIPE A/B/R:	ABOV									
DESIGN PRESS. PSIG:		PAINT SYSTEM:										
OPER. TEMP. °F:		COLOR TAG:										
OPER. PRESS. PSIG:												
INSULATION MAT'L.:												
INSULATION THK.:												
INSULATION PURPOSE:	N			000	·	ISSUED FOR CONSTRUCTION	·	·	·	·	·	
HEAT TRACE:				NO.	DATE	REVISIONS	DR	CHKD	EGS	STRESS ENGR.	PROJ. ENGR.	

EXTRACTION DATE: 07/21/20
EXTRACTION NUMBER: 10

STARTUP SYSTEM:

QUALITY ☒ Q ☐ NON-Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025 | AREA: 2 | FAC: 606 | SECT: A2G

TITLE

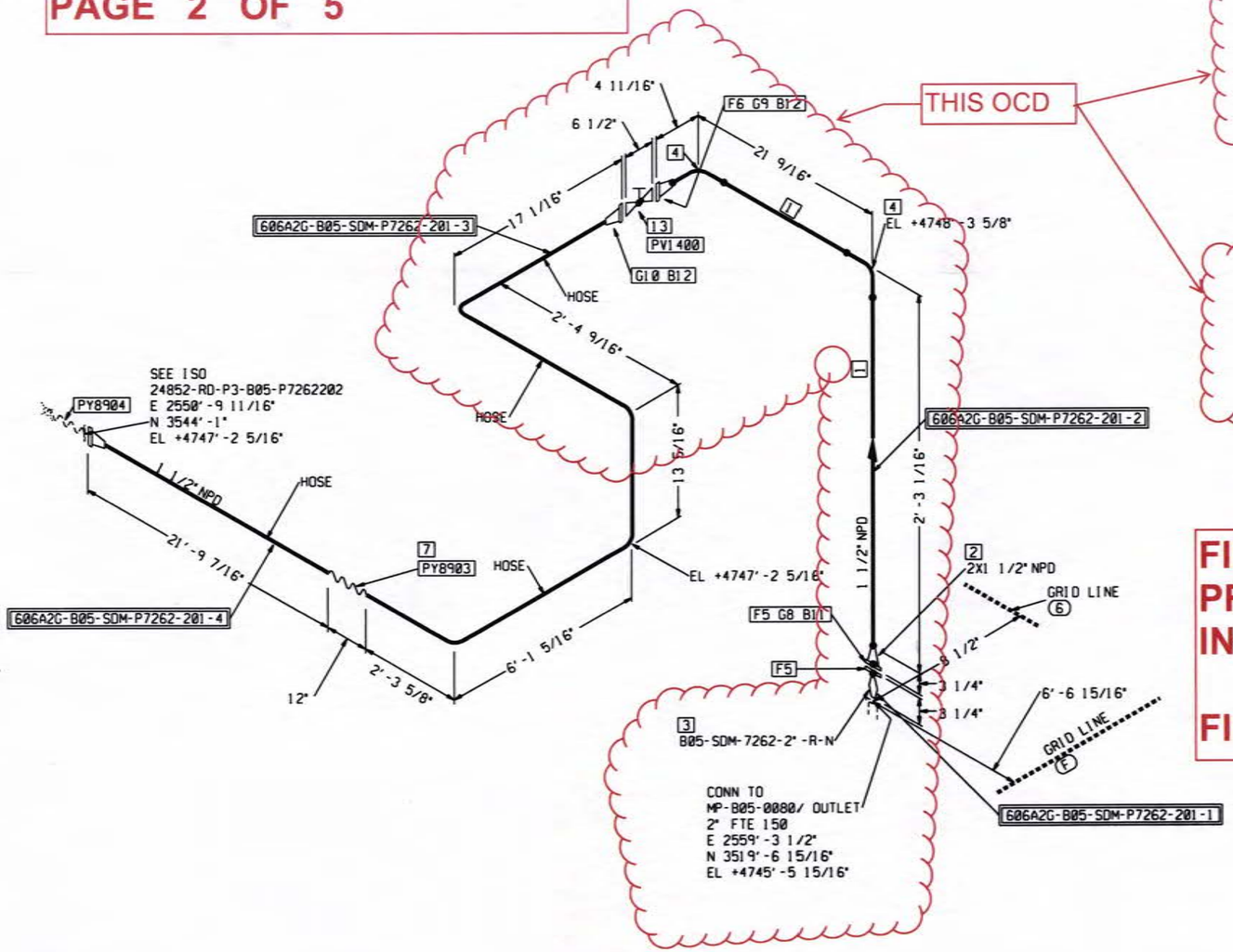
B05-SDM-7271-1-1/2"-R-N

DRAWING No. 24852-RD-P3-B05-P7271201 | REV. 000

$DATE$ $TIME$ $FILEABBREV$ 1 of 1

BNI/SF-CADD 04/27/06 C_ISO.dgn

OCD 24852-RD-OCD-B05-00006
APPENDIX D
PAGE 2 OF 5



SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	PIPE, A312TP316*, SMLS, SCH40S, BBE	1 1/2	PPPC0B0G0X0N	3.5'
2	REDCON, BW, A403WP316*, SCH40S	2X1 1/2	PFCRV60GIE07	1
3	NIPPLE, PE, MNPT, A312TP316*, SCH40S, 3IN	2	PFNP0B0GIL08	1
4	EL - 90, LR, BW, A403WP316/316L-S, SCH40S	1 1/2	PFQNV60GI603	2
5	FLGSLPON, A182-F316*, CL150, RF, STDF, B16.5	2	PFFPX71B1905	2
6	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	1 1/2	PFFWX71G0204	1

FIELD MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
7	SEE PCAPP PIPING SPECIALTY INDEX	1 1/2	PY8903	1
8	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	2	PGGC2V100904	1
9	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	1 1/2	PGGC2V100903	1
10	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	1 1/2	PGGC3N101T03	1
11	BOLT, STDBLT, A193B6/6, 3.25" BOLT LENGTH	5/8	FB8S7D00000W	4
12	BOLT, STDBLT, A193B6/6, 3.0" BOLT LENGTH	1/2	FB8S7D000004	8
13	VLV-GLB, PLGDSCRS, A182F316, CL150, RF, STDF, B16.34, OBB, TRM12, HW	1 1/2	PVVLUX101603	1

PIECE MARKS

606A2G-B05-SDM-P7262-201-1 606A2G-B05-SDM-P7262-201-2 606A2G-B05-SDM-P7262-201-3 606A2G-B05-SDM-P7262-201-4

FIELD TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION

FIELD WORK REQUIRED

STARTUP SYSTEM:

THREADED	SHOP WELD	FIELD WELD	FIELD FIT WELD	PIPE SUPPORT	SOCKETWELDED	EXISTING
—E—	—●—	—✕—	—✕FFW—	═══	—E—	- - - - -

FOR GENERAL NOTES SEE DWG 24852-RD-P3-000-P0001001

MODEL NUMBER: B05PPB10

- ☐ PIPING STRESS EVALUATED FOR COMPLIANCE WITH ASME CODE B31.3.
  1. PIPING FLEXIBILITY IS ADEQUATE TO PREVENT PIPING OVERSTRESS AND SUPPORT OVERLOAD DUE TO THERMAL EXPANSION. SUPPORT SPACING IS ADEQUATE TO CONTROL PIPE THERMAL DISPLACEMENTS IN PREVENTING LEAKAGE AT JOINTS, AND INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
  2. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO DEAD WEIGHT OF PIPE, ITS CONTENT, AND INLINE COMPONENTS.
  3. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO A SEISMIC EVENT OR DUE TO WIND PRESSURE TO CONTROL THE PIPE DISPLACEMENTS IN PREVENTING INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
- ☐ PIPING STRESS RIGOROUSLY ANALYZED FOR COMPLIANCE WITH ASME B31.3 CODE AND DOCUMENTED PER PROJECT PROCEDURE REQUIREMENTS.

P&ID NO.:		PIPE CLASS:	R										
FLUID CODE:	SDM	FABRICATION:	SHOP										
DESIGN TEMP. °F:		PIPE A/B/R:	ABOV										
DESIGN PRESS. PSIG:		PAINT SYSTEM:											
OPER. TEMP. °F:		COLOR TAG:											
OPER. PRESS. PSIG:													
INSULATION MAT'L.:													
INSULATION THK.:													
INSULATION PURPOSE:	N			000		ISSUED FOR CONSTRUCTION							
HEAT TRACE:				NO.	DATE	REVISIONS	DR	CHKD	EGS	STRESS ENGR.	PROJ. ENGR.		

EXTRACTION DATE: 07/21/20
EXTRACTION NUMBER: 10

QUALITY ☒ Q ☐ NON-Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025 | AREA: 2 | FAC: 606 | SECT: A2G

TITLE

B05-SDM-7262-2"-R-N

DRAWING No. 24852-RD-P3-B05-P7262201 | REV. 000

BNI/SF-CADD 04/27/06 C_ISO.dgn

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OCD 24852-RD-OCD-B05-00006
APPENDIX D
PAGE 3 OF 5

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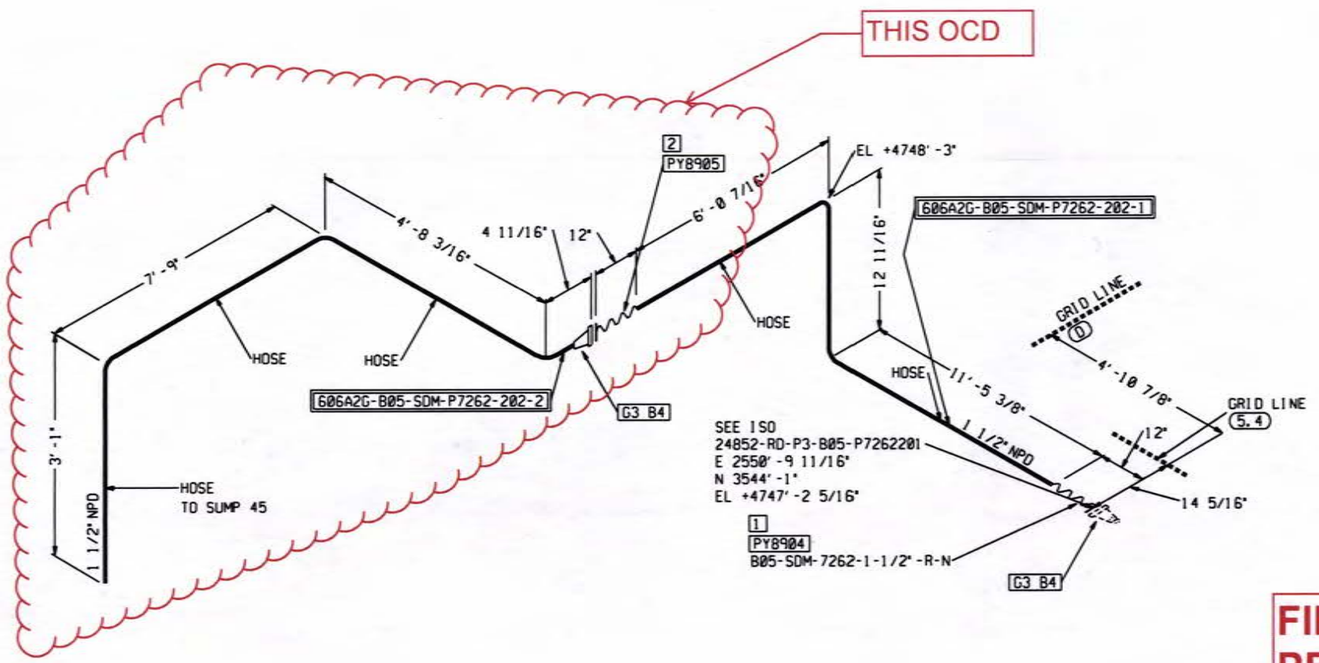


FIELD TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION

FIELD WORK REQUIRED

FIELD MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	SEE PCAPP PIPING SPECIALTY INDEX	1 1/2	PY8904	1
2	SEE PCAPP PIPING SPECIALTY INDEX	1 1/2	PY8905	1
3	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	1 1/2	PGGC3N101T03	2
4	BOLT, STDBLT, A19386/6, 3.0" BOLT LENGTH	1/2	FBBS7D000004	8

PIECE MARKS

606A2G-B05-SDM-P7262-202-1 606A2G-B05-SDM-P7262-202-2

STARTUP SYSTEM:

THREADED	SHOP WELD	FIELD WELD	FIELD FIT WELD	PIPE SUPPORT	SOCKETWELDED	EXISTING
—E—	—●—	—✕—	—✕FFW—	—═—	—E—	-----

FOR GENERAL NOTES SEE DWG 24852-RD-P3-000-P0001001

MODEL NUMBER: B05PPB10

☐ PIPING STRESS EVALUATED FOR COMPLIANCE WITH ASME CODE B31.3.

1. PIPING FLEXIBILITY IS ADEQUATE TO PREVENT PIPING OVERSTRESS AND SUPPORT OVERLOAD DUE TO THERMAL EXPANSION. SUPPORT SPACING IS ADEQUATE TO CONTROL PIPE THERMAL DISPLACEMENTS IN PREVENTING LEAKAGE AT JOINTS, AND INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
2. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO DEAD WEIGHT OF PIPE, ITS CONTENT, AND INLINE COMPONENTS.
3. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO A SEISMIC EVENT OR DUE TO WIND PRESSURE TO CONTROL THE PIPE DISPLACEMENTS IN PREVENTING INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.

☐ PIPING STRESS RIGOROUSLY ANALYZED FOR COMPLIANCE WITH ASME B31.3 CODE AND DOCUMENTED PER PROJECT PROCEDURE REQUIREMENTS.

P&ID NO.:		PIPE CLASS:	R										
FLUID CODE:	SDM	FABRICATION:	SHOP										
DESIGN TEMP. °F:		PIPE A/B/R:	ABOV										
DESIGN PRESS. PSIG:		PAINT SYSTEM:											
OPER. TEMP. °F:		COLOR TAG:											
OPER. PRESS. PSIG:													
INSULATION MAT'L.:													
INSULATION THK.:													
INSULATION PURPOSE:	N			000		ISSUED FOR CONSTRUCTION							
HEAT TRACE:				NO.	DATE	REVISIONS	DR	CHKD	EGS	STRESS ENGR.	PROJ. ENGR.		

EXTRACTION DATE: 07/21/20
EXTRACTION NUMBER: 6

QUALITY ☒ Q ☐ NON-Q ☐ N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025 | AREA: 2 | FAC: 606 | SECT: A2G

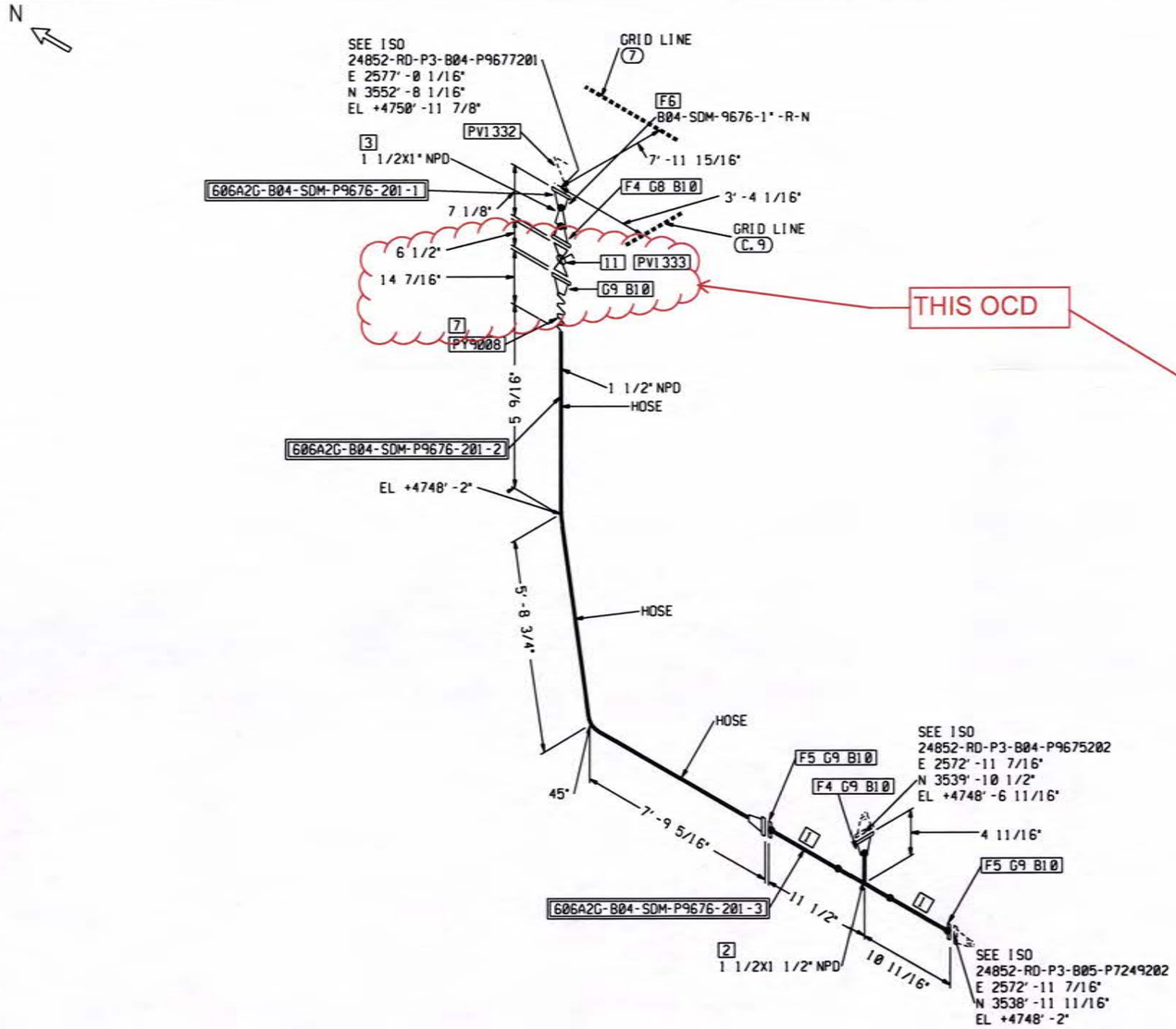
TITLE

B05-SDM-7262-1-1/2"-R-N

DRAWING NO. 24852-RD-P3-B05-P7262202 | REV. 000

$DATE$ $TIME$ $FILEABBREV$ 1 of 1

BNI/SF-CADD 04/27/06 C_ISO.dgn



THIS OCD

SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	PIPE, A312TP316*, SMLS, SCH40S, BBE	1 1/2	PPPC080G0X0N	1.5'
2	TE, BW, A403WP316*, SCH40S	1 1/2X1 1/2	PFCTV60G1C03	1
3	REDCON, BW, A403WP316*, SCH40S	1 1/2X1	PFCRV60G1E08	1
4	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	1 1/2	PFFWX71G0204	2
5	FLGSLPON, A182-F316*, CL150, RF, STDF, B16.5	1 1/2	PFFPX7101904	2
6	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	1	PFFWX71G0202	1

FIELD MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
7	SEE PCAPP PIPING SPECIALTY INDEX	1 1/2	PY9008	1
8	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	1 1/2	PGGC2V100903	1
9	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	1 1/2	PGGC3N101T03	4
10	BOLT, STDBLT, A193B6/6, 3.0" LENGTH	BOLT 1/2	FBBS7D000004	20
11	VLV-BAL, TENTFB, A182-F316*, CL150, RF, B16.34, 316BB&SR, LO	1 1/2	PVVBX710020F	1

PIECE MARKS

606A2G-B04-SDM-P9676-201-1 606A2G-B04-SDM-P9676-201-2 606A2G-B04-SDM-P9676-201-3

OCD 24852-RD-OCD-B05-00006
APPENDIX D
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FIELD TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION

FIELD WORK REQUIRED

STARTUP SYSTEM:

	THREADED	SHOP WELD	FIELD WELD	FIELD FIT WELD	PIPE SUPPORT	SOCKETWELDED	EXISTING
	E	●	X	FFW X	—	E	-----

FOR GENERAL NOTES SEE DWG 24852-RD-P3-000-P0001001

MODEL NUMBER: B05PPB09

☐ PIPING STRESS EVALUATED FOR COMPLIANCE WITH ASME CODE B31.3.
1. PIPING FLEXIBILITY IS ADEQUATE TO PREVENT PIPING OVERSTRESS AND SUPPORT OVERLOAD DUE TO THERMAL EXPANSION. SUPPORT SPACING IS ADEQUATE TO CONTROL PIPE THERMAL DISPLACEMENTS IN PREVENTING LEAKAGE AT JOINTS, AND INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
2. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO DEAD WEIGHT OF PIPE, ITS CONTENT, AND INLINE COMPONENTS.
3. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO A SEISMIC EVENT OR DUE TO WIND PRESSURE TO CONTROL THE PIPE DISPLACEMENTS IN PREVENTING INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.

☐ PIPING STRESS RIGORDUSLY ANALYZED FOR COMPLIANCE WITH ASME B31.3 CODE AND DOCUMENTED PER PROJECT PROCEDURE REQUIREMENTS.

P&ID NO.:		PIPE CLASS:	R										
FLUID CODE:	SDM	FABRICATION:	SHOP										
DESIGN TEMP. °F:		PIPE A/B/R:	ABOV										
DESIGN PRESS. PSIG:		PAINT SYSTEM:											
OPER. TEMP. °F:		COLOR TAG:											
OPER. PRESS. PSIG:													
INSULATION MAT'L.:													
INSULATION THK.:													
INSULATION PURPOSE:	N			000		ISSUED FOR CONSTRUCTION							
HEAT TRACE:				NO.	DATE	REVISIONS	DR	CHKD	EGS	STRESS ENGR.	PROJ. ENGR.		

EXTRACTION DATE: 07/22/20
EXTRACTION NUMBER: 9

BNI/SF-CADD 04/27/06 C_ISO.dgn

QUALITY [X] Q [ ] NON-Q [ ] N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025	AREA: 2	FAC: 606	SECT: A2G

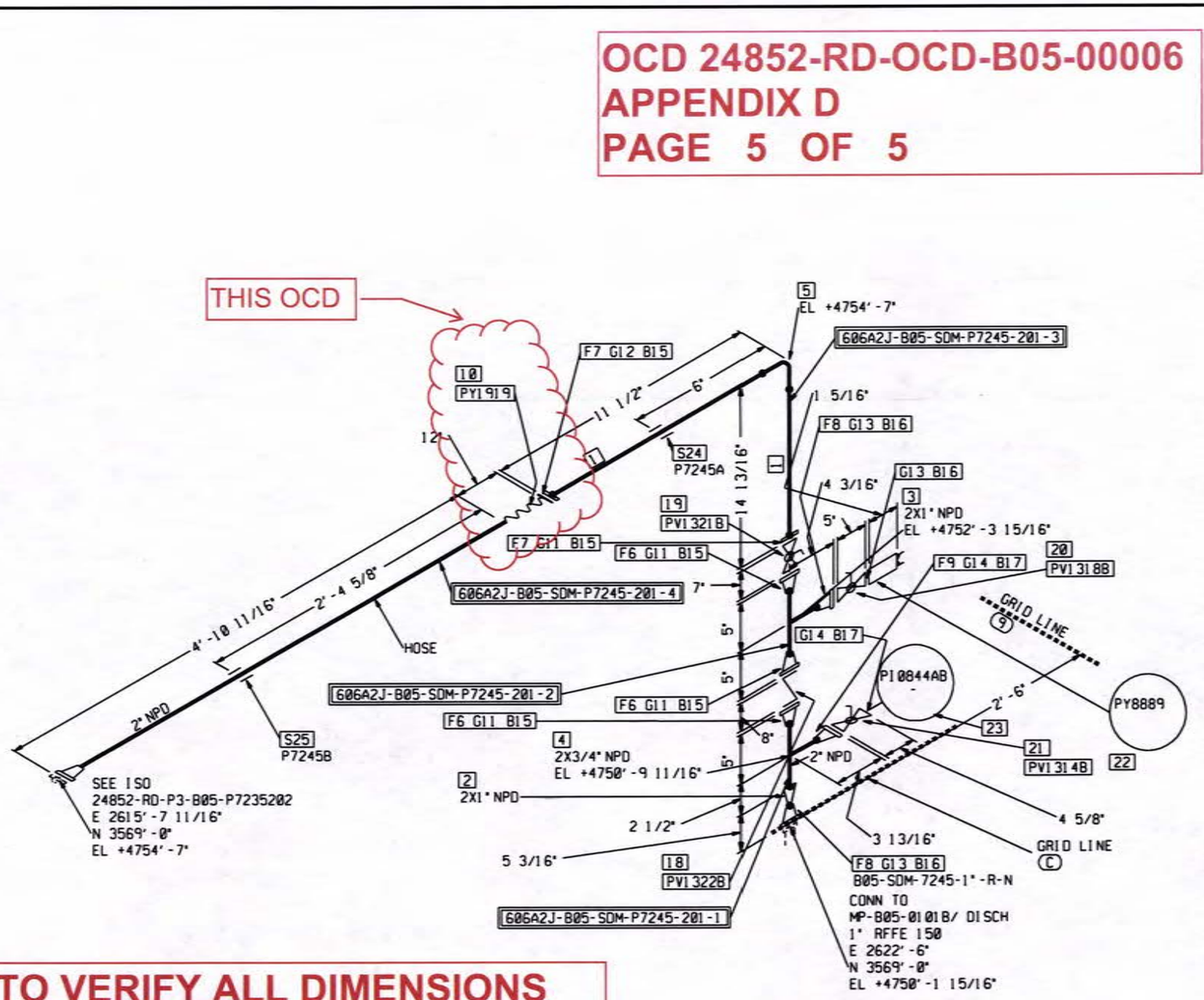
TITLE

B04-SDM-9676-1-1/2"-R-N

DRAWING No.	REV.
24852-RD-P3-B04-P9676201	000

$DATE$ $TIME$ $FILEABBREV$

OCD 24852-RD-OCD-B05-00006
APPENDIX D
PAGE 5 OF 5



FIELD TO VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION

FIELD WORK REQUIRED

SHOP MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
1	PIPE, A312TP316*, SMLS, SCH40S, BBE	2	PPPC0B0G0X00	1.7'
2	REDCON, BW, A403WP316*, SCH40S	2X1	PFCRV60GIE08	1
3	REDTE, BW, A403WP316*, SCH40S	2X1	PFCVV60GIL08	1
4	REDTE, BW, A403WP316*, SCH40S	2X3/4	PFCVV60GIL06	1
5	EL - 90, LR, BW, A403WP316/316L-S, SCH40S	2	PFQNV60GI604	1
6	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	2	PFFWX71G0205	3
7	FLGSLPON, A182-F316*, CL150, RF, STDF, B16.5	2	PFFPX7101905	2
8	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	1	PFFWX71G0202	2
9	FLGWN, A182-F316*, CL150, SCH40S, RF, STDF, B16.5	3/4	PFFWX71G0201	1

THIS OCD

FIELD MATERIALS

PT NO	DESCRIPTION	NPD (IN)	CMDTY CODE	QTY
10	SEE PCAPP PIPING SPECIALTY INDEX	2	PY1919	1
11	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	2	PGGC2V100904	4
12	GASKET, FLATFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	2	PGGC3N101T04	1
13	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	1	PGGC2V100902	3
14	GASKET, SPWND, 316L-PTFE, 1/8" SSSS, CL150, B16.20, B16.5	3/4	PGGC2V100900	2
15	BOLT, STDBLT, A193B6/6, 3.25" BOLT LENGTH	5/8	FBBS7D00000W	20
16	BOLT, STDBLT, A193B6/6, 2.75" BOLT LENGTH	1/2	FBBS7D000003	12
17	BOLT, STDBLT, A193B6/6, 2.5" BOLT LENGTH	1/2	FBBS7D000002	8
18	VLV-CHK, SWNGIS, A182-F316*, CL150, RF, B16.34, BC, TRM10	2	PVVCX710LX04	1
19	VLV-BAL, TENTFB, A182-F316*, CL150, RF, B16.34, 316B&SR, LO	2	PVVBX710020I	1
20	VLV-BAL, TENTFB, A182-F316*, CL150, RF, B16.34, 316B&SR, LO	1	PVVBX710020E	1
21	VLV-BAL, TENTFB, A182-F316*, CL150, RF, B16.34, 316B&SR, LO	3/4	PVVBX710020D	1
	INSTRUMENTS			
22	SEE PCAPP PIPING SPECIALTY INDEX	1	PY8889	1
23	SEE PCAPP INSTRUMENT INDEX	3/4	PI0844AB-	1
	PIPE SUPPORTS			
24	SUPT, 24852-RD-MGN-B05-M0047 SEE APPENDIX S, PAGE 7	2	P7245A	1
25	SUPT, 24852-RD-MGN-B05-M0047 SEE APPENDIX S, PAGE 7	2	P7245B	1
	PIECE MARKS			

606A2J-B05-SDM-P7245-201-1 606A2J-B05-SDM-P7245-201-2 606A2J-B05-SDM-P7245-201-3 606A2J-B05-SDM-P7245-201-4

STARTUP SYSTEM:

THREADED	SHOP WELD	FIELD WELD	FIELD FIT WELD	PIPE SUPPORT	SOCKETWELDED	EXISTING
—E—	—●—	—✕—	—✕FFW—	═══	—€—	-----

FOR GENERAL NOTES SEE DWG 24852-RD-P3-000-P0001001

MODEL NUMBER: B05PPB09

☐ PIPING STRESS EVALUATED FOR COMPLIANCE WITH ASME CODE B31.3.

1. PIPING FLEXIBILITY IS ADEQUATE TO PREVENT PIPING OVERSTRESS AND SUPPORT OVERLOAD DUE TO THERMAL EXPANSION. SUPPORT SPACING IS ADEQUATE TO CONTROL PIPE THERMAL DISPLACEMENTS IN PREVENTING LEAKAGE AT JOINTS, AND INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.
2. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO DEAD WEIGHT OF PIPE, ITS CONTENT, AND INLINE COMPONENTS.
3. SUPPORT SPACING AND TYPES ARE APPROPRIATE TO PREVENT PIPING OVERSTRESS DUE TO A SEISMIC EVENT OR DUE TO WIND PRESSURE TO CONTROL THE PIPE DISPLACEMENTS IN PREVENTING INTERFERENCE WITH ADJACENT PIPES OR OTHER COMMODITIES.

☐ PIPING STRESS RIGOROUSLY ANALYZED FOR COMPLIANCE WITH ASME B31.3 CODE AND DOCUMENTED PER PROJECT PROCEDURE REQUIREMENTS.

P&ID NO.:	RD-M6-B05-M0002	PIPE CLASS:	R									
FLUID CODE:	SDM	FABRICATION:	SHOP									
DESIGN TEMP. °F:	105	PIPE A/B/R:	ABOV									
DESIGN PRESS. PSIG:	150	PAINT SYSTEM:										
OPER. TEMP. °F:	80	COLOR TAG:										
OPER. PRESS. PSIG:	10											
INSULATION MAT'L.:												
INSULATION THK.:												
INSULATION PURPOSE:	N			000		ISSUED FOR CONSTRUCTION						
HEAT TRACE:				NO.	DATE	REVISIONS	DR	CHKD	EGS	STRESS ENGR.	PROJ. ENGR.	

EXTRACTION DATE: 07/20/20
EXTRACTION NUMBER: 15

QUALITY [X] Q [ ] NON-Q [ ] N/A

BECHTEL PUEBLO TEAM

PUEBLO CHEMICAL AGENT-DESTRUCTION PILOT PLANT PROJECT (PCAPP)
PUEBLO, COLORADO

CONTRACT NO. DAAA09-02-D-0025 | AREA: 2 | FAC: 606 | SECT: A2J

TITLE

B05-SDM-7245-2"-R-N

DRAWING No. 24852-RD-P3-B05-P7245201 | REV. 000

$DATE$ $TIME$ $FILEABBREV$

1 of 1

BNI/SF-CADD 04/27/06 C_ISO.dgn

Item #	System Code	EQUIPMENT TAG	REFERENCE P&ID P&ID	FACILITY	EQUIPMENT DESCRIPTION	EQUIPMENT CAPACITY /PARAMETERS														DATA SHEET	MR NUMBER	QUALITY LEVEL	SEISMIC CATEGORY	AGENT CONTAMINATION CATEGORY
						A	B	C	D	E	F	G	H	I	J	K	L	M	N	O					
New	B05	MP-B05-0080	RD-M6-B05-M0024	APB	SUMP PUMP (SUMERSIBLE)	RATED FLOW	20	GPM				RATED DELTA P	21	PSI							N/A	N/A	Q	1	A

THIS DCN
Changes in RED
Delete items in GREEN

THIS DCN
Changes in RED
Delete items in GREEN

Item #	Line Tag	System Code	Pipe Material Spec	Nominal Diameter	Fluid Code	Insulation Purpose	Insulation Thickness	Heat Tracing	Paint Code	Design Temperature	Design Pressure	Operating Temperature	Operating Pressure	Test Type	Test Pressure	Supply Responsibility	Quality Designator	Seismic Category	Contamination Category	Reference P&ID
New	B05-SDM-7262-1 1/2"-R-N	B05	R	1 1/2"	SDM	N				105	25	80	21	H	37.5	By Bechtel	Q	I	A	RD-M6-B05-M0024

THIS DCN
Changes in RED
Delete items in GREEN

Item #	System Code	Valve Tag	Material Spec Line	Reference P&ID	Grid Location	Nominal Diameter	Comp Type	Fluid Code	Quality Designator	Contamination Category	Line Tag	Design Temperature	Design Pressure	Service Temperature	Service Pressure
New	B05	PV-B05-1400	R	RD-M6-B05-M0024	E-6	1 1/2	Ball Valve	SDM	Q	A	B05-SDM-7262-1 1/2"-R-N	105	25	80	21
~~New~~	~~B05~~	~~PV-B05-1342~~	~~R~~	~~RD-M6-B05-M0025~~	~~A-5~~	~~1 1/2~~	~~Check Valve~~	~~SDM~~	~~Q~~	A	~~B05-SDM-7263-1 1/2"-R-N~~	~~105~~	~~150~~	~~80~~	
~~New~~	~~B05~~	~~PV-B05-1343~~	~~R~~	~~RD-M6-B05-M0025~~	~~A-5~~	~~1 1/2~~	~~Ball Valve~~	~~SDM~~	~~Q~~	A	~~B05-SDM-7263-1 1/2"-R-N~~	~~105~~	~~150~~	80	

THIS DCN
Changes in RED
Delete items in GREEN

Item #	System Code	Specialty Tag	Material Spec Line	Reference P&ID	Grid Location	Nominal Diameter	Comp Type	Fluid Code	Quality Designator	Contamination Category	Line Tag	Design Temperature	Design Pressure	Operating Temperature	Operating Pressure
~~New~~	~~805~~	~~PY-B05-8902~~	~~R~~	~~RD-M6-B05-M0024~~	~~E-7~~	~~1 1/2~~	~~Simplex Basket Strainer~~	~~SDM~~	~~Q~~	A	~~805-SDM-7262-1 1/2"-R-N~~	~~105~~	~~150~~	~~80~~	~~180~~
~~New~~	~~805~~	~~PY-B05-9010~~	~~R~~	~~RD-M6-B05-M0002~~	~~A-5~~	~~2~~	~~Flexible Hose~~	~~SDM~~	~~Q~~	A	~~B05-SDM-7235-2"-R-N~~	~~105~~	~~75~~	~~77~~	~~45~~
New	805	PY-B05-1919	R	RD-M6-B05-M0002	A-5	2	Flexible Hose	SDM	Q	A	B05-SDM-7235-2"-R-N	105	75	77	45

THIS DCN
Changes in RED
Delete items in GREEN

List Item #	Component Tag	P&ID	Comp Type	Configuration	Justification
Specialty					
New	PY-B05-1919	RD-M6-B05-M0002	Flexible Hose	Yes	Quality Level is Q
~~New~~	~~PY-B05-8902~~	~~RD-M6-B05-M0024~~	~~Simplex Strainer~~	~~Yes~~	~~Quality Level is Q~~
Valves					
New	PV-B05-1400	RD-M6-B05-M0025	Globe Valve	Yes	Quality Level is Q
~~New~~	~~PV-B05-1342~~	~~RD-M6-B05-M0025~~	~~Check Valve~~	~~Yes~~	~~Quality Level is Q~~
~~New~~	~~PV-B05-1343~~	~~RD-M6-B05-M0025~~	~~Ball Valve~~	~~Yes~~	~~Quality Level is Q~~
Instruments					
New	JH-B05 -HS 6714 --A	RD-M6-B05-M0024	Motor Control Switch	Yes	Quality Level is Q
New	JH-B05 -HS 6714 --B	RD-M6-B05-M0024	Motor Control Switch	Yes	Quality Level is Q

Item #	System Code	Valve Tag	Material Spec Line	Reference P&ID	Reference P&ID Revision	Grid Location	Nominal Diameter	Comp Type	Fluid Code	Quality Designator	Contamination Category	Line Tag	Design Temperature	Design Pressure	Service Temperature	Service Pressure
New	B04	PV-B04-1333	R	RD-M6-B04-M0010	7	E-4	1 1/2	Ball Valve	SDM	Q	A	B04-SDM-9676-1 1/2 "-R-N	105	150	80	TBD

THIS DCN
Changes in RED
Delete items in GREEN

THIS DCN
Changes in RED
Delete items in GREEN

List Item #	Component Tag	P&ID	Comp Type	Configuration	Justification
Valves					
New	PV-B04-1333	RD-M6-B04-M0010	Ball Valve	Yes	Quality Level is Q

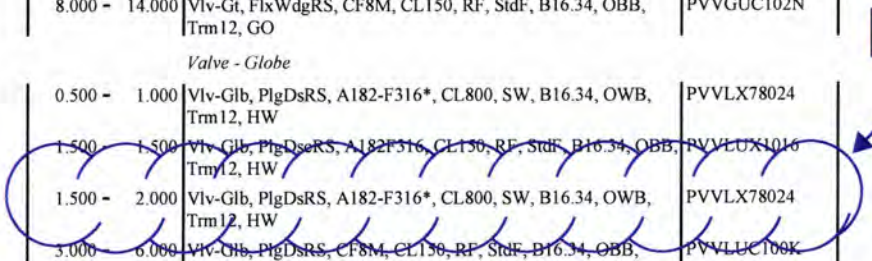
Operations Spare Parts List for Storage and Spent Decon System No. B05, 24852-RD-30X-B05-M0006, Rev. 002
Add the following in RED to the list as appropriate:

Vendor Item Number	Vendor Part Number	Description	Long Description	Manufacturer	Part Number / Model	Diameter (in)	Lead Time	BPS Stock Number	Cost	Reorder Point	Economical Order	Storage Category	Maintenance during storage	Shelf Life [year]	PCAPP P&ID	Component Tag No.	PCAPP Vendor Document No. (exp. 24852-V1A-)
N/A	N/A	Submersible Sump pump	Pump, Submersible corrosive service dewatering pump, 316 SS wetted components, 1 HP 3/460/60 motor, semi open impeller, 0.236 Inch diameter solids handling, SiC mechanical seal, Viton elastomers, free standing, nominal 2 inch NPT discharge connection, built in motor protector, PVC sheath AWG 16/4-32ft power cable, pump dry weight = 49 lbs	Tsurumi	50SFQ2.75	2	2 weeks	PSPR015526	$3671	0	1	4	4		RD-M6-B05-M0024	MP-B05-0080	N/A
N/A	N/A	Globe Valve	Vlv-Glb, PlgDSCRS, A182F31q6, CL150, RF, StdF, B16.34, OBB, Trm 12., HW	Multiple	Multiple	1 ½	4 – 6 weeks	PVVLX7802403	$600	0	1	4	4		RD-M6-B05-M0024	PV-B05-1400	N/A
N/A	N/A	Chemical Transfer hose	Chemical hose FLEXCHEM, EPDM Rubber Covered, Teflon FEP Lined, Nominal 2-inch, Flanged ends	PureFlex	32-G-29F-6-29F-6-6-xxxx-0, xxxx = hose length (inches). Last x in 1/8-in increments	2	4 weeks	PSPR015461	$4,000	0	1	4	4		RD-M6-B05-M0002	PY-B05-1919	N/A

Operations Spare Parts List Agent Collection and Neutralization System No. B04, 24852-RD-30X-B04-M0006, Rev. 002
Add the following to the list as appropriate:

Vendor Item Number	Vendor Part Number	Description	Long Description	Manufacturer	Part Number / Model	Diameter (in)	Lead Time	BPS Stock Number	Cost	Reorder Point	Economical Order	Storage Category	Maintenance during storage	Shelf Life [year]	PCAPP P&ID	Component Tag No.	PCAPP Vendor Document No. (exp. 24852-V1A-)
N/A	N/A	Ball Valve	Vlv-Ball, TEntFB, A182-F316*, CL 150, RF, B6.34, 316B&SR	Multiple	Multiple	1 ½	4 – 6 weeks	PVVBX710Q20F	$600	0	1	4	4	4	24852-RD-M6-B04-M0010	B05-PV-1333	N/A

Rev#	Size Range	Stock Code Description	Bechtel Code	Client Code	Rule	Bolt Ref.	Note No.
		GASKETS					
		Gasket					
	0.500 - 1.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL150, B16.20, B16.5	PGGC2V1009				
	0.500 - 1.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL300, B16.20, B16.5	PGGC2V3009		3		
	1.000 - 1.000	Gasket, FlatFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	PGGC3N101T		894		
	1.500 - 2.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL300, B16.20, B16.5	PGGC2V3009		3		
	1.500 - 2.000	Gasket, FlatFF, PTFE, 1/16", CL150, B16.21, B16.5, GYLON3545	PGGC3N101T		894		
	1.500 - 3.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL150, B16.20, B16.5	PGGC2V1009				
	3.000 - 3.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL300, B16.20, B16.5	PGGC2V3009		3		
	4.000 - 4.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL150, B16.20, B16.5	PGGC2V1009				
	4.000 - 4.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL300, B16.20, B16.5	PGGC2V3009		3		
	6.000 - 14.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL150, B16.20, B16.5	PGGC2V1009				
	6.000 - 14.000	Gasket, SpWnd, 316L-PTFE, 1/8"SSSS, CL300, B16.20, B16.5	PGGC2V3009		3		
		BOLTS					
		Stud Bolt - Threaded Full Length					
	0.500 - 0.500	Bolt, StdBlt, A193B6/6	FBBS7D0000			BS1RF	
	0.500 - 0.500	Bolt, StdBlt, A193B6/6	FBBS7D0000		3	BS3RF	
	0.750 - 4.000	Bolt, StdBlt, A193B6/6	FBBS7D0000			BS1RF	
	0.750 - 4.000	Bolt, StdBlt, A193B6/6	FBBS7D0000		3	BS3RF	
	6.000 - 14.000	Bolt, StdBlt, A193B6/6	FBBS7D0000			BS1RF	
	6.000 - 14.000	Bolt, StdBlt, A193B6/6	FBBS7D0000		3	BS3RF	
		VALVES					
		Valve - Gate					
	0.500 - 0.750	Vlv-Gt, SldWdgRS, A182-F316*, CL800, SW, FNPT, API602OWB, Trm12, HW	PVVGX7800C		714		
	0.500 - 1.000	Vlv-Gt, SldWdgRS, A182-F316*, CL800, SW, API602OWB, Trm12, HW	PVVGX78002				
	1.500 - 2.000	Vlv-Gt, SldWdgRS, A182-F316*, CL800, SW, API602OWB, Trm12, HW	PVVGX78002				
	3.000 - 6.000	Vlv-Gt, FlxWdgRS, CF8M, CL150, RF, StdF, B16.34, OBB, Trm12, HW	PVVGUC102M				
	8.000 - 14.000	Vlv-Gt, FlxWdgRS, CF8M, CL150, RF, StdF, B16.34, OBB, Trm12, GO	PVVGUC102N				
		Valve - Globe					
	0.500 - 1.000	Vlv-Glb, PlgDsRS, A182-F316*, CL800, SW, B16.34, OWB, Trm12, HW	PVVLX78024				
	1.500 - 1.500	Vlv-Glb, PlgDsRS, A182F316, CL150, RF, StdF, B16.34, OBB, Trm12, HW	PVVLUX1016		52		
	1.500 - 2.000	Vlv-Glb, PlgDsRS, A182-F316*, CL800, SW, B16.34, OWB, Trm12, HW	PVVLX78024				
	3.000 - 6.000	Vlv-Glb, PlgDsRS, CF8M, CL150, RF, StdF, B16.34, OBB, Trm12, HW	PVVLUC100K				
		Valve - Check					
	0.500 - 0.500	Vlv-Chk, SwngRS, A182-F316*, CL800, SW, B16.34, BC, Trm12	PVVCX780KD				
	0.750 - 1.000	Vlv-Chk, SwngRS, A182-F316*, CL800, SW, B16.34, BC, Trm12	PVVCX780KD				
	1.500 - 2.000	Vlv-Chk, SwngIS, A182-F316*, CL150, RF, B16.34, BC, Trm10	PVVCX710LX		221		
	1.500 - 2.000	Vlv-Chk, SwngRS, A182-F316*, CL800, SW, B16.34, BC, Trm12	PVVCX780KD				
	3.000 - 4.000	Vlv-Chk, SwngRS, A351 CF8M, CL150, RF, StdF, B16.34, BC, Trm12	PVVCUC102E				
	6.000 - 14.000	Vlv-Chk, SwngRS, A351 CF8M, CL150, RF, StdF, B16.34, BC, Trm12	PVVCUC102E				
		Valve - Ball					
	0.500 - 1.000	Vlv-Bal, TEntFB, A182-F316*, CL600, SW, API608, B16.34, 316RTFE, LO	PVVBX760C9				
	0.750 - 1.000	Vlv-Bal, TEntFB, A182-F316*, CL150, RF, B16.34, 316B&SR, LO	PVVBX710Q2		221		
	1.500 - 2.000	Vlv-Bal, TEntFB, A182-F316*, CL150, RF, B16.34, 316B&SR, LO	PVVBX710Q2		221		
	1.500 - 2.000	Vlv-Bal, TEntFB, A182-F316*, CL600, SW, API608, B16.34, 316RTFE, LO	PVVBX760C9				



Shelton, Roberta

From: Hill, Jason (PCAPP)
Sent: Thursday, July 23, 2020 1:46 PM
To: Shelton, Roberta; Hilzman, Misty; Lasley, Calvin; Delaney, Franki (PCAPP); Dowdey, Joe (PCAPP); Eby, James (PCAPP)
Subject: RE: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Roberta,
This will require a permit mod with prior CDPHE approval. This will be included with PMR 295 changes.

Sincerely,

Jason Hill | Environmental Permitting Manager
Pueblo Chemical Agent-Destruction Pilot Plant
45825 Hwy 96 E Pueblo, CO 81006
[redacted]

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Wednesday, July 22, 2020 1:28 PM
To: Hilzman, Misty [redacted]; Lasley, Calvin [redacted]; Delaney, Franki (PCAPP) [redacted]; Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted]; Hill, Jason (PCAPP) [redacted]
Subject: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Shelton, Roberta

From: Hughes, Paul
Sent: Friday, July 17, 2020 2:21 PM
To: Shelton, Roberta; Hilzman, Misty; Oakes, R. Wyatt; Delaney, Franki (PCAPP); Dowdey, Joe (PCAPP); Eby, James (PCAPP); Hill, Jason (PCAPP); Cumiford, Jeremy; Shepherd, Amy
Cc: Calkins, Rachael
Subject: RE: 24852-RD-OCD-B05-00006 - Part B - NO ELECTRONIC SIGNATURES

Cybersecurity approved

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Friday, July 17, 2020 11:41 AM
To: Hilzman, Misty [redacted]; Hughes, Paul [redacted]; Oakes, R. Wyatt [redacted]; Delaney, Franki (PCAPP) [redacted]; Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted]; Hill, Jason (PCAPP) [redacted]; Cumiford, Jeremy [redacted]; Shepherd, Amy [redacted]
Cc: Calkins, Rachael <rcalkins@Bechtel.com>
Subject: 24852-RD-OCD-B05-00006 - Part B - NO ELECTRONIC SIGNATURES

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Shelton, Roberta

From: Oakes, R. Wyatt
Sent: Monday, July 20, 2020 8:37 AM
To: Shelton, Roberta
Subject: RE: 24852-RD-OCD-B05-00006 - Part B - NO ELECTRONIC SIGNATURES

Approve
R Wyatt Oakes
QC Supervisor

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Friday, July 17, 2020 11:41 AM
To: Hilzman, Misty [redacted]; Hughes, Paul [redacted]; Oakes, R. Wyatt [redacted]; Delaney, Franki (PCAPP) [redacted]; Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted]; Hill, Jason (PCAPP) [redacted]; Cumiford, Jeremy [redacted]>; Shepherd, Amy [redacted]>
Cc: Calkins, Rachael <rcalkins@Bechtel.com>
Subject: 24852-RD-OCD-B05-00006 - Part B - NO ELECTRONIC SIGNATURES

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Zukowski, John

From: Nurdogan, Yakup
Sent: Tuesday, July 21, 2020 1:56 PM
To: Shelton, Roberta
Cc: Zukowski, John; Thomas, Jonathan; Halstead, Kenneth; Flaherty, Brendan; Dea, Linda; Benson, Eric
Subject: RE: OCD-B05-00006 Sig Copy for Checker Approval

Approved

Mechanical/Process Engineering

From: Zukowski, John <jrzukows@Bechtel.com>
Sent: Tuesday, July 21, 2020 1:33 PM
To: Nurdogan, Yakup [redacted]; Flaherty, Brendan [redacted]; Dea, Linda [redacted]; Benson, Eric [redacted]
Cc: Shelton, Roberta [redacted]; Thomas, Jonathan [redacted]; Halstead, Kenneth [redacted]
Subject: RE: OCD-B05-00006 Sig Copy for Checker Approval

Yakup – please approve via email for checking.

The rest – please confirm your signature is still valid for the change described below.

The change is to add a flexible hose to P&ID 24852-M6-B05-M0002 between the two discharge risers from the spent decon feed pumps which we told maintenance we would do but somehow got missed on the DCN. See:

- Part B page 4 of 6
- Appendix A, added sheet 4
- Appendix D, added sheet 5
- Appendix E, sheet 4,5 (specialty and configs list). The flexible house was identified as PY-B05-~~9010~~ 1919 on the specialty list.
- Appendix G, sheet 1 (ops spare parts list)

From: Nurdogan, Yakup [redacted]
Sent: Thursday, July 16, 2020 9:49 AM
To: Zukowski, John [redacted]
Cc: Shelton, Roberta [redacted]
Subject: RE: OCD-B05-00006 Sig Copy for Checker Approval

Approved

Mechanical/Process Engineering

Yakup Nurdogan, PhD, PE
Bechtel National, Inc.
[redacted]

[redacted]

From: Zukowski, John [redacted]
Sent: Thursday, July 16, 2020 9:43 AM
To: Nurdogan, Yakup [redacted]
Cc: Shelton, Roberta [redacted]
Subject: RE: OCD-B05-00006 Sig Copy for Checker Approval

Let try this again. See attached

From: Zukowski, John
Sent: Thursday, July 16, 2020 7:52 AM
To: Nurdogan, Yakup [redacted]
Cc: Shelton, Roberta [redacted]
Subject: OCD-B05-00006 Sig Copy for Checker Approval

Yakup – See the instructions below and respond. You are the checker of the attached document.

Thanks,

John R. Zukowski PE (WA), CEF (AESF)
Sr. Process Engineer
PCAPP
[redacted]

From: Shelton, Roberta [redacted]
Sent: Thursday, July 16, 2020 7:06 AM
To: Zukowski, John [redacted]
Subject: This is what I used last time . . .

Please review the attached document. Since you am working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your department.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin

Shelton, Roberta

From: Jones, Yetta
Sent: Wednesday, July 22, 2020 10:52 AM
To: Shelton, Roberta
Subject: RE: 24852-RD-OCD-B05-00006
Attachments: 24852-RD-OCD-B05-00006.pdf

Good morning Roberta,

Attached is the Design Screening Checklist for your records. This email is to document approval of the OCD. Please let me know if there is anything else I can help you with.

Thank you and have a safe day,

Yetta Jones, CSP | System Safety Engineer
Pueblo Chemical Agent-Destruction Pilot Plant
45825 Hwy 96 E Pueblo, CO 81006
[redacted]

From: Shelton, Roberta [redacted]
Sent: Wednesday, July 22, 2020 9:56 AM
To: Jones, Yetta [redacted]
Subject: 24852-RD-OCD-B05-00006

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

ATTACHMENT
PCAPP Design Change Impact Screening Checklist

Change Document Number 24852-RD-OCD-B05-00006		Rev. No. N/A	Document Type						
			DCN	PCP	ECP	TPMD	OCD	Other	
Have the following items been impacted by the proposed change?	**YES**	**NO**					X		
Has any one of the **Safety Critical Systems*** been impacted	☐	☒	**INSTRUCTIONS:** **The design change reviewers shall consider the potential for impacts to each of the elements listed in the left-hand column. If the reviewer is unfamiliar with or uncertain of the impact, contact the requestor for further discussion or work with the Cog. Engineer.** **Design changes shall not be approved for implementation until all areas of potential impact are resolved.** **The completed screening form shall be included with the change document for review by the requestor.**						
Is the HVCAC performance altered? • Air capture velocity • Heat or cooling load impact • Air exchange rate • Air mixing	☐	☒							
Are process conditions altered because of proposed changed?	☐	☒							
Do changes involve altering the material of construction?	☐	☒							
Will the Basis of Design, LCO, FDD and/or SDD require modification?	☐	☒							
Do procedures (SOP, etc.) require revision to meet change?	☐	☒							
Will vendor equipment be used with an existing PCAPP system and has an HA been performed? a. If this becomes a permanent change, would it require additional operations to the SOP? Y (N)	☐	☒							
Will the Fire Hazard Analysis be impacted?	☐	☒	**Actual time to complete.** **SOP Review: ____ hrs.** **Review and Revision: __1.0__hrs.** **Meetings: _____hrs.**						
Have the HTL items been impacted? List the HTL item(s) that are impacted: Is an HA needed to update HTL items? Yes ☐ No ☒	☐	☒							
Is the Agent Boundary impacted? List the P&ID(s) that need to be revised. (intrusive work does not permanently affect an agent boundary)	☐	☒							
Is the SSSD impacted?	☐	☒							

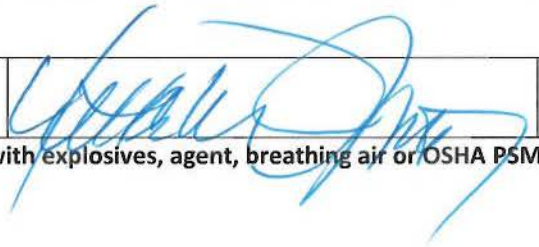
ATTACHMENT
PCAPP Design Change Impact Screening Checklist

Remarks: This OCD is for the minor changes to DCN 24852-RD-M6N-B05-M0047 which makes extensive changes to the B05 system. In this DCN, the pump MP-B05-0080 is identified as "not mature a (sic) will be the subject of a future design change." This OCD is the design change of the sump pump MP-B05-0080 from the original selection to a "submersible, corrosive service and provides changes to route the discharge of the pump to sump MT-B05-0045." After design review additional changes were made. Excluded from the scope of this OCD as with DCN 24852-M6N-B05-M0047 but will be part of future DCN 24852-RE-E1N-B05-E0001.

The specific changes to this OCD are:

- Changing Item 3 from a "total dynamic head" to "rated delta P of 21 psi"
- Addition of Item 5 Addition of hand switch MCC LOCAL/REMOTE 6714 -B
- Addition of Item 6 Change local hand switch HOA to a JOG/STOP with tag number change to 6714 -A
- Changing globe valve to "PV-B05-1400"
- Addition of Item 8 Change the symbol for pump MP-B05-0080 from a sump vertical pump (A-1D4A14) to a submersible vertical pump (A-1D4A15)
- Addition of Item 9 Change off sheet connector label to read "TO SUMP 45 VIA TRENCH"
- Removal on 24852-RD-M6-B05-M0025 of Item 1 for addition of flexible hose (PY-B05-9020) routing to sump MT-B05-0045
- Changing isolation ball valve from PV-B05-1343 to PV-B04-1333
- Addition of flex hose PY-B05-1919 on 24852-RD-M6-B05-M0002

Affected P&IDs: 24852-RD-M6-B05-M0024, M6-B05-M0025, -B05-M0002 and -B04-M0010 are affected and will changes with the OCD will be incorporated. All drawings are within the agent boundary but will not expand. Individual components cited in document will have associated symbols and valves updated with correct identifiers.

Screening performed by: Yetta D. Jones, CSP		Date: 22 JUL 2020	

***Defined as any system dealing with explosives, agent, breathing air or OSHA PSM covered processes**

Shelton, Roberta

From: Lasley, Calvin
Sent: Wednesday, July 22, 2020 2:17 PM
To: Shelton, Roberta
Subject: RE: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Roberta,
I approve the OCD as the D-APE.

Thanks,
Calvin

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Wednesday, July 22, 2020 1:28 PM
To: Hilzman, Misty [redacted]; Lasley, Calvin [redacted] Delaney, Franki (PCAPP) [redacted]; Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted]; Hill, Jason (PCAPP) [redacted]
[redacted]ECT ATTACHMENT

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
([redacted]
[redacted]

Shelton, Roberta

From: Hilzman, Misty
Sent: Wednesday, July 22, 2020 1:36 PM
To: Shelton, Roberta
Subject: RE: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Approved
Misty
Security

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Wednesday, July 22, 2020 1:28 PM
To: Hilzman, Misty [redacted]; Lasley, Calvin [redacted]; Delaney, Franki (PCAPP) [redacted] Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted] Hill, Jason (PCAPP) [redacted]
Subject: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Shelton, Roberta

From: Hill, Jason (PCAPP)
Sent: Thursday, July 23, 2020 1:46 PM
To: Shelton, Roberta; Hilzman, Misty; Lasley, Calvin; Delaney, Franki (PCAPP); Dowdey, Joe (PCAPP); Eby, James (PCAPP)
Subject: RE: 24852-RD-OCD-B05-00006 - CORRECT ATTACHMENT

Roberta,
This will require a permit mod with prior CDPHE approval. This will be included with PMR 295 changes.

Sincerely,

Jason Hill | Environmental Permitting Manager
Pueblo Chemical Agent-Destruction Pilot Plant
45825 Hwy 96 E Pueblo, CO 81006
[redacted]

From: Shelton, Roberta <rkshelto@bechtel.com>
Sent: Wednesday, July 22, 2020 1:28 PM
To: Hilzman, Misty [redacted]; Lasley, Calvin [redacted]; Delaney, Franki (PCAPP) [redacted]; Dowdey, Joe (PCAPP) [redacted]; Eby, James (PCAPP) [redacted]; Hill, Jason (PCAPP) [redacted]ECT ATTACHMENT

Please review the attached document. Since many individuals are working from home, you must reply via email if you **approve.** If you do not **approve,** please send me an email stating the reasons why. The **approval** emails will be attached to the back of the document and will serve as your signature. Please make sure the email states "**Approved**" and your **department/title**.

If someone else in your department is responsible for reviewing documents, please let me know.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Shelton, Roberta

From: Omel, Peter
Sent: Monday, July 27, 2020 7:00 AM
To: Shelton, Roberta
Subject: RE: 24852-RD-OCD-B05-00006

Roberta,

I approve of the subject OCD, if you need anything further please let me know.

Thanks,
Peter

From: Shelton, Roberta [redacted]
Sent: Friday, July 24, 2020 12:28 PM
To: Omel, Peter [redacted]
Subject: 24852-RD-OCD-B05-00006

For your review and signature via email.

Thank you.

Roberta Shelton
PCAPP – Bechtel Engineering Admin
[redacted]

Enclosure 11

Document Change Notice “EI&C Spent Decon Storage System
Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-E1N-B05-E0001)

Document Change Notice (DCN) “EI&C Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-E1N-B05-E0001) has been redacted because it contains Export Control/International Traffic Arms Regulations Information.

A copy of DCN “EI&C Spent Decon Storage System Toxic Room Changes (24852-PCP-B05-00013)” (24852-RD-E1N-B05-E0001) with appropriate Export Control markings will be submitted to the Division in a separate letter (Chron20-02250).

Enclosure 12

Document Change Notice “Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)” (24852-RD-M6N-B04-M0120)

Document Change Notice (DCN) “Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)” (24852-RD-M6N-B04-M0120) has been redacted because it contains Export Control/International Traffic Arms Regulations Information.

A copy of DCN “Install Hose and Valve to B04 Caustic Drain Line (24852-PCP-B04-00046)” (24852-RD-M6N-B04-M0120) with appropriate Export Control markings will be submitted to the Division in a separate letter (Chron20-02250).

Enclosure 13

Document Change Notice "Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)" (24852-RD-J3N-B04-J0016)

Document Change Notice (DCN) “Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)” (24852-RD-J3N-B04-J0016) has been redacted because it contains Export Control/International Traffic Arms Regulations Information.

A copy of DCN “Revise Logic for Agent Water Separator Wash Water Transfer Sequencer to Run in Automatic (24852-PCP-B04-00034)” (24852-RD-J3N-B04-J0016) with appropriate Export Control markings will be submitted to the Division in a separate letter (Chron20-02250).

Enclosure 14

Design Change Notice “Replace MWS Surge Drum Pump Isolators” (24852-RD-30N-B02-M0016)

	Parent WO# (NA for minor): 553975	24852-RD-30N-B02-M0016	Rev: 000

Design Change Notice

Minor Yes (complete fields marked *) or No: *No*

Area Below is Reserved for Security Markings

FINAL – OPSEC Review completed 2 September 2020

DESCRIPTION

***Title (Approved, Implemented, or Appended):**
Approved - Replace MWS Surge Drum Pump Isolators

***System ID:** B02

Initiating change request (ECP/TCCB) No (NA for Minor):
TCCB-49

***Summary of Change:**
By replacing the current EPDM lined isolator with Proco 231/ET the reliability of the surge drum pump can be improved

*** Permit Change Required? (Must be No for minor)**
Yes

If Yes, Prior CDPHE Approval Required?
Yes

If Yes, Maximo Service Request Marked?
Yes

ICFM required?
No

***Document Lists**

Document No.	Rev	Document Title	Affected / Reference	Essential
24852-RD-30X-B02-M0006	5	Operation Spare Parts List Munitions Washout System, System No. B02	Affected	No
24852-V1A-MPPD-1001s01	2	Data Sheet	Affected	No

***Description of Change** (Describe the change)**:**

This change is to replace the existing isolators B02-PY8557,8561,8560,8564,8559,8563,8558 and 8562 with Proco 231/ET. Current isolators are Proco 240AV/EEW/S304. The current isolators are EPDM lined and have experienced repeated degradation and premature failure. The alternative isolators are PFTE lined.

Alternative Isolator:
PSPR012406 Expansion Joint, 1-1/2", ASME Class 150, Flanged FF, 6" Length, Proco 231/ET

Alternative Isolator backing ring:
PSPR012691 Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD

***Justification and Logic for Change** (indicate the reason for the change, why the change is required and why the change is acceptable, including logic and assumptions)**:**

The intent of this change is to improve surge drum pump reliability.
The current EPDM lined isolators degrade overtime due to the acidic environment.
The Proco 231/ET is PFTE (teflon) lined isolator which is more chemically resistant to the acidic process fluid.
The alternative isolator will be able to bolt onto the existing pipe flanges without disrupting the piping configuration.

Special Instructions (e.g., preauthorized field changes, QC for design verification, acceptable test results, required child WOs [e. g., update to essential drawings, software changes, testing and verification, job plan/PM/rounds and readings updates]):

N/A

	Parent WO# (NA for minor): 553975	24852-RD-30N-B02-M0016	Rev: 000
	Design Change Notice		
	Minor Yes (complete fields marked *) or No: ***No***		

Impacts/Applicable for Implementation or Minor Change (highlighted fields must be NA for minor)		Yes / N/A
1	Upstream (Include document numbers)	N/A
2	Downstream (include document numbers)	N/A
3	Vendor publications (Include document numbers)	Yes
4	References to support installation (see procedure for examples, include document numbers)	N/A
5	Preauthorized changes for installation (list from 24852-RD-30X-GEX-00005, *Pre-Authorization Agreement Operational Change Document)* (include in special instructions)	N/A
6	Calculations (include document numbers)	N/A
7	Related DCNs (include document numbers)	N/A
8	Spare Parts Lists (include document numbers)	Yes
9	Software changes (include SWCR number)	N/A
10	Engineering studies results (include document numbers)	N/A
11	Hazard analysis results (include document numbers)	N/A
12	Applicable environmental permit requirements (include document numbers)	N/A
13	Affected Design Criteria (include document number) Must be revised prior to approval of an implementing DCN.	N/A
Attachments - Check box for included attachments or N/A as applicable.		Attached or N/A
14	*PCAPP Design Change Impact Screening Checklist, GDI-GHX-00019-F002	Attached
15	Bill of Materials (includes revised stock codes)	Attached
16	Other: Attachment A	Attached

	Parent WO# (NA for minor): 553975	24852-RD-30N-B02-M0016	Rev: 000

Design Change Notice

Minor Yes (complete fields marked *) or No: ***No***

SIGNATURES

(*) INDICATES SIGNATURE REQUIRED FOR SELECTED MINOR CHANGES (SEE PROCEDURE)

(SEE ALSO WORKFLOW PROGRESS BELOW)

CSE:

The CSE's signature indicates that they have performed a review of the DCN for constructability, technical acceptability, system operability and that changes to maintenance plans have been identified.

Randy Johnson	Aug 7, 2020
(Name)	(Date)

***System Safety:**

System Safety's signature indicates that DCN has been reviewed for design impacts associated with system and personnel safety. Additional actions required based on positive screening have been completed. A copy of the PCAPP Design Change Impact Screening Checklist (PCAPP Form GDI-GHX-00019-F002) is attached to the DCN request. For minor design changes, signature indicates review for documents listed in 24852-RD-30G-GHX-00001, System Safety Program Plan for PCAPP, CDRL B012, Section 7.1 or 24852-RD-GQR-000-T0001, Quality List, otherwise system safety review not required for minor design changes.

Jeremy Cumiford	Aug 17, 2020
(Name)	(Date)

***Environmental:**

Environmental's signature indicates that permit considerations have been completed and the front of this DCN is marked as required. For minor design change, signature indicates review for documents associated with RCRA Permit Attachment E document or Bxx systems, otherwise Environmental review signature not required for minor design changes.

James Eby	Aug 16, 2020
(Name)	(Date)

Cybersecurity:

Cybersecurity's signature indicates the DCN has been evaluated for cyber impacts.

Paul Hughes	Aug 18, 2020
(Name)	(Date)

***Responsible Engineer:**

The RE's signature indicates that required elements are complete and accurate.

Ailes Catedral	Aug 19, 2020
(Name)	(Date)

***Checker/Verifier:**

The Checker's signature indicates that checking is completed as required and revisions are made.

Jonathan Thomas	Aug 18, 2020
(Name)	(Date)

	Parent WO# (NA for minor): 553975	24852-RD-30N-B02-M0016	Rev: 000

Design Change Notice

Minor Yes (complete fields marked *) or No: ***No***

APPROVAL
EGS/PE approves minor changes, PEM approves all other
***EGS/PE** **NA** (Name) (Date)
PEM Peter Omel Aug 20, 2020 (Name) (Date)

IMPLEMENTATION VERIFICATION
Function Test/ Installation Verification Work Order Number: Date Completed
The CSE's signature verifies that the above test has been completed and the DCN has been implemented correctly in the plant. **VERIFIED by Cognizant System Engineer (CSE):** Name Date Completed

INCORPORATION OF DESIGN CHANGE
Documents affected or referenced by this DCN updated or indicate appropriate association. Was an IFCM required? If so, hold DCN until approval received and attach copy of ICFM. ***Responsible Engineer:** The RE's signature indicates that required elements are complete and configuration is aligned. (Name) (Date)

	Parent WO# (NA for minor): 553975	24852-RD-30N-B02-M0016	Rev: 000

Design Change Notice

Minor Yes (complete fields marked *) or No: ***No***

GENERAL COMMENTS		
General Comment	**Name**	**Date**

UNIFIER WORKFLOW PROGRESS				
Step Name	**Assignee**	**Status**	**Action**	**Completion Date & Time**
Approved - Eng Admin Send to DCC	Roberta Shelton	Not Started		
Creation	Ailes Catedral	Completed	Send for Doc No	Aug 5, 2020 9:02 AM
DCC Assign Doc Number	Darcey Young	Completed	Send Forward	Aug 6, 2020 7:14 AM
RE Develop DCN	Ailes Catedral	Completed	Send Forward	Aug 6, 2020 7:30 AM
CSE Lead Assign	Joseph McEvoy	Completed	Send for CSE Review	Aug 7, 2020 8:06 AM
CSE Review / Sign	Randy Johnson	Completed	Concur - DCN Signed	Aug 7, 2020 9:57 AM
Environmental Tech Review / Signature	Jason Hill	Completed	Concur - DCN Signed	Aug 16, 2020 5:56 PM
System Safety Tech Review / Signatures	Amy Shepherd	Completed	Concur - DCN Signed	Aug 17, 2020 3:22 PM
Cyber Security Tech Review	Paul Hughes	Completed	Concur - DCN Signed	Aug 18, 2020 9:46 AM
RE Sign	Ailes Catedral	Completed	Send for Additional Tech Review	Aug 18, 2020 10:32 AM
Additional Tech Eval	Jeremy Cumiford	Completed	Concur - Send for RE	Aug 18, 2020 10:46 AM
RE Sign	Ailes Catedral	Completed	DCN Signed	Aug 18, 2020 10:56 AM
EGS Assign Checkers	Jonathan Thomas	Completed	Send for Checker Review	Aug 18, 2020 12:10 PM
Checker Review	Jonathan Thomas	Completed	Return to RE	Aug 18, 2020 1:18 PM
RE - Corrections from Checker	Ailes Catedral	Completed	Concur - Correction Complete	Aug 18, 2020 1:59 PM
Checker Review	Jonathan Thomas	Completed	Return to RE	Aug 18, 2020 2:49 PM
RE - Corrections from Checker	Ailes Catedral	Completed	Concur - Correction Complete	Aug 20, 2020 9:55 AM
Checker Review	Jonathan Thomas	Completed	Concur - Send for PEM	Aug 20, 2020 10:02 AM
PEM Approve	Peter Omel	Completed	Approved	Aug 20, 2020 11:27 AM
Security Review	Misty Hilzman	Completed	Review Complete	Aug 31, 2020 11:16 AM

Building/Area/Location	PUEBLO, COLORADO	Req'n. No.	24852-MRA-MPPD-00001	Item No.	5
		Spec. No.	24852-RD-3PS-000-M0074	No. Req'd	4
		P.O. No.		Cost Code	
Dwg Ref.		P&I.D. Ref.	24852-RD-M6-B02-R0011/R0023	Mfr.	

1	**Equipment No.:**	MP-B02-0101A/B & MP-B02-0201A/B	**Manufacturer/Model**	Warren Rupp / ST 1 1/2 SGN4HI
2	**Description:**	Washed Agent and Water Booster Pumps	**Serial Number:**	TBD
3			**Size/Type:**	1 1/2" Containment

PROCESS DATA

5	Liquid	Washed Agent & Water	Capacity US GPM @ P.T. Min.	7 (Note 2)	Air Type	Dry & Filtered
6	Pump T Norm °F	108	Capacity US GPM @ P.T. Rated	10	Inlet Press Min./Max.(psig)	0/125
7	SP GR @ Pump T	0.99 to 1.27	Discharge Pressure (psig)	30.1	Flow, Min./Max. (scfm)	<10 / 100 (12 Norm)
8	Vapor Press @ PT (psia)	1.21	Suction Pressure (psig)	5.43	Air Supply pressure	
9	Viscosity @ PT (cp)	0.813 to 0.91	Differential Pressure (psi)	25.5	(Nor./Min.) (Psig)	110/70
10	Corrosion Due to	Mustard Agent	$NPSH_A$ (ft)	12.53		

MATERIAL/CONSTRUCTION

12	Case	Alloy "C"	Base plate	N/A	Displacement/Stroke (Gallons)	0.3
13	Diaphragms	Santoprene	Suction Strainer	By others	Stroke per minute	33.3 Rated
14	Valve Seat	Alloy "C"	Foot Valve	N/A	Valve Type	Ball Check
15	Valve	PTFE	Air Distribution Valve	*	Pump Design Pressure (psig)	125
16	Wetted Parts	Alloy "C"			Pump Design Temperature (F)	220
17	Liquid Connections	1.5" 150# Flange				

ACCESSORIES

19	(x) Pressure Regulator	Yes	( ) Foot Valve	Not required
20	Manufacturer	Parker	Manufacturer	
21	Model No.	B12-04DJCRSS	Model No.	
22				
23	(x) Air Filter	Yes	( ) Strainer	By others
24	Manufacturer	Parker	Manufacturer	
25	Model No.	B12-04DJCRSS	Model No.	
26				
27	(x) Lubricator	Yes	(x) Exh. Air Silencer	Yes
28	Manufacturer	Parker	Manufacturer	Allied Witan
29	Model No.	L10-04DSS	Model No.	B-68
30				
31	( ) Run Away Valve	Not required	(x) Leak Detection	Yes (Monitor between diaphragms), Note 4
32	Manufacturer		Manufacturer	Warren Rupp
33	Model No.		Model No.	032.044.000
34				
35	( ) Totalizing Counter	Not required	(x) Pump Running Switch	Not required
36	Manufacturer		Manufacturer	
37	Model No.		Model No.	
38				
39	(x) Pulsation Dampener	Yes (discharge)	(x) Flex Connector (air/Liquid)	Yes, Note 9 / Yes, Note 10
40	Manufacturer	Warren Rupp	Manufacturer	Liquid: Proco Products
41	Model No.	TA1 1/2,S1SS	Model No.	240AV/EEW/S304
42				
43	(x) Solenoid Valve	Yes		Air: Summers Rubber Co.
44	Manufacturer	Jefferson		Inlet: 1/2BLACK*8BI-8MSS*18*IN LONG
45	Model No.	YC1342IA08T		Exhaust: 3/4 BLACK*12BI-12MSS*18*IN LONG

this DCN

231/ET

	QUALITY (Q or Non-Q) Q	**SEISMIC CATEGORY - I**	**AGENT CONTAMINATION CATEGORY (A, B, C, D, E):** A

Rev	Date	Revision	BY	CHK		EGS
000	12/16/08	Issued for Purchase	WS	TM	DS	MM

Bechtel Pueblo Team	Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) AIR OPERATED DIAPHRAGM PUMP DATA SHEET Title: Wash Water Pump	Job No.	24852
		Document Number: 24852-RD-MPD-B02-M0001	REV: 000
		SHEET 1 OF 2	

SPECIALTY

Vendor Item Number	Vendor Part Number	Description	Long Description	Installed Manufacturer	Installed Part Number / Model	Diameter	Lead Time	BPS Stock Number	Cost (valve / repair kit)	Reorder Point	Economical Order QTY	Storage Category	Maintenance during storage	Shelf Life [year]	PCAPP P&ID	Component Tag No	PCAPP Vendor Document No.
-	-	Single basket strainer	Single Basket Strainer, Titanium Grd 2, IFC-#B150FT2BW (24852-RD-PYD-B02-M0041) Fabricated Simplex basket strainers, 2" ANSI 150# R.F. flanged, material Grade 2 Titanium, Type: Bolted Blind Cover Enclosure W/ 1/2" NPT vent, A193-B8-1 / A194-8 hardware, spiral wound Titanium PTFE filled gasket, 1/8" perforated plate filtration W/Magnetic inserts (Type 2 titanium), Hydro Test Reports & MTR's included, ANSI B31.1 Design Code, Rated to 14.9 PSIG @ 150 Deg. F, no internal/external painting or coating.	IFC	B150FT2BW1	2	-	PYSP2000340J2	$14,900	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-0101A	-
-	-	Single Basket Strainer - Basket Only	BASKET ONLY FOR ABOVE ITEM	IFC	D-8082-8	2	-	PSPR012258	-	1	1	4	-	-	RD-M6-B02-R0011 RD-M6-B02-R0023	PY-B02-0101A PY-B02-0101B PY-B02-0201A PY-B02-0201B	-
-	-	Single basket strainer	Single Basket Strainer, Titanium Grd 2, IFC-#B150FT2BW (24852-RD-PYD-B02-M0041) Fabricated Simplex basket strainers, 2" ANSI 150# R.F. flanged, material Grade 2 Titanium, Type: Bolted Blind Cover Enclosure W/ 1/2" NPT vent, A193-B8-1 / A194-8 hardware, spiral wound Titanium PTFE filled gasket, 1/8" perforated plate filtration W/Magnetic inserts (Type 2 titanium), Hydro Test Reports & MTR's included, ANSI B31.1 Design Code, Rated to 14.9 PSIG @ 150 Deg. F, no internal/external painting or coating.	IFC	B150FT2BW1	2	-	PYSP2000340J2	$14,900	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-0101B	-
-	-	Quick Disconnect - Process Water 0.5"	Hose Coupling Assembly, Socket Part, Quick-Disconnect Type, Valved, 316 Stainless Steel Body, Nitrile (Buna-N) Seals or Approved Equal, Female National Pipe Thread End Connection To Pipe, Dust Plug for Socket with Chain, with Locking Mechanism to Prevent Unintended Uncoupling, Per ISO 7241 Series B, Per ASME B16.11, Per ANSI B1.20.1, Parker 60 Series or Equal	Parker	SSH4-62Y-SL	0.5	-	PSPR002108	-	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-0166L	-
-	-	Filter Regulator	Air Filter/Pressure Regulator	Parker	B12-04DJCRSS	0.5	21	PSPR002180	$695	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8541	V1A-MPPD-1001s01-002
-	-	Filter Regulator	Air Filter/Pressure Regulator	Parker	B12-04DJCRSS	0.5	21	PSPR002180	$695	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8544	V1A-MPPD-1001s01-002
-	-	Lubricator	Lubricator Parker L10-04DSS	Parker	L10-04DSS	0.5	17	PSPR002249	$547	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8545	V1A-MPPD-1001s01-002
-	-	Lubricator	Lubricator Parker L10-04DSS	Parker	L10-04DSS	0.5	17	PSPR002249	$547	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8548	V1A-MPPD-1001s01-002
-	-	Hammer arrestor	Pulsation Dampener, Warren Rupp PN: TA1 1/2, S1SS.SC57209. Warren Rupp Drawing 032.SK009.000	Warren Rupp	TA1 1/2, S1SS SC57209	1.5	-	PSPR013647	-	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	Pulsation Dampener, Warren Rupp PN: TA1 1/2, S1SS.SC57209. Warren Rupp Drawing 032.SK009.000	Warren Rupp	TA1 1/2, S1SS SC57209	1.5	-	PSPR013647	-	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	Diaphragm (for Warren Rupp TA1-1/2 Pulsation Dampener) Warren Rupp Part No. 286.036.364	Warren Rupp	286.036.364		21	PSPR015011	$343	6	6	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	Diaphragm, FKM (Viton), Warren-Rupp Part No. 286.036.363	Warren Rupp	286.036.363		45	PSPR015212	$648	2	4	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	Gage, Warren Rupp Part No. 020.061.000	Warren Rupp	020.061.000	-	21	PSPR015012	$31	6	6	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	WASHER, LOCK - 7/16, Warren Rupp Part No. 900.006.115	Warren Rupp	900.006.115	-	21	PSPR015013	$3	100	100	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	CAPSCREW, HEX HD, 7/16-14 X 2, Warren Rupp Part No. 170.060.115	Warren Rupp	170.060.115	-	21	PSPR015014	$5	50	50	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	CAPSCREW, HEX HD, 7/16-14 X 1 1/2, Warren Rupp Part No. 170.035.115	Warren Rupp	170.035.115	-	21	PSPR015015	$6	25	25	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	NUT, HEX - 7/16-14, Warren Rupp Part No. 545.007.115	Warren Rupp	545.007.115	-	21	PSPR015016	$3	50	50	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	CHAMBER, INNER (for Warren Rupp TA1-1/2 Pulsation Dampener) Warren Rupp Part No. 196.SK026.304	Warren Rupp	196.SK026.304	-	21	PSPR015017	$895	2	2	4	-	-	RD-M6-B02-R0011	PY-B02-8549 PY-B02-8550 PY-B02-8551 PY-B02-8552	24852-V1A-MPPD-1041s01
-	-	Hammer arrestor	CAP, CYLINDER, Warren Rupp Part No. 165.SK007.304	Warren Rupp	165.SK007.304	-	21	PSPR015018	$745	2	2	4					
-	-	Hammer arrestor	VALVE, SCHRADER, 1/4 NPT (for Warren Rupp TA1 Pulsation Dampener) Warren Rupp Part No. 893.SK006.000 or McMaster-Carr Part Number: 8063K37	Warren Rupp	893.SK006.000	-	21	PSPR009800	$8	6	6	4					
-	-	Flexible hose	1/2" Black Air inlet flexible hose, 18" long	Summers Rubber Co.	8BI-8MSS	0.5	34	PSPR002109	$21	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8553	V1A-MPPD-1001s01-002
-	-	Flexible hose	1/2" Black Air inlet flexible hose, 18" long	Summers Rubber Co	8BI-8MSS	0.5	34	PSPR002109	$21	Already Listed	-	4	-	-	RD-M6-B02-R0011	PY-B02-8556	V1A-MPPD-1001s01-002
-	-	Flexible hose	Suction Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5	84	PSPR002110	$150		1	4	-	-	RD-M6-B02-R0011	PY-B02-8557	V1A-MPPD-1001s01-002
-	-	Flexible hose	Suction Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5	84	PSPR002110	$150	Already Listed	-	4	-	-	RD-M6-B02-R0011	PY-B02-8560	V1A-MPPD-1001s01-002
-	-	Flexible hose	Discharge Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5	84	PSPR002110	$150	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8561	V1A-MPPD-1001s01-002
-	-	Flexible hose	Discharge Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5	84	PSPR002110	$150	Already Listed	-	4	-	-	RD-M6-B02-R0011	PY-B02-8564	V1A-MPPD-1001s01-002
-	-	Vent silencer	Vent Silencer, Allied Witan Model: B-68	Allied Witan	Model: B-68	0.75	-	PSPR012171	-	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8569	V1A-MPPD-1001s01-002
-	-	Vent silencer	Vent Silencer, Allied Witan Model: B-68	Allied Witan	Model: B-68	0.75	-	PSPR012171	-	1	1	4	-	-	RD-M6-B02-R0011	PY-B02-8572	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691			2	4	-	-	RD-M6-B02-R0011	PY-B02-8557	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691			2	4	-	-	RD-M6-B02-R0011	PY-B02-8560	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691			2	4	-	-	RD-M6-B02-R0011	PY-B02-8561	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691			2	4	-	-	RD-M6-B02-R0011	PY-B02-8564	V1A-MPPD-1001s01-002

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Add into the Spare Parts List table

SPECIALTY

Vendor Item Number	Vendor Part Number	Description	Long Description	Installed Manufacturer	Installed Part Number / Model	Diameter	Lead Time	BPS Stock Number	Cost (valve / repair kit)	Reorder Point	Economical Order QTY	Storage Category	Maintenance during storage	Shelf Life [year]	PCAPP P&ID	Component Tag No	PCAPP Vendor Document No.
-	-	Single basket strainer	Single Basket Strainer, Titanium Grd 2, IFC-#B150FT2BW (24852-RD-PYD-B02-M0041) Fabricated Simplex basket strainers, 2" ANSI 150# R.F. flanged, material Grade 2 Titanium, Type: Bolted Blind Cover Enclosure W/ 1/2" NPT vent, A193-B8-1 / A194-8 hardware, spiral wound Titanium PTFE filled gasket, 1/8" perforated plate filtration W/Magnetic inserts (Type 2 titanium), Hydro Test Reports & MTR's included, ANSI B31.1 Design Code, Rated to 14.9 PSIG @ 150 Deg. F, no internal/external painting or coating.	IFC	B150FT2BW1	2	-	PYSP2000340J2	$14,900	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-0201A	-
-	-	Single basket strainer		IFC	B150FT2BW1	2	-	PYSP2000340J2	$14,900	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-0201B	-
-	-	Quick Disconnect - Process Water	Hose Coupling Assembly, Socket Part, Quick-Disconnect Type, Valved, 316 Stainless Steel Body, Nitrile (Buna-N) Seals or Approved Equal, Female National Pipe Thread End Connection To Pipe, Dust Plug for Socket with Chain, with Locking Mechanism to Prevent Unintended Uncoupling, Per ISO 7241 Series B, Per ASME B16.11, Per ANSI B1.20.1, Parker 60 Series or Equal	Parker	SSH4-62Y-SL	0.5	46	PYSP2S0S1003	$168	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-0266L	-
-	-	Quick Disconnect - Process Water	Quick Couplings (hydraulic) up to 5000 psi, ISO 7241 series B - 60 Series Female Couplers	Parker	-	-	0	PSPR008068	$101	-	-	4	-	-	RD-M6-B02-M0024	B02-PY-8424	-
																B02-PY-8425	
																B02-PY-8430	
																B02-PY-8431	
															RD-M6-B02-M0025	B02-PY-8436	
																B02-PY-8437	
																B02-PY-8442	
																B02-PY-8443	
															RD-M6-B02-M0026	B02-PY-8448	
																B02-PY-8449	
															RD-M6-B02-M0027	B02-PY-8454	
																B02-PY-8455	
																B02-PY-8460	
																B02-PY-8461	
															RD-M6-B02-M0028	B02-PY-8466	
																B02-PY-8467	
																B02-PY-8472	
																B02-PY-8473	
															RD-M6-B02-M0029	B02-PY-8478	
																B02-PY-8479	
-	-	Quick Disconnect - Process Water	Quick Couplings (hydraulic) up to 5000 psi, ISO 7241 series B - 60 Series Female Couplers	Parker	-	-	1	PSPR008069	$47	-	-	4	-	-	RD-M6-B02-M0024	B02-PY-8424	-
																B02-PY-8425	
																B02-PY-8430	
																B02-PY-8431	
															RD-M6-B02-M0025	B02-PY-8436	
																B02-PY-8437	
																B02-PY-8442	
																B02-PY-8443	
															RD-M6-B02-M0026	B02-PY-8448	
																B02-PY-8449	
															RD-M6-B02-M0027	B02-PY-8454	
																B02-PY-8455	
																B02-PY-8460	
																B02-PY-8461	
															RD-M6-B02-M0028	B02-PY-8466	
																B02-PY-8467	
																B02-PY-8472	
																B02-PY-8473	
															RD-M6-B02-M0029	B02-PY-8478	
																B02-PY-8479	
-	-	Filter Regulator	Air Filter/Pressure Regulator	Parker	B12-04DJCRSS	0.5	21	PSPR002180	$695	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8542	V1A-MPPD-1001s01-002
-	-	Filter Regulator	Air Filter/Pressure Regulator	Parker	B12-04DJCRSS	0.5	21	PSPR002180	$695	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8543	V1A-MPPD-1001s01-002
-	-	Lubricator	-	Parker	L10-04DSS	0.5	17	PSPR002249	$547	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8546	V1A-MPPD-1001s01-002
-	-	Lubricator	-	Parker	L10-04DSS	0.5	17	PSPR002249	$547	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8547	V1A-MPPD-1001s01-002
-	-	Hammer arrestor	Pulsation Dampener for Air Operated Water Pump	Warren Rupp	TA1 1/2, S1SS	1.5	-	PSPR009401	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8550	V1A-MPPD-1001s01-002
-	-	Hammer arrestor	Pulsation Dampener for Air Operated Water Pump	Warren Rupp	TA1 1/2, S1SS	1.5	-	PSPR009401	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8551	V1A-MPPD-1001s01-002
-	-	Flexible hose	1/2" Black Air inlet flexible hose, 18" long	Summers Rubber Co.	8BI-8MSS	0.5	34	PSPR002109	$21	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8554	V1A-MPPD-1001s01-002
-	-	Flexible hose	1/2" Black Air inlet flexible hose, 18" long	Summers Rubber Co.	8BI-8MSS	0.5	34	PSPR002109	$21	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8555	V1A-MPPD-1001s01-002
-	-	Flexible hose	Suction Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5		PSPR009402	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8558	V1A-MPPD-1001s01-002
-	-	Flexible hose	Suction Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5		PSPR009402	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8559	V1A-MPPD-1001s01-002
-	-	Flexible hose	Discharge Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5		PSPR009402	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8562	V1A-MPPD-1001s01-002
-	-	Flexible hose	Discharge Flex Connector for Pump	Proco Products	240AV/EEW/S304	1.5		PSPR009402	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8563	V1A-MPPD-1001s01-002
-	-	Vent silencer	Vent Silencer, Allied Witan Model: B-68	Allied Witan	Model: B-68	0.75		PSPR012171	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8570	V1A-MPPD-1001s01-002
-	-	Vent silencer	Vent Silencer, Allied Witan Model: B-68	Allied Witan	Model: B-68	0.75		PSPR012171	-	Already Listed	-	4	-	-	RD-M6-B02-R0023	PY-B02-8571	V1A-MPPD-1001s01-002
-	-	2" Y strainer	SS body SW connection Class 600	Mueller	582SS	2		PSPR009449	-	-1	1	4			RD-M6-B02-M0012	PY-B02-8579	-
-	-	Flexible hose	-	SPIR STAR	1" C&T 4 FT	1	17	PSPR009450	$554	1	2	4			RD-M6-B02-M0018	PY-B02-8585	-
															RD-M6-B02-M0017	PY-B02-9473	
-	-	Pressure Relief	Hydroseal 150 series relief valve	Hydroseal	15CFM0E0O	-	55	PSPR009601	$464	1	1	4	-	-	RD-M6-B02-M0006	JV-B02 -PSV 0770CA-	V1A-MPF0-0258s01
															RD-M6-B02-M0006	JV-B02 -PSV 0770CB-	
															RD-M6-B02-M0007	JV-B02 -PSV 0780CA-	
															RD-M6-B02-M0007	JV-B02 -PSV 0780CB-	
-	-	Pressure Relief	Hydroseal 150 series relief valve	Hydroseal	15CFM0E0O	-	55	PSPR009602	$464	1	1	4	-	-	RD-M6-B02-M0021	JV-B02 -PSV 0739A--	V1A-MPF0-0258s01
															RD-M6-B02-M0038	JV-B02 -PSV 0739B--	
															RD-M6-B02-M0039	JV-B02 -PSV 0739C--	
-	-	Inline Filter	High pressure filter, 10 gpm, 10,000 psi, 316 Stainless body	Norman	145375 TF-B10 CE DR-1 V	0.375	-	PSPR012675	-	-1	0	4	-	-	RD-M6-B02-M0059	PY-B02-9515	24852-V1A-MFP0-0192s01
															RD-M6-B02-M0060	PY-B02-9516	
-	-	Replacement Filter	High pressure filter element	Norman	535 F-B10 CD	-	-	PSPR012676	-	2	4	4	-	-	RD-M6-B02-M0059	-	24852-V1A-MFP0-0192s01
															RD-M6-B02-M0060		
-	-	Seal Kit	Norman Seal Kit: KIT-145-535-E-V for filter unit 145375 TF-B10 CE DR-1 V (Minimum order of $50.00)	Norman	KIT-145-535-E-V	-	-	PSPR014000	$45	2	2	4					
-	-	Inline Filter	Low pressure filter, 24 gpm, 5,000 psi, 316 Stainless body	Norman	4586 TF-B10 CE DR-1 V	0.75	-	PSPR012677	-	-1	0	4	-	-	RD-M6-B02-M0059	PY-B02-9517	24852-V1A-MFP0-0192s01
															RD-M6-B02-M0060	PY-B02-9518	
-	-	Replacement Filter	Low pressure filter element	Norman	586 F-B10 CE	-	-	PSPR012678	-	2	4	4	-	-	RD-M6-B02-M0059	-	24852-V1A-MFP0-0192s01
															RD-M6-B02-M0060		
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691		2	4	-	-		RD-M6-B02-R0023	PY-B02-8558	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691		2	4	-	-		RD-M6-B02-R0023	PY-B02-8559	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691		2	4	-	-		RD-M6-B02-R0023	PY-B02-8562	V1A-MPPD-1001s01-002
-	-	Backing ring	Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD	Proco Products		3		PSPR012691		2	4	-	-		RD-M6-B02-R0023	PY-B02-8563	V1A-MPPD-1001s01-002

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Add into the Spare Parts List table

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BILL OF MATERIALS (BOM)

Work Order Number **553975**

Attached to Document Number _____ That Document Title _____

Design Engineer _____ Signature and Date _____

Checker **Alcides Patete** Signature and Date _____

TAG NO.	ITEM NO.	PART / MODEL NO.	DESCRIPTION	MANUFACTURER	QTY	SUPPLIER / VENDOR	DOCUMENT/REQUISITION NO.	STOCK CODE	MATERIAL REQUISTIONING RESPONSIBILITY
PY-B02-8557		231/ET, 1.5 inches	Suction Flex Connector for Pump	Proco Products	8			PSPR012406	Work Control
PY-B02-8560									
PY-B02-8561									
PY-B02-8564									
PY-B02-8558									
PY-B02-8559									
PY-B02-8562									
PY-B02-8563									
			Interlocking Split Backing Ring		16			PSPR012691	Work Control

BILL OF MATERIALS (BOM)

Work Order Number: **553975**
Attached to Document Number: **24852-RD-30N-B02-M0016** That Document Title: **Replace MWS Surge Drum Pump Isolators**
Design Engineer: **Ailes Catedral** Signature and Date: Catedral, Ailes Digitally signed by Catedral, Ailes Date: 2020.03.10 10:23:44 -06'00'
Checker: **Kenneth Halstead** Signature and Date: Halstead, Kenneth Digitally signed by Halstead, Kenneth Date: 2020.03.10 10:23:01 -06'00'

TAG NO.	ITEM NO.	PART / MODEL NO.	DESCRIPTION	MANUFACTURER	QTY	SUPPLIER / VENDOR	DOCUMENT/REQUISITION NO.	STOCK CODE	MATERIAL REQUISITIONING RESPONSIBILITY
PY-B02-8557		231/ET, 1.5 inches	Expansion Joint, 1-1/2" Diameter Spherical Arch, PTFE lined, Reinforced EPDM Cover, EPDM Flanges with steel backing rings, ASME Class 150, Flanged Flat Face End, Per ASME B16.5, Single Arch Type, 6 inch Neutral Length, Proco 231/ET. (Installation Requires 2 each of PSPR012691)	Proco Products	10			PSPR012406	Work Control
PY-B02-8560									
PY-B02-8561									
PY-B02-8564									
PY-B02-8558									
PY-B02-8559									
PY-B02-8562									
PY-B02-8563									
			Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD, 4 equal-spaced bolt holes 0.625" diameter on 3-7/8" bolt circle, Inside of backing ring to have 1/8" bevel on one side. (2 Each are required for installation of PSPR012406)		20			PSPR012691	Work Control

Technical Configuration Change Board Disposition

Title	MWS Surge Drum Pump Isolators
Attachments	Click here to attach a file ID: 49 RE MP-B02-0201A Failed Isolator.msg
Originator/Requestor	Johnson, Randy
Requesting Org	Engineering
System	B02
Location	CLA
Description of change	This change is to replace the existing isolators B02-PY-8557,8561,8560,8564,8559,8563,8558 and 8562 with Proco 231/ET. Current isolators are Proco 240AV/EEW/S304. The current isolators are EPDM lined and have experienced repeated degradation and premature failure. The alternative isolators were identified by one our materials engineer, please see attached email. Alternative Isolator: PSPR012406 Expansion Joint, 1-1/2", ASME Class 150, Flanged FF, 6" Length, Proco 231/ET Alternative Isolator backing ring: PSPR012691 Interlocking split backing ring, A-80 steel, 9/16" thick, 3" ID, 5" OD
Justification of change	The intent of this change is to improve surge drum pump reliablity. Materials engineering has identifed a better suited material for the acidic environment of the B02 system. The alternative isolator will be able to bolt onto the existing pipe flanges without disrupting the piping configuration.
Reason/applicability proof	Increases reliability w/ROI
Description Field: (to be completed only if "Other" is selected)	
Reason/applicability for change	The repeated failure of pump isolators in the MWS room has impacted plant schedule and cost. Isolator failure generates excessive SDS in addition to costly repair entries to replace the failed component. Isolator replacement often takes 24 hours to complete due to torque intervals. The subject pump is inoperable for the majority of this torque sequence. Cost of Alternative Isolator is estimated to be $556.25. Cost of Backing ring is estimated to be $65.44. Total estimated cost of installing the alternative isolator is $5,497.04. This estimate does not include engineering or technician man hours for implementing the change.
The section below is for Environmental only.	
Permit Affecting:	Yes
Environmental Review Comments:	Level of permit impact and need for CDPHE prior approval pending review of DCN
Reviewed by	Eby, James (PCAPP) On: 5/20/2020
The section below is for PEM only.	
Change class	

	4
Review Date	5/13/2020
TCCB Disposition	DCN
TCCB Notes	This TCCB item needs a minor revision - estimated pricing is need to determine if exceeds CDRL 11 pricing. Once completed, forward to Environmental - for their review.
PEM Notes:	Sent to orginator to obtain pricing, then it should be routed to Env. for their review. 05/14/2020 - Per Randy, he completed pricing as requesting, rerouting to Peter. DLC 5/15/2020 - This TCCB requires Env. review, routing to ENV. 05/19/2020 - Emailed James Eby for review. DLC 05/20/2020 - Sent James a reminder. DLC 5/20/2020 - Proceed with DCN, note - ENV will need to review DCN. 05/21/2020 - Created actin item in EAIL for DCN. Closing this TCCB. DLC
Admin Status (for Admin. entry only)	Closed
Meeting Minutes Chron	
Route to:	Admin

BILL OF MATERIALS (BOM)

Work Order Number **553975**

Attached to Document Number _____ That Document Title _____

Design Engineer _____ Signature and Date _____

Checker **Alcides Patete** Signature and Date _____

TAG NO.	ITEM NO.	PART / MODEL NO.	DESCRIPTION	MANUFACTURER	QTY	SUPPLIER / VENDOR	DOCUMENT/REQUISITION NO.	STOCK CODE	MATERIAL REQUISTIONING RESPONSIBILITY
PY-B02-8557		231/ET, 1.5 inches	Suction Flex Connector for Pump	Proco Products	8			PSPR012406	Work Control
PY-B02-8560									
PY-B02-8561									
PY-B02-8564									
PY-B02-8558									
PY-B02-8559									
PY-B02-8562									
PY-B02-8563									
			Interlocking Split Backing Ring		16			PSPR012691	Work Control

ATTACHMENT
PCAPP Design Change Impact Screening Checklist

<table>
<tr><td colspan="2">Change Document Number
24852-RD-30N-B02-M0016</td><td>Rev. No.
NA</td><td colspan="6">Document Type</td><td></td></tr>
<tr><td colspan="2"></td><td></td><td>DCN</td><td>PCP</td><td>ECP</td><td>TPMD</td><td>OCD</td><td>Other</td><td></td></tr>
<tr><td>Have the following items been impacted by the proposed change?</td><td>YES</td><td>NO</td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Has any one of the Safety Critical Systems* been impacted</td><td>☐</td><td>☒</td><td colspan="6" rowspan="6">INSTRUCTIONS:
The design change reviewers shall consider the potential for impacts to each of the elements listed in the left-hand column. If the reviewer is unfamiliar with or uncertain of the impact, contact the requestor for further discussion or work with the Cog. Engineer.

Design changes shall not be approved for implementation until all areas of potential impact are resolved.

The completed screening form shall be included with the change document for review by the requestor.</td></tr>
<tr><td>Is the HVCAC performance altered?
• Air capture velocity
• Heat or cooling load impact
• Air exchange rate
• Air mixing</td><td>☐</td><td>☒</td></tr>
<tr><td>Are process conditions altered because of proposed changed?</td><td>☐</td><td>☒</td></tr>
<tr><td>Do changes involve altering the material of construction?</td><td>☒</td><td>☐</td></tr>
<tr><td>Will the Basis of Design, LCO, FDD and/or SDD require modification?</td><td>☐</td><td>☒</td></tr>
<tr><td>Do procedures (SOP, etc.) require revision to meet change?</td><td>☐</td><td>☒</td></tr>
<tr><td>Will vendor equipment be used with an existing PCAPP system and has an HA been performed?
a. If this becomes a permanent change, would it require additional operations to the SOP? Y/N</td><td>☐</td><td>☒</td><td colspan="6" rowspan="6"><u>Actual</u> time to complete.

SOP Review: __NA__ hrs.
Review and Revision: __1.5__hrs.
Meetings: _____NA_____hrs.</td></tr>
<tr><td>Will the Fire Hazard Analysis be impacted?</td><td>☐</td><td>☒</td></tr>
<tr><td>Have the HTL items been impacted? List the HTL item(s) that are impacted:

Is an HA needed to update HTL items? Yes ☐ No ☒</td><td>☐</td><td>☒</td></tr>
<tr><td>Is the Agent Boundary impacted? List the P&ID(s) that need to be revised. (intrusive work does not permanently affect an agent boundary)</td><td>☐</td><td>☒</td></tr>
<tr><td>Is the SSSD impacted?</td><td>☐</td><td>☒</td></tr>
</table>

ATTACHMENT
PCAPP Design Change Impact Screening Checklist

Remarks: This DCN is to Replace MWS Surge Drum Pump Isolators, part of the B02 system. The intent of this change is to improve surge drum pump reliability. The current EPDM lined isolators degrade overtime due to the acidic environment. The Proco-231/ET is PFTE (Teflon) lined isolator which is more chemically resistant to the acidic process fluid. The alternative isolator will be able to bolt onto the existing pipe flanges without disrupting the piping configuration. **No additional process risks and no additional identified hazards associated to this OCD.**			
Screening performed by:	Jeremy Cumiford	Date:	17 Aug 2020

***Defined as any system dealing with explosives, agent, breathing air or OSHA PSM covered processes**

Enclosure 15

White Paper on Chemical Compatibility of Goodyear HI-PER® Hose for Spent Decon Service (24852-30H-B05-B0001)

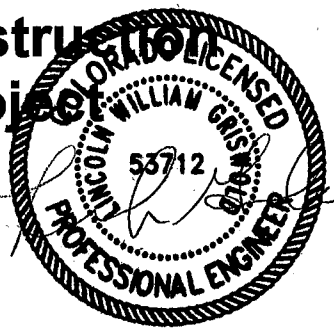
FINAL – OPSEC Review Completed 5/07/2020

WHITE PAPER

ON

CHEMICAL COMPATIBILITY OF GOODYEAR HI-PER® HOSE FOR SPENT DECON SERVICE

Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) Project



000	5/7/2020	Issued for Review	Zukowski, John	Shaffer, Andrew	Omel, Peter (PEOMEL)		N/A
REV	**DATE**	**REASON FOR REVISION**	**BY**	**CHKD**	**EGS**	**PEM**	**APPR**
ORIGIN			**JOB NO. 24852**				
Edited By:		**Pueblo Technical Publications**					
Bechtel Pueblo Team			**DOCUMENT NO.** 24852-30H-B05-B0001				**REV** 000
			Sheet 1 of 90				

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Table of Contents

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ACRONYMS

APB	Agent Processing Building
ERB	Enhanced Reconfiguration Building
FEP	Fluoroethylene propylene
MWS	Munitions Washout System
OTS	Off-gas Treatment System
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant
SDS	spent decon system
SS	stainless steel
WAP	waste analysis plan
WW	wash water

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1.0 PURPOSE

The purpose of this white paper is to provide chemical compatibility analysis and recommendation for use of Goodyear Hi-Per® Teflon™ Fluoroethylene propylene lined hose in continuous contact with spent decontamination solution.

2.0 BACKGROUND INFORMATION

This white paper supports temporary modification 24852-TPMD-B05-00011, *APPROVED OPERATIONS TPMD - Route B05 SDS to B04 Collected Washwater Tank*.

New Goodyear Hi-Per® hoses will be used to transfer spent decontamination solutions from Spent Decon Holding Tank MV-B05-0101 to either Munitions Washout System (MWS) Wash Water Collection Tank MV-B04-0104/0204 or to Tank MV-B04-0204 via sump (MT-B05-0066) The mode of transfer will be accomplished by two options via air operated diaphragm pump use:

- Wash Water Pump MP-B04-0001A (normal operation)
- Sump Pump MP-B05-0066 (off-normal operation)

The inner tube (wetted) hose material of Goodyear Hi-Per® universal chemical hose is composed of Teflon™ Fluoroethylene propylene (FEP). Other wetted components of the hose are the sealing Viton™ O-ring at the camlock connection, and the 316 stainless steel (SS) coupling. These hoses have a temperature rating of 300 ºF and a working pressure limit of 200 psi. The hose is reinforced with a double metal helix such that it can be used for suction service. The temperature and pressure conditions to which the hose will be subjected is not challenging to its limits of use (ambient temperatures and highest operating pressure is 45 psi).

The materials added to the spent decontamination system (SDS) are defined in the Pueblo Chemical Agent-Destruction Pilot Plant (DoD Colorado) (PCAPP) waste analysis plan (WAP, 24852-G01-GBL-V0007) in Table D-5-1 with more specific detail provided in Paragraph D-5d (5). Specifically,

> *The Spent Decontamination Holding Tanks aggregate the following waste streams: spent decontamination/rinse solutions from the Agent Processing Building (APB), Enhanced Reconfiguration Building (ERB), and medical facility; condensate from APB air handling units, steam lines, hot process water, and autoclave; blowdown from the Off-gas Treatment System (OTS) scrubber; process liquids, including hydrolysate, that are generated during maintenance, repair, and decontamination activities; cleanup after incidental spills of fluids from industrial equipment in the immediate area of a spent decon system sump (e.g., propylene glycol, or lubricating fluids from the metering pumps in the Tox Room.) The quantity of the liquids entering the sumps from incidental spills from*

industrial equipment during maintenance activities will be maintained to be one gallon or less.

3.0 ANALYSIS

There are five (5) inflow streams to the SDS collection tanks in the APB described in the Table 1 along with each stream's makeup. Enhanced Reconfiguration Building (ERB) and medical facility waste are segregated from the APB SDS and are not included in this assessment. The combined pH range of the stream, and the associated chemical resistance rating are provided in the Table. Note: an "A" rating from the supplier literature designates the material as appropriate for continuous service.

Table 1. Chemical Compatibility Chart for SDS Feed Streams

Components					**Goodyear Hi-Per Hose ®**	**Viton™ O-ring**	**316/316L SS**
B05 feed streams	Main Constituents or Reactant (R)	Reaction Products	Concentration Max (wt.%)	Combined pH	Chemical Resistance Rating	Chemical Resistance Rating	Chemical Resistance Rating
Level B and C sumps				7			Note 1
	Flush water (no agent)	N/A	100%		A	A	A
	Maintenance fluids (hydrocarbons)	N/A	Trace		A	A	A
	DI water (steam trap condensate)	N/A	100%		A	A	A
Level A sumps, Spent decon from HD contaminated materials (incl. champagne rounds)				3 to 14			Note 1
	Liquid Agent (R)	Hydrolysate	<1%		A (Note 2)	A (Note 2)	
	Water	HCl	<1%		A	A (Note 4)	
		Byproducts	Trace		Note 3	Note 3	Note 3
	NaOH	NA^{+1}, OH^{-1}	25%		A	A	
Autoclave Condensate				5 to 7			Note 1
	Liquid Agent (R)	Hydrolysate	Trace		A (Note 2)	A (Note 2)	
	Water	HCl	< 0.1%		A	A (Note 4)	
		Water	100%		A	A	
OTS blowdown, contaminated water with NaOH added				8 to 9			Note 1
	Liquid Agent (R)	Hydrolysate			A (Note 2)	A (Note 2)	
	Water	HCl	< 0.1%		A	A (Note 4)	
	NaOH	NA^{+1}, OH^{-1}	25%		A	A	
		NA^{+1}, Cl^{-1}	2000 ppm		A	A	
		Water	100%		A	A	
		Byproducts	Trace		Note 3	Note 3	Note 3

Notes:

1. 316 SS rate of corrosion for the combined stream pH range at ambient temperature conditions and for the individual constituents/reaction products at the concentration range indicated is less than 0.1mm year. See Attachment 3 for support material and analysis.
2. Hydrolysate is not listed on chemical resistance material in Attachment 1. However, its resistance rating is compared to Diethylene Glycol which is similar in reactivity and structurally similar.
3. Concentration is too low to have an appreciable impact of corrosion to the material. See Attachment 4 for an Assessment of Organic Components of SDS.
4. Goodyear comparability chart only denotes 38% wt. %. HCL fuming acid compatibility and recommends Teflon. The concentration maximum of HCL in SDS solution is less than 1 wt.%. Other recourse (e.g., Chemours) provide corrosion data for up to 20 wt.% for HCl which clearly shows all types of Viton ™ are rated "A" (See Figure 3, Attachment C).

Level A sumps (nine total) are significant contributors to the overall waste sent to the SDS. The Level A sumps in the MWS (four total) are the primary contributors whose waste derive from the decontamination of toxic area entrants in the MWS and the clean-up of agent that is unable to be captured or contained when a munition is punched and drained at a cavity access machine.

Chlorinated solvents (hydrocarbons) have been identified as a specific concern to the PCAPP regulator. It should be noted that due to potential interference with the agent monitoring systems the use of chlorinated industrial chemicals (solvents, lubricants, etc) are generally excluded from use in the APB. Contribution to the total amount of chlorine ion from the minimal chlorinated compounds in the APB in the SDS is negligible. The main source of chlorinated compounds in SDS and wash water (WW) is agent and agent breakdown products. These accumulate in trace amounts (Attachment 4) and do not have appreciable impact to corrosion or compatibility with the hose materials. Regardless, the Goodyear Hi-Per® hose is compatible with the majority of chlorinated solvents and is rated “A” for continuous service. See Attachment A Goodyear product data, including chemical compatibility chart, for Goodyear Hi-Per® hose.

Although these Goodyear hoses are not recommended for continuous service with vinyl chloride (and ethylene oxide are not included on the manufacturer’s compatibility table) based on FEP and Viton™ component compatibility, these manufacturer recommendations are made assuming that the listed chemical would be the primary constituent being transferred. Both vinyl chloride and ethylene oxide would be gasses under PCAPP process conditions and these hoses are designed for liquid and not vapor transport service. In the PCAPP application (transport of SDS and WW) these two compounds only achieve trace-level concentrations in process fluids. As such, the trace contaminations observed in PCAPP SDS and WW data do not pose a compatibility issue.

Department of Defense document CB-008776 (Ref. 1, Copy provided in Attachment E.) provides confirmation that Teflon™ FEP is acceptable for use with thiodiglycol.

4.0 CONCLUSION AND RECOMENDATIONS

The conclusion based on analysis of the Hi-Per hose is that the hose and its wetted components are acceptable for their intended use for the B05 system temporary configuration. Once in service, hoses will be visually inspected routinely for damage. Hoses showing signs of external damage will be physically inspected by competent maintenance technicians and replaced as required per the RCRA - Inspection Sheet: APB-Daily-TOX SDS – Temp Mod Equipment.

5.0 ATTACHMENTS

A. Goodyear product data, including chemical compatibility chart, for Goodyear Hi-Per® hose

B. KELCO Chemical Compatibility Chart, Viton™

C. 316/316L SS and Viton™ Compatibility for Spent Decon Service

D. Assessment of Organic Components of SDS

E. Compatibility of Plastics with Mustard (HD), Thiodiglycol, VX Hydrolysis Products, DS-2, HTL, and Tetrachloroethylene

6.0 REFERENCES

1. CB-008776, Johnnie M. Albizo, et., al, October 1979. *Compatibility of Plastics with Mustard (HD), Thiodiglycol, VX Hydrolysis Products, DS-2, HTL, and Tetrachloroethylene,* Aberdeen Proving Ground, Maryland (DOD), DRDAR-CLJ-R

2. 24852-TPMD-B05-00011, Rev 001, APPROVED OPERATIONS TPMD - Route B05 SDS to B04 Collected Washwater Tank

3. 24852-RD-NEC-B20-P0001, Rev 000, *B20 Piping Corrosion Evaluation*.

ATTACHMENT A.

GOODYEAR PRODUCT DATA, INCLUDING CHEMICAL COMPATIBILITY CHART, FOR GOODYEAR HI-PER® HOSE

HI-PER®

Product Specifications

APPLICATION: A premium hose which is Teflon® lined to handle a broad spectrum of fluids and materials in a wide variety of applications.

CONSTRUCTION TUBE: Teflon® Fluoroethylenepropylene (FEP) has FDA/USDA compliant materials

COVER: Blue Versigard® synthetic rubber with bright orange spiral transfer tape (wrapped impression)

REINFORCEMENT: Spiral-plied synthetic fabric with double wire helix

TEMPERATURE: -40˚F to 300˚F (-40˚C to 149˚C)

PACKAGING: Custom lengths available (minimum 5')

BRANDING (SPIRAL): Example: Goodyear® Hi-Per® Universal Chemical Hose Teflon® lined

COUPLINGS: Use Goodyear Engineered Products Insta-Lock Cam & Groove Fittings with this product. See the Coupling Systems information pages at the back of the catalog.

NON-STOCK/SIZES: Order in increments of 100' for 1/2"–2"
Order in increments of 60' for 2½" and larger sizes

ORDER CODES: 546-256

HI-PER®

ID		NOM. OD		MAX. WP		BEND RADIUS		VACUUM HG		WEIGHT	
in.	mm.	in.	mm.	psi	Mpa	in.	mm.	in.	mm.	lb./ft.	kg./m.
1/2	12.7	0.97	24.6	200	1.38	3	76	29	737	0.37	0.55
3/4	19.1	1.11	28.2	200	1.38	5	127	29	737	0.56	0.83
1	25.4	1.52	38.6	200	1.38	8	191	29	737	0.71	1.06
1¼	31.8	1.73	43.9	200	1.38	11	279	29	737	0.84	1.25
1½	38.1	2.13	54.1	200	1.38	14	356	29	737	1.24	1.85
2	50.8	2.69	68.3	200	1.38	18	457	29	737	1.71	2.54
2½	63.5	3.14	79.8	200	1.38	22	559	29	737	2.01	2.99
3	76.2	3.67	93.2	200	1.38	35	889	29	737	2.52	3.75

Note: Refer to the Goodyear Engineered Products Chemical Resistance Charts pages in Appendix B for specific chemical and temperature compatibility.

Teflon® is a registered trademark of E.I. Du Pont De Nemours and Company Corporation.

APPENDIX B

CHEMICAL CHARTS

This chemical chart is offered as a guide only. There are many variables to be considered with each application. Ratings are for tube polymer only! For explanation of ratings see the initial page of these Chemical Charts in Appendix B. Contact customer services for chemicals or polymers not listed at 800-235-4632.

RATING SCALE

A = May be used for Continuous Service
B = May be used for Intermittent Service
I = Insufficient data, contact customer services
X = Do not use

GASKET

T = Teflon®
V = Viton®
B = Nitrile
N = Neoprene
S = Silicone

A	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER											FITTING — METAL			
		UHMWPE	Butyl (Fabchem™)	Hypalon® (Gray Flexwing®)	NR (Yellow Flexwing)	Viton® (Tan Flexwing)	Nitrile (Orange Flexwing)	CPE (Flexwing Petroleum)	EPDM (Brown Flexwing, ExtremeFlex™ Brown)	XLPE (Purple Flexwing, ExtremeFlex™ Purple)	Alphasyn™ (Green XLPE Blue Flexwing)	Teflon® (Chem One™ & Viper™)	316 SS (HI-PER®)	Aluminum (Insta-Lock™)	Brass (Insta-Lock)	Gasket (Insta-Lock)
Acetaldehyde	100	B	B	X	X	X	X	I	A	A	A	A	A	B	X	TS
Acetic Acid, Conc.	100	A	A	X	B	X	X	A	A	A	A	A	A	B	X	T
Acetic Acid, Dilute 10	150	B	A	X	A	X	X	A	A	A	A	A	A	I	X	TVN
Acetic Acid, Glacial	100	A	B	X	X	X	X	A	A	A	A	A	A	B	X	TS
Acetic Aldehyde	100	A	B	X	X	X	X	I	A	A	A	A	A	B	X	T
Acetic Anhydride	100	B	A	B	X	X	X	A	A	A	A	A	A	B	X	T S
Acetic Ester	100	B	B	X	X	X	X	B	A	A	A	A	A	A	A	T V
Acetic Ether	100	B	B	X	X	X	X	B	A	A	A	A	A	A	A	T
Acetic Oxide	100	B	A	B	X	X	X	A	A	A	A	A	A	B	X	T
Acetone	100	A	A	X	B	X	X	A	A	A	A	A	A	A	I	T
Acetone Cyanohydrin	100	B	A	X	X	X	X	A	A	A	A	A	I	I	I	T S
Acetyl Acetone	100	B	B	X	X	X	X	B	I	A	A	A	I	B	I	T
Acetyl Chloride	100	B	X	X	X	B	X	A	B	B	A	A	B	X	A	T V
Acetyl Oxide	100	B	A	B	X	X	X	A	A	A	A	A	A	B	X	T
Acetylene (dry)	100	A	A	A	A	A	A	A	A	A	X	A	A	I	I	TVBNS
Acetylene Dichloride	100	B	X	X	X	A	X	I	I	A	X	A	I	A	X	T V
Acetylene Tetrachloride	100	B	X	X	X	A	X	I	I	A	I	A	A	X	X	T V
Acrolein	100	B	A	B	B	A	B	I	I	A	A	A	I	I	I	T V
Acrylic Acid	100	B	X	X	X	A	X	X	X	A	A	A	A	I	I	T V
Acrylonitrile	100	B	X	X	X	X	X	A	X	B	A	A	A	X	I	T
Alk-Tri	100	I	X	X	X	A	X	I	I	A	I	A	A	I	I	T V
Allyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	A	TBN
Allyl Bromide	100	B	X	X	X	B	X	B	I	B	I	A	I	I	I	T
Allyl Chloride	100	B	X	X	X	B	X	B	X	B	I	A	A	X	X	T S
Alum	150	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Aluminum Acetate	100	A	A	A	X	X	X	A	A	A	A	A	A	I	X	T
Aluminum Chloride	150	A	A	A	A	A	A	A	A	A	A	A	I	I	X	TVB
Aluminum Formate	100	A	B	X	X	X	X	I	I	A	A	A	I	I	I	T
Aluminum Hydroxide	150	A	A	B	A	X	B	A	A	A	A	A	A	I	X	T S
Aluminum Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Aminoethanol	100	A	A	B	B	I	B	A	I	A	A	A	A	B	I	TBN
Aminoethylethanolamine	100	A	A	B	B	I	B	A	I	A	A	A	I	I	I	T
Ammonia	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														

CHEMICAL CHARTS

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GASKET

T = Teflon®
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A	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
Ammonia Cupric Sulfate	150	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Ammonium Chloride	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Ammonium Hydroxide	150	A	A	B	A	X	X	A	X	A	A	A	A	X	I	TNS
Ammonium Nitrate (ANFO)	150	SPECIAL HOSE REQUIRED											A	B	X	TVBS
Ammonium Phosphate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Ammonium Sulfate	150	A	A	A	A	A	X	A	A	A	A	A	A	X	X	TVNS
Ammonium Sulfide	150	A	A	A	A	A	X	A	A	A	A	A	A	X	X	TVN
Ammonium Sulfite	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBN
Ammonium Thiosulfate	100	A	A	A	A	A	A	A	A	A	A	A	A	B	X	TVBN
Amyl Acetate	100	A	A	B	X	X	X	X	B	A	A	A	A	A	I	T
Amyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	A	TBNS
Amyl Chloride	100	A	X	X	X	A	X	X	X	A	B	A	A	X	I	T V
Amyl Oleate	100	A	X	X	X	I	B	I	I	A	I	A	I	I	I	T
Amyl Phenol	100	A	X	X	X	A	X	I	I	A	I	A	I	I	I	T V
Amyl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Amylamine	100	A	B	X	X	X	X	B	X	A	I	A	I	I	I	T
Anethole	100	X	X	X	X	B	X	X	I	X	I	A	I	I	I	T
Anhydrous Ammonia	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Aniline	100	A	A	X	X	A	X	B	A	A	A	A	A	B	X	T V
Animal Grease	100	A	X	X	X	A	A	B	X	A	A	A	A	A	I	TVB
Animal Oils	100	A	B	X	X	A	A	A	X	A	B	A	A	A	I	TVB
Antimony Pentachloride	100	A	X	X	X	I	X	I	X	B	B	A	I	I	I	T
Aqua Ammonia	150	A	A	B	A	A	B	B	B	A	A	A	A	X	I	T V
Aromatic Spirits	100	A	X	X	X	A	X	I	X	A	I	A	A	I	I	T V
Aromatic Tar	100	A	X	X	X	A	X	B	X	A	I	A	I	I	I	T V
Arquads	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Arsenic Acid	100	A	A	A	A	I	X	A	A	A	A	A	A	X	X	TVS
Arsenic Chloride	100	I	X	X	X	X	X	X	X	X	X	A	I	I	I	T N
Arsenic Trichloride	100	I	X	X	X	X	X	X	X	X	X	A	X	I	I	T N
Asphalt	500	SPECIAL HOSE REQUIRED											A	I	I	TVN
ASTM #1 Oil	100	A	X	B	X	A	A	A	X	A	A	A	A	A	I	TVBNS
ASTM #2 Oil	100	A	X	X	X	A	A	A	X	A	A	A	A	A	A	TVB
ASTM #3 Oil	100	A	X	X	X	A	A	A	X	A	A	A	A	A	A	TVB

APPENDIX B

CHEMICAL CHARTS

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X = Do not use

GASKET

T = Teflon®
V = Viton®
B = Nitrile
N = Neoprene
S = Silicone

B	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER											FITTING — METAL			
		UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
Barium Carbonate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBN
Barium Chloride	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBN
Barium Hydroxide	150	A	A	A	A	B	A	A	A	A	A	A	A	X	X	TBNS
Barium Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	B	A	X	TVBS
Barium Sulfide	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBS
Benzal Chloride	100	A	B	I	I	I	X	X	I	A	I	A	B	X	I	T
Benzaldehyde	100	A	B	X	X	X	X	X	B	A	B	A	A	B	I	T
Benzene (Benzol)	100	A	X	X	X	A	X	X	X	B	B	A	A	A	A	T V
Benzine (Ligroin)	100	A	X	X	X	A	A	I	X	A	B	A	A	A	I	TVB
Benzine Solvent (Ligroin)	100	A	X	X	X	A	A	I	X	A	I	A	A	A	I	TVBS
Benzoic Acid	100	A	B	B	X	I	I	A	B	A	A	A	B	B	X	TVN
Benzoic Aldehyde	100	A	B	X	X	X	X	X	B	A	I	A	A	I	B	T
Benzotrichloride	100	X	I	I	I	I	X	X	X	X	X	A	I	I	I	T
Benzoyl Chloride	100	X	I	I	I	I	X	X	X	B	X	A	B	I	I	T
Benzyl Acetate	100	A	A	B	X	X	X	B	I	A	B	A	B	I	I	T
Benzyl Alcohol	100	A	A	X	X	A	X	A	X	A	A	A	A	B	I	TVS
Benzyl Chloride	100	A	X	X	X	A	X	X	X	A	I	A	A	X	X	T V
Bichromate of Soda	150	A	A	X	I	I	I	I	I	A	A	A	I	I	I	T
Black Sulfate Liquor	150	A	X	B	B	B	B	A	B	A	A	A	A	X	X	TVBN
Black Sulfate Liquor	275	X	X	X	X	X	X	A	X	X	X	A	A	X	X	T
Bleach	100	X	B	X	X	B	X	I	A	X	B	A	X	X	X	T V
Brine	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBNS
Bromine	100	X	X	X	X	B	X	I	X	X	X	A	X	X	X	T V
Bromo Benzene	100	B	X	X	X	B	X	X	X	X	X	A	I	I	I	T V
Bromo Toluene	100	X	X	X	X	B	X	X	X	X	X	A	I	I	I	T
Bromochloromethane	100	X	B	X	X	B	X	X	I	X	A	A	A	X	X	T
Bunker C.	100	B	X	X	X	A	A	I	X	A	B	A	A	I	I	TVB
Bunker Oil	100	B	X	X	X	A	A	I	X	X	B	A	A	I	I	TVB
Butanol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBN
Butyl (Normal) Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBN
Butyl (Secondary) Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBN
Butyl Acetate	100	A	A	B	X	X	X	B	B	A	B	A	A	B	I	T
Butyl Acetoacetate	100	A	X	X	X	X	X	X	I	A	B	A	I	I	I	T

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B	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
Butyl Acrylate	100	B	X	X	X	X	X	B	X	B	B	A	I	I	I	T
Butyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBN
Butyl Aldehyde	100	A	B	X	X	X	X	B	X	A	B	A	X	A	X	T
Butyl Amine	100	A	B	X	X	X	X	B	X	A	B	A	A	A	I	T
Butyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V
Butyl Benzl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Butyl Bromide	100	B	X	X	X	B	X	X	X	B	B	A	I	I	I	T
Butyl Butyrate	100	B	X	X	X	X	X	X	I	B	I	A	I	I	I	T V
Butyl Carbitol	100	A	A	A	X	I	X	A	B	A	A	A	I	I	I	T
Butyl Cellosolve	100	A	A	A	X	X	X	A	A	X	A	A	A	A	X	T
Butyl Chloride	100	B	X	X	X	A	X	X	I	B	I	A	B	I	I	T V
Butyl Ether	100	A	X	B	X	X	B	A	X	A	A	A	A	I	I	T
Butyl Ethyl Acetaldehyde	100	A	B	X	X	X	X	I	I	A	B	A	I	I	I	T
Butyl Ethyl Ether	100	A	X	B	X	I	B	I	X	A	A	A	I	I	I	T
Butyl Phthalate	100	A	A	X	X	X	X	I	I	A	A	A	A	A	I	T
Butyl Stearate	100	A	X	X	X	I	A	B	X	A	B	A	A	A	A	TBS
Butylate	100	A	I	I	I	I	I	I	A	I	I	I	I	I	I	I
Butyraldehyde	100	A	B	X	X	X	X	B	X	A	B	A	X	A	X	T
Butyric Acid	100	A	X	B	X	I	X	A	B	A	A	A	A	B	I	T
Butyric Anhydride	100	A	X	B	X	I	X	I	I	A	I	A	I	I	I	T
C																
Cadmium Acetate	100	A	A	A	X	X	X	A	I	A	A	A	I	I	I	T
Calcium Acetate	100	A	A	A	X	X	X	A	A	A	A	A	A	I	I	T B
Calcium Aluminate	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Calcium Bichromate	150	X	A	X	I	I	I	I	I	X	I	A	I	I	I	T
Calcium Bisulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Calcium Bisulfite	150	A	A	A	A	A	A	A	A	I	A	A	A	X	X	TVBNS
Calcium Carbonate	150	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Calcium Chloride	150	A	A	A	A	A	A	A	A	A	A	A	B	X	X	TVBNS
Calcium Hydroxide (Caustic Lime)	100	A	A	B	A	X	B	A	A	A	A	A	A	X	X	TNS
Calcium Hypochlorite	100	B	B	X	X	B	X	A	B	X	A	A	A	X	X	T V
Calcium Nitrate	150	A	A	A	A	A	A	A	A	A	A	A	B	X	X	TVBN
Calcium Silicate	150	A	A	A	A	A	A	A	A	A	A	A	I	A	I	TVBN

APPENDIX B

CHEMICAL CHARTS

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C	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
Calcium Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBS
Calcium Sulfhydrate	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Calcium Sulfide	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Calcium Sulfite	150	A	A	A	X	A	A	A	A	A	A	A	B	B	X	TVBNS
Caprylic Acid	100	A	X	B	X	I	X	A	I	A	A	A	B	I	X	T
Carbitol	100	A	A	A	X	I	X	A	A	A	A	A	B	A	X	T
Carbitol Acetate	100	A	B	B	X	I	X	I	I	A	A	A	I	I	I	T
Carbolic Acid, Phenol	100	A	A	X	X	A	X	A	X	A	B	A	A	B	A	T V
Carbon Dioxide	100	A	A	A	A	A	A	A	A	A	A	A	A	B	I	TVBNS
Carbon Disulfide	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Carbon Tetrachloride	100	B	X	X	X	A	X	X	X	A	B	A	A	I	I	T V
Carbonic Acid	100	A	A	A	A	A	A	A	A	A	A	A	A	B	B	TVBS
Casinghead Gasoline	100	B	X	X	X	A	A	B	X	B	B	A	I	I	I	TVB
Caster Oil (Castor Oil)	100	A	A	A	X	A	A	A	A	A	A	A	A	A	I	TVBS
Caustic Potash	150	A	A	B	A	X	B	A	B	A	A	A	A	X	X	T
Caustic Soda	150	A	A	B	A	X	B	A	A	A	A	A	A	X	X	TNS
Cellosize	100	A	A	X	X	I	X	I	I	A	A	A	I	I	I	T
Cellosolve	100	A	A	A	X	X	X	I	A	A	A	A	A	A	X	T
Cellosolve Acetate	100	A	B	B	X	X	X	X	B	A	A	A	A	I	X	T
Chloracetic Acid	100	A	X	X	B	X	X	A	X	A	A	A	A	X	X	T
Chlorinated Solvents	100	B	X	X	X	A	X	B	X	A	I	A	B	X	A	T V
Chlorine (Dry) (Gas)	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Chlorine (Wet)	100	X	X	X	X	B	X	X	X	X	X	A	X	X	X	T V
Chloroacetone	100	A	I	X	X	X	X	X	X	A	I	A	A	X	X	T
Chlorobenzene	100	B	X	X	X	A	X	X	X	A	B	A	A	B	I	T V
Chlorobenzol	100	A	X	X	X	A	X	I	X	A	B	A	A	B	I	T V
Chlorobutane	100	X	X	X	X	A	X	X	I	X	I	A	I	I	I	T V
Chloroethylbenzene	100	A	X	X	X	A	X	I	X	A	I	A	I	I	I	T V
Chloroform	100	B	X	X	X	B	X	X	X	X	B	A	A	B	I	T V
Chloropentane	100	A	X	X	X	A	X	X	X	A	I	A	A	X	I	T V
Chlorophenol	100	A	X	X	X	B	X	X	X	X	B	A	I	I	I	T V
Chloropropanone	100	A	I	X	X	X	X	X	X	A	I	A	I	I	I	T
Chlorosulfonic Acid	100	X	X	X	X	X	X	I	X	X	X	A	B	X	X	T

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C	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER											FITTING — METAL			
		Fabchem™ UHMWPE	Gray Flexwing® Butyl	Yellow Flexwing Hypalon®	Tan Flexwing NR	Orange Flexwing Viton®	Flexwing Petroleum Nitrile	Brown Flexwing, ExtremeFlex™ Brown CPE	Purple Flexwing, ExtremeFlex™ Purple EPDM	Green XLPE Blue Flexwing XLPE	Chem One™ & Viper™ Alphasyn®	HI-PER® Teflon®	Insta-Lock™ 316 SS	Insta-Lock Aluminum	Insta-Lock Brass	Insta-Lock Gasket
Chlorothene	100	X	X	X	X	A	X	I	X	A	I	A	A	I	I	T V
Chlorotoluene	100	X	X	X	X	A	X	X	X	X	I	A	A	I	I	T V
Chlorpyrifos	100	I	I	I	I	I	I	I	X	I	I	I	I	I	I	I
Chromic Acid 25%	100	B	X	B	X	I	X	A	X	X	B	A	B	X	X	T V
Coal Oil	100	A	X	X	X	A	A	A	X	A	A	A	A	X	A	TVB
Coal Tar	100	A	X	X	X	A	X	B	X	A	A	A	A	I	I	TVS
Coal Tar Naptha	100	A	X	X	X	A	X	B	X	A	A	A	A	A	I	T V
Copper Chloride	100	A	A	A	X	A	A	A	A	A	A	A	X	X	X	TVBNS
Copper Hydrate	100	A	A	B	X	X	B	I	I	A	A	A	I	I	I	T B
Copper Hydroxide	100	A	A	B	X	X	B	I	I	A	A	A	I	I	I	T B
Copper Nitrate	100	A	A	A	X	A	A	A	A	A	A	A	A	X	X	TVBNS
Copper Nitrite	100	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Copper Sulfate	100	A	A	A	X	A	A	A	A	A	A	A	A	X	X	TVBNS
Copper Sulfide	100	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Creosols	100	A	A	X	X	A	X	A	X	A	B	A	A	I	X	T V
Creosote	100	A	X	X	X	A	B	I	X	A	B	A	A	I	I	T V
Cresylic Acid	100	A	A	X	X	I	X	X	X	A	I	A	A	B	X	T V
Crotonaldehyde	100	A	A	X	X	X	X	A	I	A	A	A	I	I	I	T
Crude Oil	100	A	X	X	X	A	A	B	X	A	B	A	A	A	I	TVB
Cumene	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V
Cupric Carbonate	100	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVBN
Cupric Chloride	100	A	A	A	X	A	A	A	A	A	A	A	B	X	I	TVBNS
Cupric Nitrate	100	A	A	A	X	A	A	A	A	A	A	A	B	I	I	TVBN
Cupric Nitrite	100	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Cupric Sulfate	100	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVBNS
Cyclohexane	100	A	X	X	X	A	B	A	X	A	B	A	A	B	X	T V
Cyclohexanol	100	A	X	X	X	B	B	A	X	A	B	A	A	X	X	TVB
Cyclohexanone	100	A	X	X	X	X	X	X	X	A	B	A	A	I	I	T
Cyclopentane	100	A	X	X	X	A	B	B	X	A	B	A	I	I	I	TVN
Cyclopentane, methyl	100	A	X	X	X	A	B	I	X	A	B	A	I	I	I	T V
Cyclopentanol	100	A	X	X	X	B	B	A	X	A	A	A	I	I	I	TVB
Cyclopentanone	100	A	X	X	X	X	X	X	X	A	B	A	I	I	I	T

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D.D.T. in Kerosene	100	A	X	X	X	A	A	A	X	A	B	A	I	I	A	TVB
D.M.P.	100	X	X	X	X	X	X	X	X	X	A	A	A	I	I	T V
Decalin®	100	X	X	X	X	A	X	X	X	A	X	A	I	I	I	T V
Decanol	100	A	A	A	X	B	A	A	A	A	A	A	I	I	I	T B
Decyl Alcohol	100	A	A	A	X	B	A	A	A	A	A	A	I	I	I	T B
Decyl Aldehyde	100	A	X	X	X	X	X	I	I	A	B	A	I	I	I	T
Decyl Butyl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Denatured Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	B	A	T B
Diacetone Alcohol	100	A	A	B	B	X	X	A	X	A	A	A	A	I	I	T
Diamyl Phenol	100	A	X	X	X	A	X	A	X	A	I	A	I	I	I	T V
Diamylamine	100	A	A	X	B	I	B	A	I	A	B	A	I	I	I	T B
Diamylene	100	A	X	X	X	A	X	B	X	A	B	A	I	I	I	T V
Dibenzyl Ether	100	A	B	X	X	I	X	X	X	A	B	A	A	A	X	T
Dibromobenzene	100	B	X	X	X	A	X	I	X	A	I	A	I	I	I	T V
Dibutyl Amine	100	A	X	X	B	X	B	A	X	A	A	A	I	I	I	T
Dibutyl Ether	100	A	X	B	X	X	X	A	X	A	A	A	A	A	X	T
Dibutyl Phthalate	100	A	A	X	X	X	X	X	A	A	A	A	A	A	I	T V
Dibutyl Sebacate	100	A	A	X	X	X	X	B	X	A	I	A	I	I	I	TVS
Dicalcium Phosphate	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Dicamba	100	A	I	I	I	I	I	I	A	A	I	A	I	I	I	T
Dichloroacetic Acid	100	A	X	X	B	X	X	B	I	A	I	A	I	I	I	T
Dichlorobenzene	100	A	X	X	X	A	X	X	X	A	B	A	A	B	I	T V
Dichlorobutane	100	A	X	X	X	A	X	X	X	A	I	A	I	I	I	T V
Dichlorodifluoromethane	100	I	X	X	X	B	B	I	X	I	X	A	I	I	I	TVB
Dichloroethane	100	A	X	X	X	A	X	X	X	A	A	A	I	A	I	T V
Dichloroethyl Ether	100	A	X	X	X	I	X	B	X	A	B	A	I	I	I	T
Dichloroethylene	100	X	X	X	X	A	X	I	I	X	X	A	I	A	X	T V
Dichlorohexane	100	A	X	X	X	A	X	X	X	A	A	A	I	I	I	T V
Dichloropentane	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V
Dichloropropane	100	A	X	X	X	A	X	X	X	B	I	A	A	X	I	T V
Diesel Oil	150	A	X	X	X	A	A	A	X	A	B	A	A	A	I	TVB
Diethanol Amine	100	A	A	X	B	I	B	A	I	A	A	A	A	I	I	T
Diethyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V

GOODYEAR ENGINEERED PRODUCTS

CHEMICAL CHARTS

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GASKET

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B = Nitrile
N = Neoprene
S = Silicone

D	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
Diethyl Carbinol	100	A	A	A	A	B	A	I	I	A	A	A	I	I	I	TBN
Diethyl Ketone	100	A	B	X	X	X	X	X	X	A	B	A	I	I	I	T
Diethyl Oxalate	100	A	B	X	B	I	X	A	X	A	B	A	I	I	I	T
Diethyl Phthalate	100	A	A	X	X	X	X	B	X	A	B	A	I	I	I	T
Diethyl Sebacate	100	A	A	X	X	X	X	B	X	A	B	A	A	A	I	T
Diethyl Sulfate	100	A	B	X	X	X	X	A	I	A	A	A	X	I	I	TNS
Diethyl Triamine	100	A	A	X	B	I	B	A	I	A	A	A	I	I	I	T B
Diethylamine	100	A	A	X	B	I	B	B	B	A	B	A	A	I	X	T B
Diethylene Dioxide	100	A	B	X	X	X	X	B	A	A	A	A	X	X	X	T
Diethylene Glycol	100	A	A	A	A	A	A	X	A	A	A	A	A	B	A	TVBN
Diethylene Triamine	100	A	A	X	B	I	B	A	I	A	A	A	I	I	X	T
Dihydroxydiethyl Ether	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN
Dihydroxyethyl Amine	100	A	A	X	B	I	B	A	I	A	A	A	I	I	I	T B
Diisobutyl Ketone	100	A	B	X	X	X	X	I	B	A	B	A	I	I	I	T
Diisobutylene	100	A	X	X	X	A	A	X	X	A	B	A	A	I	I	TVB
Diisoctyl Adipate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Diisoctyl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Diisocyanate	100	X	X	X	X	X	X	X	X	X	B	A	I	I	I	T
Diisodecyl Adipate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Diisodecyl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Diisopropanol Amine	100	A	A	X	B	I	B	I	I	A	B	A	I	I	I	T B
Diisopropyl Amine	100	A	A	X	B	I	B	I	I	A	B	A	I	I	I	T B
Diisopropyl Ether	100	A	X	B	X	I	B	I	X	A	B	A	A	I	I	T B
Diisopropyl Ketone	100	A	B	X	X	X	X	I	B	A	B	A	A	A	I	T
Dilauryl Ether	100	A	I	B	X	I	B	I	I	A	B	A	I	I		T B
Dimethyl Amine	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Dimethyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	A	I	I	T V
Dimethyl Ether	100	A	X	B	X	I	B	I	X	B	B	A	I	I	I	T B
Dimethyl Ketone	100	A	A	X	B	X	X	A	A	B	A	A	A	A	I	T
Dimethyl Phenol	100	A	X	X	X	A	X	I	X	A	A	A	I	I	I	T V
Dimethyl Phthalate	100	A	A	X	X	X	X	A	B	A	A	A	A	I	I	T V
Dimethyl Sulfate	100	A	B	X	X	X	X	A	I	A	A	A	I	I	I	T
Dimethyl Sulfide	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														

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N = Neoprene
S = Silicone

		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
D																
Dimethyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBNS
Dinitrobenzene	100	A	X	X	X	A	X	I	I	A	B	A	I	I	I	T V
Dioctyl Adipate	100	A	A	X	X	X	X	X	B	A	I	A	I	I	I	T
Dioctyl Amine	100	A	A	X	B	I	B	I	I	A	B	A	I	I	I	T
Dioctyl Phthalate	100	A	B	X	X	A	X	X	X	A	A	A	A	I	I	T V
Dioctyl Sebacate	100	A	A	X	X	X	X	X	B	A	I	A	I	I	I	T V
Dioxane	100	A	B	X	X	X	X	B	X	A	A	A	A	I	I	T
Dioxolane	100	A	X	X	X	I	X	B	X	A	B	A	I	I	I	T
Diphenyl Phthalate	100	A	A	X	X	X	X	I	I	A	A	A	I	I	I	T
Dipropyl Ketone	100	A	B	X	X	X	X	X	I	A	A	A	I	I	I	T
Dipropylamine	100	A	A	X	B	I	B	B	I	A	A	A	I	I	I	T
Dipropylene Glycol	100	A	A	A	A	A	A	A	I	A	A	A	I	I	I	TVB
Disodium Phosophate	100	A	A	A	A	I	A	A	I	A	A	A	A	I	B	T B
Divinyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V
Dodecyl Benzene	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Dodecyl Toluene	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Dow-Per	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Dowtherm® A	100	A	I	X	X	A	X	X	X	A	A	A	I	A	I	T V
Dowtherm® E	100	A	X	X	X	A	X	X	X	A	A	I	I	X	I	V
Dowtherm® SR-1	100	A	A	A	A	A	A	I	I	A	A	A	I	I	I	TVB
E																
Endolene	100	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
Epichlorohydrin	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ethanol	100	A	A	A	A	B	A	A	A	A	A	A	A	B	A	TBN
Ethanol Amine	100	A	A	B	B	I	B	A	B	A	B	A	A	B	I	T B
Ethyl Acetate	100	A	B	X	X	X	X	B	A	A	A	A	A	A	A	T
Ethyl Acetoacetate	100	A	B	X	X	X	X	A	B	A	A	A	B	I	I	T
Ethyl Acrylate	100	A	X	X	X	X	X	B	X	B	B	A	A	A	A	T
Ethyl Alcohol	100	A	A	A	A	A	A	A	A	A	A	A	A	B	A	TVBNS
Ethyl Aldehyde	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ethyl Aluminum Dichloride	100	X	X	X	X	B	X	I	X	B	I	A	I	I	I	T V
Ethyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	A	A	X	T V
Ethyl Butanol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B

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E	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
Ethyl Butyl Acetate	100	A	A	B	X	X	X	I	I	A	B	A	I	I	I	T
Ethyl Butyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Ethyl Butyl Amine	100	A	A	X	B	I	B	I	I	I	I	A	I	I	I	T B
Ethyl Butyl Ketone	100	A	B	X	X	X	X	X	I	A	A	A	I	I	I	T
Ethyl Butyraldehyde	100	A	B	X	X	X	X	X	I	A	B	A	I	I	I	T
Ethyl Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ethyl Dichloride	100	B	X	X	X	B	X	X	X	B	B	A	I	I	I	T V
Ethyl Ether	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ethyl Formate	100	A	B	X	X	X	X	A	B	A	A	A	A	I	I	T V
Ethyl Hexanol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	TBN
Ethyl Hexoic Acid	100	A	X	B	X	I	X	I	I	A	A	A	I	I	I	T
Ethyl Hexyl Acetate	100	A	A	B	X	X	X	I	I	A	B	A	I	I	I	T
Ethyl Hexyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	TBN
Ethyl Iodide	100	X	X	X	X	B	X	X	X	B	B	A	I	I	I	T V
Ethyl Isobutyl Ether	100	A	X	B	X	I	B	I	X	A	B	A	I	I	I	T
Ethyl Methyl Ketone	100	A	B	X	X	X	X	I	I	A	A	A	A	A	A	T
Ethyl Oxalate	100	A	A	X	A	I	X	A	X	A	B	A	I	I	I	T V
Ethyl Phthalate	100	A	A	X	X	X	X	B	I	A	I	A	I	I	I	T
Ethyl Propyl Ether	100	A	X	B	X	I	B	A	X	A	B	A	I	I	I	T B
Ethyl Propyl Ketone	100	A	B	X	X	X	X	I	I	A	A	A	I	I	I	T
Ethyl Silicate	100	A	A	I	X	I	A	A	I	A	A	A	A	I	I	TBN
Ethyl Sulfate	100	A	B	X	X	X	X	A	I	A	A	A	X	I	I	TBS
Ethylamine	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ethylene Bromide	100	X	X	X	X	B	X	I	X	B	B	A	A	X	I	T V
Ethylene Chloride	100	B	X	X	X	B	X	I	X	B	B	A	A	B	I	T V
Ethylene Diamine	100	A	A	X	B	I	B	I	B	A	I	A	A	I	I	T B
Ethylene Dibromide	100	X	X	X	X	B	X	I	X	B	B	A	A	X	I	T V
Ethylene Dichloride	100	B	X	X	X	B	X	X	X	B	A	A	A	B	I	T V
Ethylene Glycol	150	A	A	A	A	A	A	A	A	A	A	A	A	A	I	TVBNS
Ethylhexil Phosphorodieth	100	I	X	X	I	I	A	A	X	X	I	I	I	I	I	B
Ex-Tri	100	A	X	X	X	A	X	I	I	A	B	A	I	I	I	T V

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		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
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	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
F																
Ferric Bromide	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Ferric Chloride	150	A	A	A	A	A	A	A	A	A	A	A	X	X	X	TVBNS
Ferric Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Ferrous Acetate	100	A	A	A	X	X	X	I	I	A	A	A	I	I	I	T
Ferrous Chloride	150	A	A	A	A	B	A	A	A	A	A	A	I	X	X	T B
Ferrous Hydroxide	100	A	A	B	A	X	B	I	I	A	A	A	B	I	I	T N
Ferrous Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	B	X	X	TVBN
Fluoboric Acid 65%	150	B	A	A	A	I	I	A	I	I	A	A	I	I	X	T N
Fluorine (wet)	100	X	X	X	X	X	X	X	X	X	X	B	X	X	X	T
Fluosilicic Acid 50%	150	B	A	A	A	I	I	A	I	I	A	A	A	X	X	T N
Formaldehyde 40%	100	A	A	A	B	B	A	A	A	A	A	A	A	B	I	T B
Formalin	100	A	A	A	B	A	A	A	A	A	A	A	A	B	I	TVB
Formic Acid	100	A	A	X	B	X	X	A	A	B	A	A	B	I	X	T V
Freon® 12	100	A	X	X	X	B	B	I	X	B	X	A	A	I	I	T N
Freon® 22	100	A	X	X	X	X	X	I	I	B	X	A	A	I	I	T N
Fuel A (ASTM)	100	B	X	X	X	A	A	I	X	B	B	A	A	A	A	TVB
Fuel B (ASTM)	100	B	X	X	X	A	A	I	X	B	B	A	I	I	I	TVB
Fuel Oil	100	A	X	X	X	A	A	X	X	B	B	A	A	A	I	TVB
Furfural	100	A	A	I	I	X	X	A	B	A	A	A	A	A	X	T
Furfuryl Alcohol	100	A	X	I	I	X	I	A	I	A	A	A	A	A	I	T
G																
Gallic Acid	100	A	B	I	A	I	I	A	B	I	B	A	B	I	I	T S
Gasoline	100	B	X	X	X	A	A	B	X	B	B	A	A	I	I	TVB
Glacial Acetic Acid	100	A	B	X	X	X	X	B	A	A	A	A	A	B	X	T
Gluconic Acid	100	A	X	B	X	I	X	A	I	A	A	A	X	X	A	T
Glycerin	100	A	A	A	A	A	A	A	A	B	A	A	A	A	A	TVBNS
Glyphosate	100	A	I	I	I	I	I	I	A	I	I	I	I	I	I	I
Graffinite	100	I	X	X	X	X	A	A	X	X	I	I	I	I	I	B
Grease	100	A	X	X	X	A	A	I	X	B	A	A	A	A	A	TVB
Green Sulfate Liquor	150	A	A	A	A	I	A	A	A	A	A	A	A	X	X	TBS
H																
Heptanal	100	A	X	X	X	X	X	X	I	A	I	A	I	I	I	T B
Heptane	100	A	X	X	X	A	A	A	X	B	B	A	A	A	I	TVB

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	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
H																
Heptane Carboxylic Acid	100	A	X	B	X	A	X	A	I	A	A	A	I	I	I	T V
Hexaldehyde	100	A	X	X	X	X	X	I	X	A	B	A	A	A	I	T
Hexane	100	B	X	X	X	A	A	B	X	B	B	A	A	A	A	TVB
Hexanol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	T B
Hexyl Methyl Ketone	100	A	B	X	X	X	X	I	I	A	A	A	I	I	I	T
Hexylamine	100	A	B	X	X	X	X	B	I	A	B	A	I	I	I	T
Hexylene	100	X	X	X	X	A	A	I	X	X	I	A	I	I	I	TVB
Hexylene Glycol	150	A	A	A	A	A	A	A	I	A	A	A	A	B	A	TVBN
Hexyl-Alcohol	100	A	A	A	A	B	A	A	X	A	A	A	A	I	I	T B
Hi-Tri	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Hydrobromic Acid (37%)	150	B	A	A	A	I	X	A	A	I	A	A	X	X	X	T N
Hydrochloric Acid 38% concentrated, fuming acid	125	A	B	X	I	I	X	X	I	A	I	A	X	X	X	T
Hydrochloric Acid 37%	125	A	B	A	B	X	X	A	B	A	A	A	X	X	X	T
Hydrofluoric Acid (10%)	125	A	A	A	X	I	X	A	I	A	A	A	A	X	X	T N
Hydrofluosilicic Acid	150	B	B	A	A	I	I	A	A	I	A	A	A	X	X	T
Hydrogen Dioxide 10%	100	B	X	X	X	A	X	I	I	I	I	A	A	B	X	T V
Hydrogen Dioxide over 10%	100	B	X	X	X	I	X	I	X	I	I	A	I	I	X	T
Hydrogen Gas	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Hydrogen Peroxide 10% to 50%	100	B	X	X	X	A	X	A	I	I	I	A	I	B	I	TVS
Hydrogen Peroxide over 50%	100	X	X	X	X	X	X	X	X	X	I	A	A	I	X	T
I																
Iodine	100	A	I	A	I	I	I	A	I	B	I	A	I	I	X	TVB
Iron Acetate	100	A	A	A	X	X	X	I	I	A	A	A	I	I	I	TNS
Iron Hydroxide	100	A	A	B	X	X	B	I	I	A	A	A	I	I	I	T N
Iron Salts	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN
Iron Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN
Iron Sulfide	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Isoamyl Acetate	100	A	A	B	X	X	X	I	X	A	B	A	I	I	I	T
Isoamyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	A	TBN
Isoamyl Bromide	100	B	X	X	X	B	X	I	X	B	I	A	I	I	I	T V
Isoamyl Butyrate	100	B	X	X	X	X	X	I	I	B	B	A	I	I	I	T
Isoamyl Chloride	100	X	X	X	X	B	X	I	I	X	B	A	I	I	I	T V

APPENDIX B

CHEMICAL CHARTS

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N = Neoprene
S = Silicone

		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
I																
Isoamyl Ether	100	A	X	B	X	I	B	I	X	A	I	A	I	I	I	T
Isoamyl Phthalate	100	A	A	X	X	X	X	I	I	A	I	A	I	I	I	T
Isobutane	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Isobutanol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBNS
Isobutyl Acetate	100	A	A	B	X	X	X	B	X	A	B	A	A	B	I	T
Isobutyl Alcohol	100	A	A	A	A	B	X	A	A	A	A	A	A	I	I	TNS
Isobutyl Aldehyde	100	A	B	X	X	X	X	B	I	A	B	A	I	I	I	T
Isobutyl Amine	100	A	B	X	X	X	X	I	I	A	B	A	I	I	I	T
Isobutyl Bromide	100	B	X	X	X	B	X	I	X	X	I	A	I	I	I	T V
Isobutyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	A	TBN
Isobutyl Chloride	100	B	X	X	X	B	X	I	X	X	I	A	I	I	I	T V
Isobutyl Ether	100	A	X	B	X	I	X	I	X	A	I	A	I	I	I	T B
Isobutylene	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Isooctane	100	B	X	X	X	A	A	I	X	B	B	A	A	A	A	TVBS
Isopentane	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Isophorone	100	B	A	I	I	I	X	I	A	B	B	A	B	A	I	T
Isopropanol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TVBS
Isopropanol Amine	100	A	A	X	B	X	B	I	I	A	B	A	I	I	I	T B
Isopropyl Acetate	100	A	A	X	X	X	X	B	X	A	A	A	A	I	I	T
Isopropyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TBNS
Isopropyl Amine	100	A	B	X	X	X	X	I	I	A	B	A	I	I	I	T
Isopropyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	I	I	I	T V
Isopropyl Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Isopropyl Ether	100	A	X	B	X	I	X	I	X	A	B	A	A	I	I	T B
Isopropyl Toluene	100	A	X	X	X	A	X	I	X	A	I	A	I	I	I	T V
J																
Jet Fuels	---	SPECIAL HOSE REQUIRED											A	A	A	TVB
K																
Kerosene	100	A	X	X	X	A	A	A	X	A	A	A	A	A	I	TVB
L																
Lauryl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Lead Acetate	100	A	A	X	X	X	X	A	B	A	A	A	A	X	X	T

GOODYEAR ENGINEERED PRODUCTS

CHEMICAL CHARTS

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		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
L																
Lead Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Ligroin	100	A	X	X	X	A	A	I	X	A	B	A	A	A	I	T V B
Linseed Oil	100	A	A	B	X	A	A	A	B	I	A	A	A	I	A	TVBNS
Liquefied Natural Gas (LNG)	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Liquefied Petroleum Gas (LPG)	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Lubricating Oils	100	A	X	X	X	A	A	I	X	A	I	A	A	A	A	T V B
M																
MIBK	100	A	X	X	X	X	X	X	X	A	B	A	X	X	X	T
M.E.K.	100	A	X	X	X	X	X	X	X	A	B	A	X	X	X	T
Magnesium Acetate	100	A	A	A	X	X	X	A	I	A	A	A	I	I	I	T
Magnesium Chloride	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBS
Magnesium Hydrate	150	A	A	B	A	B	B	I	I	A	A	A	A	X	I	T N
Magnesium Hydroxide	150	A	A	B	A	B	B	A	A	A	A	A	A	X	I	TVBN
Magnesium Sulfate	150	A	A	A	A	A	A	A	B	A	A	A	A	I	I	TVBNS
Maleic Acid	100	A	X	X	X	I	X	I	I	B	I	A	A	B	X	T V
Malic Acid	150	B	I	A	A	I	I	I	I	I	I	A	A	B	X	TVBNS
Manganese Sulfate	150	A	A	A	X	A	A	A	A	A	A	A	A	I	I	TVBN
Manganese Sulfide	150	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Manganese Sulfite	150	A	A	A	X	A	A	A	A	A	A	A	I	I	I	TVB
Methanol	100	A	A	A	A	X	A	A	A	A	A	A	A	I	I	T B
Mesityl Oxide	100	A	B	X	X	X	X	B	X	A	B	A	A	I	I	T
Methallyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Methyl (Wood) Alcohol	100	A	A	A	A	X	A	A	A	A	A	A	A	I	I	TBNS
Methyl Acetate	100	A	A	B	X	X	X	A	A	A	A	A	A	I	I	T
Methyl Acetoacetate	100	A	B	X	X	X	X	A	I	A	A	A	I	I	I	T
Methyl Acetone	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Methyl Amyl Acetate	100	B	A	B	X	X	X	I	X	A	B	A	I	I	I	T
Methyl Amyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	TBN
Methyl Amyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Methyl Amyl Ketone	100	A	B	X	X	X	X	X	I	A	B	A	I	I	I	T
Methyl Benzene	100	A	X	X	X	A	X	X	X	A	B	A	A	A	A	T V
Methyl Butanol	100	A	A	A	A	B	A	A	I	A	A	A	A	I	A	TBN

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M	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER: UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING — METAL: 316 SS	Aluminum	Brass	Gasket
Methyl Butanone	100	A	B	X	X	X	X	B	B	A	B	A	I	I	I	T
Methyl Butyl Ketone	100	A	B	X	X	X	X	X	I	A	B	A	A	B	I	T
Methyl Carbitol	100	A	A	A	X	I	X	A	I	A	A	A	I	I	I	T
Methyl Cellosolve	100	A	A	A	X	I	X	A	A	A	A	A	A	B	A	T
Methyl Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Methyl Cyclohexane	100	A	X	X	X	B	X	B	X	B	I	A	I	I	I	T V
Methyl Ethyl Ketone (M.E.K.)	100	A	X	X	X	X	X	X	X	A	B	A	X	X	X	T
Methyl Hexanol	100	A	A	A	B	A	A	A	A	A	A	A	I	I	I	TVB
Methyl Hexanone	100	A	B	X	X	X	X	X	I	A	B	A	I	I	I	T
Methyl Hexyl Ketone	100	A	B	X	X	X	X	X	I	A	B	A	I	I	I	T
Methyl Isobutyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	B	I	I	TBN
Methyl Isobutyl Ketone (MIBK)	100	A	X	X	X	X	X	X	X	A	B	A	X	X	X	T
Methyl Isopropyl Ketone	100	A	B	X	X	X	X	B	B	A	B	A	A	I	I	T
Methyl Normal Amyl Ketone	100	A	B	X	X	X	X	I	I	A	B	A	I	I	I	T
Methyl Propyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Methyl Propyl Ether	100	A	X	B	X	I	X	I	X	A	B	A	I	I	I	T
Methyl Propyl Ketone	100	A	B	X	X	X	X	B	I	A	B	A	I	I	I	T
Methyl Tertiary Butyl Ether (MTBE) 100% Concentratel	100	X	X	X	X	X	X	X	X	A	B	I	I	I	I	I
Methylallyl Acetate	100	A	A	B	X	X	X	I	A	A	A	A	I	I	I	T
Methylallyl Chloride	100	A	X	X	X	X	X	X	I	B	I	A	I	I	I	T
Methyldiethanolamine	100	A	X	X	X	X	A	A	X	A	A	A	I	I	I	T B
Methylene Bromide	100	B	X	X	X	B	X	I	X	B	A	A	I	I	I	T V
Methylene Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Metribuzin	100	A	I	I	I	I	I	I	A	I	I	A	I	I	I	T
Mineral Spirits	100	A	X	X	X	B	A	I	X	A	B	A	A	A	I	T B
Monochloroacetic Acid	100	A	X	X	B	I	X	A	X	A	A	A	A	X	X	T
Monochlorobenzene	100	B	X	X	X	A	X	X	X	B	B	A	A	B	B	T V
Monochlorodifluoromethane	100	I	X	X	X	X	X	I	I	I	I	A	A	I	I	T N
Monoethanol Amine	100	A	A	X	B	I	B	A	B	A	B	A	A	B	I	T N
Monoethyl Amine	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Monoisopropanol Amine	100	A	A	X	B	I	B	I	I	A	B	A	I	I	I	T B
Muriatic Acid	125	A	X	X	A	I	X	A	X	A	A	A	X	X	X	T

APPENDIX B

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		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
N																
N/Methylpyrrolidone	100	A	X	X	X	X	X	X	X	A	I	A	I	I	I	T
Naphtha	100	A	X	X	X	A	A	A	X	A	A	A	A	A	I	TVBN
Naphthalene	100	A	X	X	X	A	X	I	X	A	I	A	A	B	I	T V
Natural Gas	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Neohexane	100	A	X	X	X	A	A	B	X	A	B	A	A	A	I	TVB
Neu-Tri	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Nickel Chloride	150	A	A	A	A	A	A	A	A	A	A	A	B	X	X	TVBS
Nickel Nitrate	150	A	A	A	A	A	A	A	A	A	A	A	B	X	X	TVBN
Nickel Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Nitric Acid 25%	100	B	B	X	X	X	X	X	X	B	A	A	A	X	X	T V
Nitric Acid 37%	100	X	X	X	X	X	X	X	X	X	A	A	A	X	X	T V
Nitric Acid 40%-60%	100	X	X	X	X	X	X	X	X	X	B	A	A	X	X	T V
Nitric Acid 70%	100	X	X	X	X	X	X	X	X	X	B	A	B	X	X	T
Nitro Benzene	100	A	X	X	X	B	X	X	X	A	B	A	A	B	X	T
Nitrogen Gas	100	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBNS
Nitrous Oxide	100	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Nonenes	100	A	X	X	X	A	A	I	X	A	B	A	I	I	I	V B
O																
Octadecanoic Acid	100	A	B	X	X	I	A	A	B	A	A	A	A	B	A	T B
Octane	100	B	X	X	X	A	A	A	X	B	B	A	B	I	B	TVB
Octanol	100	A	A	A	A	B	A	A	X	A	A	A	A	I	I	TBN
Octyl Acetate	100	A	A	A	X	X	X	X	I	A	B	A	I	I	I	T
Octyl Alcohol	100	A	A	A	A	B	A	A	X	A	A	A	A	I	I	T B
Octyl Aldehyde	100	A	X	X	X	X	X	I	I	A	I	A	I	I	I	T
Octyl Amine	100	A	B	X	X	X	X	B	I	A	B	A	I	I	I	T
Octyl Carbinol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Octylene Glycol	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Oil Petroleum	100	B	X	X	X	A	A	A	X	A	B	A	A	A	X	TVB
Oleic Acid	100	A	B	X	X	I	B	A	X	A	B	A	A	B	X	T B
Oleum	100	X	X	X	X	X	X	X	X	X	X	A	I	X	X	T V
Organic Fatty Acids	100	A	X	X	X	X	A	A	X	A	B	A	A	I	I	T B
Orthodichlorobenzene	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V

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	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
O																
Orthodichlorobenzol	100	A	X	X	X	A	X	I	X	A	I	A	I	I	I	T V
Orthoxylene	100	B	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Oxalic Acid	100	A	A	X	X	I	X	A	B	I	B	A	A	B	X	T S
Oxygen	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Ozone	100	A	B	B	X	I	X	A	A	I	B	A	I	I	I	T S
P																
Palmitic Acid	100	A	A	B	X	I	A	A	B	B	B	A	A	I	X	TBS
Papermakers Alum	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN
Paradichlorobenzol	100	B	X	X	X	A	X	I	X	A	I	A	I	I	I	T V
Paraffin	150	A	B	X	X	A	A	A	X	X	I	A	A	A	A	TVB
Paraldehyde	100	A	B	X	X	X	X	I	B	A	B	A	A	A	I	T
Paraxylene	100	A	X	X	X	A	X	I	X	A	B	A	I	I	I	T V
Pelargonic Acid	100	A	A	X	X	I	A	I	I	A	I	A	I	I	I	T B
Pentachloroethane	100	A	X	X	X	A	X	I	X	A	I	A	A	B	X	T V
Pentane	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Pentanol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	TBN
Pentanone	100	A	B	X	X	X	X	B	I	A	B	A	I	I	I	T
Perchloroethylene	100	B	X	X	X	A	X	X	X	A	B	A	A	B	X	T V
Petroleum Ether (Ligroin)	100	A	X	X	X	A	A	A	X	A	B	A	A	A	I	TVB
Petroleum - Crude	100	A	X	X	X	A	A	A	X	A	B	A	A	A	X	TVB
Petroleum Oils	100	A	X	X	X	A	A	A	X	A	B	A	A	A	X	TVB
Phenol	125	A	A	X	X	A	X	A	X	A	B	A	A	B	B	T V
Phenolsulfonic Acid	100	X	X	X	X	X	X	A	I	B	B	A	B	I	I	T
Phenyl Chloride	100	A	X	X	X	A	X	X	X	A	B	A	A	B	I	T V
Phosphoric Acid 10%	150	A	A	A	A	X	A	A	A	A	A	A	A	X	X	TVBN
Phosphoric Acid 10-85%	100	A	A	A	B	X	X	A	A	A	A	A	A	X	I	TVN
Pine Oil	100	A	X	X	X	A	X	B	X	A	B	A	A	I	X	T V
Pinene	100	A	X	X	X	A	B	B	X	A	B	A	B	I	I	T V
Polyethylene Glycol	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN
Polypropylene Glycol	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Potassium Acetate	100	A	A	B	X	X	X	A	B	A	A	A	A	X	X	T B
Potassium Bisulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBN
Potassium Bisulfite	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBN

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GASKET

T = Teflon®
V = Viton®
B = Nitrile
N = Neoprene
S = Silicone

		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
P																
Potassium Carbonate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN S
Potassium Chloride	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Potassium Chromate	150	B	A	X	I	I	I	A	I	B	B	A	B	I	I	TVBN
Potassium Dichromate	150	B	A	X	I	I	I	A	I	B	B	A	A	B	X	TVBNS
Potassium Hydrate	150	A	A	B	A	X	B	A	B	A	A	A	A	X	I	T S
Potassium Hydroxide	150	B	A	B	A	X	B	A	B	A	A	A	A	X	X	T N
Potassium Nitrate	150	A	A	A	A	A	A	A	A	A	A	A	A	B	A	TVBNS
Potassium Permanganate	100	A	A	A	A	A	B	I	I	A	A	A	A	I	I	TVS
Potassium Silicate	150	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBNS
Potassium Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	B	A	TVBNS
Potassium Sulfide	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Potassium Sulfite	150	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Propanediol	100	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVBS
Propane Gas	---	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Propanol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	TVB
Propyl Acetate	100	A	A	B	X	X	X	B	X	A	B	A	A	I	I	T
Propyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	A	I	I	T B
Propyl Aldehyde	100	A	B	X	X	X	X	X	I	A	B	A	I	I	I	T
Propyl Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Propylene Diamine	100	A	A	X	B	I	B	A	I	A	I	A	I	I	I	T B
Propylene Dichloride	100	B	X	X	X	B	X	X	X	B	I	A	A	X	I	T V
Propylene Glycol	100	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBS
Propylene Tetramer	100	A	X	X	X	X	A	A	X	A	B	I	I	I	I	B
S																
Sea Water	100	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Sewage	100	A	X	A	X	I	A	A	A	A	A	A	A	X	I	TBNS
Silicate of Soda	100	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Soap	100	A	X	X	X	X	A	A	X	X	I	A	A	X	X	TBNS
Soda Ash	100	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBNS
Soda, Caustic	100	A	A	B	A	X	B	A	A	A	A	A	A	X	X	TNS
Soda, Lime	100	A	A	B	A	X	B	A	A	A	A	A	I	I	I	TVB
Soda, Niter	100	A	A	A	A	A	A	A	B	A	A	A	A	B	I	TVB
Sodium Acetate	100	A	A	A	X	X	X	A	B	B	B	A	A	I	A	TNS

CHEMICAL CHARTS

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S = Silicone

S	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE — HOSE TUBE POLYMER											FITTING — METAL			
		Fabchem™ UHMWPE	Gray Flexwing® Butyl	Yellow Flexwing Hypalon®	Tan Flexwing NR	Orange Flexwing Viton®	Flexwing Petroleum Nitrile	Brown Flexwing, ExtremeFlex™ Brown CPE	Purple Flexwing, ExtremeFlex™ Purple EPDM	Green XLPE Blue Flexwing XLPE	Chem One™ & Viper™ Alphasyn®	HI-PER® Teflon®	Insta-Lock™ 316 SS	Insta-Lock Aluminum	Insta-Lock Brass	Insta-Lock Gasket
Sodium Aluminate	100	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBN
Sodium Bisulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Sodium Bisulfite	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Sodium Carbonate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBNS
Sodium Chloride (Brine)	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBNS
Sodium Chromate	150	X	A	X	I	I	I	A	I	X	I	A	A	A	A	TVBN
Sodium Dichromate	150	A	A	X	I	I	I	A	A	A	A	A	A	I	X	T
Sodium Hydrate	150	A	A	B	A	X	B	A	A	A	A	A	B	X	X	T N
Sodium Hydrochlorite (20%)	100	A	B	X	X	B	X	I	I	B	A	A	I	I	I	T
Sodium Hydrosulfide	100	A	X	X	X	X	A	A	X	A	I	A	I	B	I	T B
Sodium Hydroxide (50%)	150	A	A	B	A	X	B	A	A	A	A	A	A	X	X	TBN
Sodium Hypochlorite	100	B	B	X	X	B	X	A	A	X	B	A	X	X	X	TVS
Sodium Nitrate	150	A	A	A	A	A	A	A	B	A	A	A	A	B	I	TVBNS
Sodium Silicate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Sodium Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	B	X	TVBNS
Sodium Sulfide	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBN
Sodium Sulfite	150	A	A	A	A	A	A	A	B	A	A	A	A	I	I	TVBNS
Sodium Sulphydrate	100	A	X	X	X	X	A	A	X	A	B	A	I	I	I	T B
Sodium Thiosulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	I	X	TVBNS
Stannic Chloride	150	A	A	A	A	I	A	A	A	A	A	A	X	X	X	T B
Stannic Sulfide	150	A	A	A	A	I	A	A	A	A	A	A	I	I	I	TBN
Stannous Chloride	150	A	A	A	A	I	A	A	B	A	A	A	A	X	X	T B
Stannous Sulfide	150	A	A	A	A	I	A	A	A	A	A	A	I	I	I	T B
Stearic Acid	100	A	B	X	X	I	A	A	B	A	A	A	A	B	A	TVB
Stoddard Solvent	100	A	X	X	X	A	A	A	X	A	B	A	A	A	I	TVB
Styrene	100	B	X	X	X	A	X	X	X	X	I	A	A	I	I	T V
Sulfamic Acid (>10%)	100	X	A	B	B	I	B	A	I	I	I	A	I	I	I	TVN
Sulfonic Acid	100	B	X	X	X	X	X	I	I	B	I	A	I	I	I	TVN
Sulfur Dioxide (Liquid)	100	B	B	B	I	X	I	I	I	X	I	A	A	I	I	T N
Sulfuric Acid 25%	150	A	A	B	B	I	X	A	A	A	A	A	I	X	X	TVN
Sulfuric Acid 93%	100	X	X	B	X	B	X	X	B	A	A	A	I	X	X	T V
Sulfuric Acid 93-98%	100	X	X	X	X	B	X	X	X	I	B	A	I	X	X	T V
Sulfuric Acid Fuming	100	X	X	X	X	X	X	X	X	X	X	A	I	X	X	T

GOODYEAR ENGINEERED PRODUCTS

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		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn®	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
S																
Sulfurous Acid 10%	150	A	A	A	A	I	X	A	A	A	A	A	I	X	X	T
Sulfurous Acid 10-75%	100	A	A	A	A	I	X	A	A	A	A	A	I	X	X	T
Sulphonate	100	I	X	X	X	X	A	A	X	X	I	I	I	I	I	B
T																
Tall Oil	100	A	X	X	X	A	A	I	X	I	I	A	A	X	X	TVB
Tallow	150	A	X	X	X	I	A	A	X	I	I	A	A	I	A	TBNS
Tannic Acid	150	A	A	A	A	I	B	A	X	I	I	A	A	X	I	TVBN
Tar	---	SPECIAL HOSE REQUIRED											A	A	I	I
Tartaric Acid	150	A	A	A	A	I	A	A	A	A	A	A	A	I	A	TBN
Tergitol	100	X	I	I	I	I	I	I	I	I	I	A	I	I	I	T
Tertiary Butyl Alcohol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Tetrachlorobenzene	100	B	X	X	X	B	X	I	X	B	I	A	I	I	I	T
Tetrachloroethane	100	A	X	X	X	A	X	I	X	X	I	A	A	X	X	T V
Tetrachloroethylene	100	A	X	X	X	A	X	X	X	A	B	A	A	B	X	T V
Tetrachloromethane	100	A	X	X	X	A	X	X	X	X	B	A	A	I	I	T V
Tetrachloronaphthalene	100	B	X	X	X	B	X	I	X	X	I	A	I	I	I	T
Tetradecanol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Tetraethylene Glycol	150	A	A	A	A	A	A	A	A	A	A	A	I	I	I	TVB
Tetraethylene Lead	100	X	X	X	X	A	X	X	X	X	I	A	I	I	I	T V
Tetrahydrofuran	100	B	X	X	X	X	X	X	X	B	X	A	A	B	X	T
THF	100	B	X	X	X	X	X	X	X	B	X	A	A	B	X	T
Thionyl Chloride	100	X	I	I	I	I	I	I	I	I	X	A	X	X	X	T
Tin Chloride	100	A	A	A	A	I	A	A	A	A	A	A	X	X	X	TVB
Tin Tetrachloride	150	B	A	A	A	I	A	A	A	A	A	A	X	X	X	T B
Titanium Tetrachloride	100	B	X	X	X	A	B	X	X	A	B	A	B	X	X	T V
Toluene	100	A	X	X	X	A	X	X	X	B	B	A	A	A	A	T V
Toluidine	100	X	I	I	I	I	I	I	I	I	I	A	I	I	I	T
Toluol	100	A	X	X	X	A	X	X	X	A	B	A	A	A	A	T V
Transformer Oil	100	X	I	I	I	I	I	I	I	I	I	A	A	I	I	T
Transmission Oil "A"	150	B	X	X	X	A	A	I	X	I	I	A	A	A	A	TVB
Tributoxy Ethysulphate	100	I	A	X	X	A	X	X	A	X	I	I	I	I	I	V
Tributyl Amine	100	A	A	X	B	I	B	A	I	A	A	A	I	I	I	T
Tributyl Phosphate	100	A	A	X	X	X	X	X	X	A	I	A	A	I	X	T

APPENDIX B

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		GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE											FITTING			
		Fabchem™	Gray Flexwing®	Yellow Flexwing	Tan Flexwing	Orange Flexwing	Flexwing Petroleum	Brown Flexwing, ExtremeFlex™ Brown	Purple Flexwing, ExtremeFlex™ Purple	Green XLPE Blue Flexwing	Chem One™ & Viper™	HI-PER®	Insta-Lock™	Insta-Lock	Insta-Lock	Insta-Lock
	Temperature (°F)	UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	316 SS	Aluminum	Brass	Gasket
		HOSE TUBE POLYMER											METAL			
T																
Trichlorobenzene	100	B	X	X	X	B	X	X	X	B	I	A	I	A	I	T
Trichloroethane	100	A	X	X	X	A	X	B	X	X	B	A	A	I	I	T V
Trichloroethylene	100	X	X	X	X	A	X	X	X	X	B	A	A	I	I	T V
Trichloropropane	100	A	X	X	X	A	X	I	X	A	I	A	A	X	I	T V
Tricresylphosphate	100	A	A	X	X	A	X	A	A	A	I	A	A	X	I	T V
Tridecanol	100	A	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
Triethanolamine	100	A	A	X	B	X	B	A	A	A	A	A	A	I	X	T B
Triethylamine	100	A	A	X	B	I	B	A	I	A	A	A	A	I	I	TVBN
Triethylene Glycol	150	A	A	A	A	I	A	A	I	A	A	A	A	A	I	T B
Trifluralin (Trefalin)	100	A	X	X	X	A	X	X	X	A	I	A	I	I	I	T V
Triphenyl Phosphate	100	A	A	X	X	I	X	I	I	A	I	A	A	I	I	T
Tripolyphosphate	100	X	I	I	I	I	I	I	I	I	I	A	I	I	I	T
Trisodium Phosphate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	I	TVBNS
Turpentine	100	A	X	X	X	A	A	B	X	A	X	A	A	A	A	T V B
U																
Urea	100	A	A	I	I	I	X	A	I	A	A	A	A	B	I	TVBN
Undecanol	100	B	A	A	A	B	A	A	A	A	A	A	I	I	I	T B
V																
V.M. & P. Naptha	100	A	X	X	X	A	A	I	X	A	I	A	I	I	I	TVBS
Vinyl Acetate	100	A	A	B	X	X	X	A	X	A	B	A	A	I	X	T V
Vinyl Benzene	100	A	X	X	X	A	X	X	X	A	I	A	A	I	I	T V
Vinyl Chloride	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Vinyl Ether	---	NO HOSE RECOMMENDED FOR THIS APPLICATION														
Vinyl Toluene	100	A	X	X	X	A	X	X	X	A	I	A	I	I	I	T V
Vinyl Trichloride	100	A	X	X	X	A	X	X	X	A	B	A	A	I	I	T V

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W	Temperature (°F)	GOODYEAR ENGINEERED PRODUCTS CHEMICAL HOSE: HOSE TUBE POLYMER — UHMWPE	Butyl	Hypalon®	NR	Viton®	Nitrile	CPE	EPDM	XLPE	Alphasyn™	Teflon®	FITTING: METAL — 316 SS	Aluminum	Brass	Gasket
Water	180	A	A	A	A	A	A	A	A	A	A	A	A	I	I	TVBNS
Wax	100	A	X	X	X	X	A	A	X	X	X	A	A	I	I	TVBN
White Oil	100	A	X	X	X	I	A	A	X	I	I	A	I	I	I	TVB
Wood Alcohol	100	A	A	A	A	X	A	A	A	A	A	A	A	I	I	TBNS
X																
Xylene (Xylol)	100	X	X	X	X	A	X	X	X	A	B	A	A	I	I	T V
Xylidine	100	B	X	X	X	X	X	X	X	B	B	A	B	A	I	T
Z																
Zinc Carbonate	150	A	A	A	A	A	A	A	A	A	A	A	B	B	X	TVBN
Zinc Chloride	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS
Zinc Chromate	150	A	A	X	I	I	I	A	X	B	I	A	I	I	I	T
Zinc Phosphate	100	A	X	X	X	X	A	A	A	X	I	A	I	I	I	TBNS
Zinc Sulfate	150	A	A	A	A	A	A	A	A	A	A	A	A	X	X	TVBNS

APPENDIX B

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

Thermoplastic Hose

A = May be used for Continuous Service
B = May be used for Intermittent Service
X = Do not use
I = Insufficient data

A	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Acetaldehyde	70˚	X	X	I	X
Acetic Acid, Conc.	70˚	X	B	I	I
Acetic Acid, Dilute 10	70˚	B	A	I	I
Acetic Acid, Glacial	70˚	X	B	I	X
Acetic Aldehyde	70˚	I	X	I	X
Acetic Anhydride	70˚	X	X	X	X
Acetic Ester	70˚	X	X	X	B
Acetic Ether	70˚	X	X	X	I
Acetone	70˚	X	X	X	B
Acetone Cyanohydrin	70˚	X	X	X	I
Acetyl Acetone	70˚	X	X	X	I
Acetyl Chloride	70˚	X	I	X	X
Acetylene Dichloride	70˚	I	X	I	X
Acetylene Tetrachloride	70˚	I	X	I	I
Acrylonitrile	70˚	A	A	B	I
Allyl Alcohol	70˚	X	X	X	X
Allyl Bromide	70˚	X	X	X	I
Allyl Chloride	70˚	X	X	X	I
Alum	70˚	A	A	A	B
Aluminum Acetate	70˚	I	I	I	I
Aluminum Chloride	70˚	A	A	A	B
Aluminum Hydroxide	70˚	A	A	A	I
Aluminum Sulfate	70˚	A	A	A	B
Ammonia Cupric Sulfate	70˚	I	X	I	I
Ammonia Water	70˚	A	A	A	A
Ammonium Chloride	70˚	A	A	A	B
Ammonium Hydroxide	70˚	B	B	I	B
Ammonium Nitrate	70˚	A	A	A	I
Ammonium Phosphate	70˚	I	I	I	B
Ammonium Sulfate	70˚	A	A	A	B
Ammonium Sulfide	70˚	A	A	A	I
Ammonium Sulfite	70˚	A	A	A	I
Ammonium Thiosulfate	70˚	A	A	I	I

Thermoplastic Hose

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I = Insufficient data

A	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Amyl Acetate	70˚	X	X	X	X
Amyl Alcohol	70˚	B	B	I	X
Amyl Chloride	70˚	X	X	X	X
Amyl Phenol	70˚	I	X	I	I
Amyl Phthalate	70˚	I	X	I	I
Aniline Oils	70˚	X	X	X	I
Animal Grease	70˚	A	A	A	I
Animal Oils	70˚	A	A	A	X
Aqua Ammonia	70˚	I	B	B	I
Aromatic Tar	70˚	X	X	X	I
Arsenic Acid	70˚	A	A	A	I
Arsenic Chloride	70˚	A	A	I	I
Arsenic Trichloride	70˚	A	A	I	I
Asphalt	70˚	X	X	X	X
ASTM #1 Oil	70˚	A	A	A	X
ASTM #2 Oil	70˚	A	A	I	X
ASTM #3 Oil	70˚	A	A	B	X
B					
Barium Carbonate	70˚	A	A	A	I
Barium Chloride	70˚	A	A	A	I
Barium Hydroxide	70˚	A	A	A	I
Barium Sulfate	70˚	A	A	A	I
Barium Sulfide	70˚	A	A	A	I
Benzyl Chloride	70˚	I	X	I	I
Benzaldehyde	70˚	X	X	X	X
Benzene (Benzol)	70˚	X	X	X	X
Benzine (Ligroin)	70˚	X	X	X	X
Benzine Solvent (Ligroin)	70˚	X	X	X	X
Benzoic Acid	70˚	B	A	A	B
Benzoic Aldehyde	70˚	I	X	I	I
Benzotrichloride	70˚	I	X	I	I
Benzoyl Chloride	70˚	I	X	I	I
Benzyl Acetate	70˚	I	X	I	I

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

Thermoplastic Hose

A = May be used for Continuous Service
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B	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Benzyl Chloride	70˚	I	X	I	I
Bichromate of Soda	70˚	I	A	I	I
Black Sulfate Liquor	70˚	A	A	A	I
Bleach	70˚	A	A	A	B
Brine	70˚	A	A	A	B
Bromine	70˚	X	X	X	X
Bromo Benzene	70˚	I	X	I	X
Bromo Toluene	70˚	I	X	I	I
Bromochloromethane	70˚	I	X	I	X
Butanol	70˚	I	X	I	B
Butyl (Normal) Alcohol	70˚	I	X	X	B
Butyl (Secondary) Alcohol	70˚	I	X	X	B
Butyl Acetate	70˚	X	X	I	X
Butyl Acetoacetate	70˚	I	X	I	I
Butyl Acrylate	70˚	I	X	I	I
Butyl Alcohol	70˚	A	A	A	B
Butyl Benzene	70˚	I	X	I	I
Butyl Benzl Phthalate	70˚	I	X	I	I
Butyl Bromide	70˚	I	X	I	I
Butyl Butyrate	70˚	I	X	I	I
Butyl Chloride	70˚	I	X	I	I
Butyl Phthalate	70˚	I	X	I	X
Butyric Acid	70˚	I	X	B	I
C					
Cadmium Acetate	70˚	I	A	I	I
Calcium Acetate	70˚	I	A	I	I
Calcium Aluminate	70˚	I	A	I	I
Calcium Bichromate	70˚	I	A	I	I
Calcium Bisulfate	70˚	I	A	B	I
Calcium Bisulfite	70˚	A	A	A	I
Calcium Carbonate	70˚	A	A	A	I
Calcium Chloride	70˚	A	A	A	I
Calcium Hydroxide (Caustic Lime)	70˚	A	A	A	I

Thermoplastic Hose

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C	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Calcium Hypochlorite	70˚	A	A	I	I
Calcium Nitrate	70˚	A	A	I	I
Calcium Silicate	70˚	A	A	I	I
Calcium Sulfate	70˚	A	A	A	I
Calcium Sulfide	70˚	A	A	I	I
Calcium Sulfite	70˚	A	A	I	I
Carbolic Acid, Phenol	70˚	X	X	X	X
Carbon Dioxide	70˚	A	A	A	B
Carbon Disulfide	70˚	X	X	X	X
Carbon Monoxide	70˚	A	A	A	B
Carbon Tetrachloride	70˚	X	X	X	X
Carbonic Acid	70˚	I	A	A	I
Casinghead Gasoline	70˚	I	X	X	X
Caster Oil (Castor Oil)	70˚	A	A	A	I
Caustic Potash	70˚	A	A	A	A
Caustic Soda	70˚	A	A	A	B
Chlorinated Solvents	70˚	I	X	I	I
Chlorine (Dry)	70˚	A	A	A	B
Chlorine (Wet)	70˚	B	X	I	B
Chloroacetone	70˚	I	X	I	I
Chlorobenzene	70˚	X	X	X	X
Chlorobutane	70˚	I	X	I	I
Chloroethylbenzene	70˚	I	X	I	I
Chloroform	70˚	X	X	X	X
Chloropentane	70˚	I	X	I	X
Chlorophenol	70˚	I	X	I	I
Chloropropanone	70˚	I	X	I	I
Chlorosulfonic Acid	70˚	I	B	I	X
Chlorothene	70˚	I	X	I	X
Chlorotoluene	70˚	X	X	X	X
Chromic Acid	70˚	B	B	B	B
Copper Chloride	70˚	A	A	A	B
Copper Hydrate	70˚	I	A	I	I

APPENDIX B

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

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Thermoplastic Hose

C	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Copper Hydroxide	70˚	I	A	I	I
Copper Nitrate	70˚	A	A	A	I
Copper Nitrite	70˚	A	A	A	I
Copper Sulfate	70˚	A	A	A	I
Copper Sulfide	70˚	B	A	B	I
Creosol	70˚	X	X	X	X
Creosote	70˚	X	X	X	X
Crude Oil	70˚	B	A	B	X
Cupric Carbonate	70˚	I	A	I	I
Cupric Chloride	70˚	A	A	I	I
Cupric Nitrate	70˚	A	A	I	I
Cupric Nitrite	70˚	A	A	I	I
Cupric Sulfate	70˚	A	A	A	I
Cyclohexane	70˚	X	X	X	X
Cyclohexanol	70˚	X	X	X	X
Cyclohexanone	70˚	X	X	X	X
Cyclopentane, methyl	70˚	I	A	I	I
Cyclopentanol	70˚	I	A	I	I
Cyclopentanone	70˚	I	A	I	I
D					
D.D.T.	70˚	I	A	I	I
D.D.T. in Kerosene	70˚	X	X	X	X
Decalin	70˚	I	B	I	I
Decanol	70˚	I	B	I	I
Decyl Alcohol	70˚	I	A	I	I
Decyl Butyl Phthalate	70˚	X	X	X	X
Denatured Alcohol	70˚	I	A	B	I
Diacetone Alcohol	70˚	B	A	B	B
Diamyl Phenol	70˚	X	X	X	X
Dibromobenzene	70˚	I	X	I	I
Dibutyl Amine	70˚	I	X	I	I
Dibutyl Phthalate	70˚	X	X	X	X
Dibutyl Sebacate	70˚	I	X	I	I

Thermoplastic Hose

D	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Dicalcium Phosphate	70˚	B	A	B	I
Dichlorobenzene	70˚	X	X	X	X
Dichlorobutane	70˚	I	X	I	I
Dichlorodiboromethane	70˚	X	X	X	X
Dichloroethane	70˚	I	X	I	I
Dichloroethyl Ether	70˚	I	X	I	X
Dichloroethylene	70˚	I	X	I	X
Dichlorohexane	70˚	I	X	I	X
Dichloromethane	70˚	I	X	I	X
Dichloropentane	70˚	I	X	I	X
Dichloropropane	70˚	I	X	I	X
Diesel Oil	70˚	I	B	X	X
Diethylamine	70˚	I	I	I	I
Diethyl Benzene	70˚	I	X	I	X
Diethyl Ketone	70˚	I	X	I	I
Diethyl Oxalate	70˚	I	X	I	I
Diethyl Phthalate	70˚	I	X	I	I
Diethyl Sebacate	70˚	I	X	I	I
Diethylene Glycol	70˚	I	B	I	I
Diisobutyl Ketone	70˚	I	X	I	I
Diisoctyl Adipate	70˚	I	X	I	I
Diisoctyl Phthalate	70˚	I	X	I	I
Diisodecyl Adipate	70˚	I	X	I	I
Diisopropyl Amine	70˚	I	X	I	I
Diisopropyl Ketone	70˚	I	X	I	I
Dimethyl Amine	70˚	I	X	I	I
Dimethyl Benzene	70˚	I	X	I	I
Dimethyl Ketone	70˚	I	X	I	I
Dimethyl Phthalate	70˚	I	X	I	I
Dinitrobenzene	70˚	I	X	I	I
Dioctyl Adipate	70˚	I	X	I	I
Dioctyl Phthalate	70˚	X	X	X	X
Dioctyl Sebacate	70˚	I	X	I	I

APPENDIX B

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

Thermoplastic Hose

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D	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Diphenyl Phthalate	70˚	I	X	I	I
Dipropyl Ketone	70˚	I	X	I	I
Disodium Phosphate	70˚	A	A	A	B
Divinyl Benzene	70˚	I	X	I	I
Dodecyl Benzene	70˚	I	X	I	I
E					
Ethanol	70˚	A	A	A	A
Ethanol Amine	70˚	B	A	B	I
Ethyl Acetate	70˚	X	X	X	B
Ethyl Acetoacetate	70˚	I	X	I	I
Ethyl Acrylate	70˚	X	X	X	I
Ethyl Alcohol	70˚	A	A	A	A
Ethyl Benzene	70˚	I	X	I	X
Ethyl Butanol	70˚	I	A	I	I
Ethyl Butyl Acetate	70˚	I	X	I	I
Ethyl Butyl Alcohol	70˚	I	A	I	I
Ethyl Butyl Ketone	70˚	I	X	I	I
Ethyl Chloride	---	X	X	X	X
Ethyl Dichloride	70˚	X	X	X	X
Ethyl Ether	---	X	X	X	X
Ethyl Formate	70˚	I	X	I	I
Ethyl Hexyl Acetate	70˚	I	X	I	I
Ethyl Hexyl Alcohol	70˚	I	A	I	I
Ethyl Iodide	70˚	X	X	X	X
Ethyl Isobutyl Ether	70˚	I	X	I	I
Ethyl Methyl Ketone	70˚	X	X	X	X
Ethyl Oxalate	70˚	I	X	I	I
Ethyl Phthalate	70˚	I	X	I	I
Ethyl Propyl Ether	70˚	I	X	I	I
Ethyl Propyl Ketone	70˚	X	X	X	I
Ethylene Bromide	70˚	X	X	X	X
Ethylene Chloride	70˚	X	X	X	X
Ethylene Dibromide	70˚	X	X	X	X

Thermoplastic Hose

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E	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Ethylene Dichloride	70˚	X	X	X	X
Ethylene Glycol	70˚	A	A	A	A
F					
Ferric Bromide	70˚	A	A	A	B
Ferric Chloride	70˚	A	A	A	A
Ferric Sulfate	70˚	A	A	A	A
Ferrous Acetate	70˚	A	A	A	I
Ferrous Chloride	70˚	A	A	A	B
Ferrous Hydroxide	70˚	I	A	A	I
Ferrous Sulfate	70˚	A	A	A	A
Fluorine	70˚	X	X	X	X
Fluosilicic Acid	70˚	A	A	A	B
Formaldehyde	70˚	X	X	B	A
Formalin	70˚	I	I	A	A
Formic Acid (less than 50%)	70˚	B	B	A	A
Formic Acid (more than 50%)	70˚	B	X	X	B
Freon® 12	70˚	B	B	B	X
Freon® 22	70˚	X	X	X	X
Fuel A (ASTM)	70˚	A	B	B	I
Fuel B (ASTM)	70˚	A	B	X	X
Fuel Oil	70˚	A	B	B	X
Furfural	70˚	X	X	X	X
G					
Gasoline	70˚	X	X	X	X
Glacial Acetic Acid	70˚	X	B	I	I
Glycerin	70˚	A	A	A	B
Grease	70˚	A	A	A	B
H					
Heptane	70˚	A	A	X	X
Hexane	70˚	A	A	B	X
Hexanol	70˚	B	A	B	B
Hexyl Methyl Ketone	70˚	I	X	I	I
Hexylene Glycol	70˚	I	B	I	I

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APPENDIX B

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

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Thermoplastic Hose

H	Temperature (°F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Hexyly-Alcohol	70°	I	A	I	I
Hydrobromic Acid	70°	A	A	B	B
Hydrochloric Acid	70°	A	B	A	A
Hydrofluoric Acid	70°	A	B	A	B
Hydrofluosilicic Acid	70°	B	B	I	I
Hydrogen Dioxide 10%	70°	I	A	A	I
Hydrogen Dioxide (over 10%)	70°	I	A	A	I
Hydrogen Gas	70°	X	X	X	B
Hydrogen Peroxide 10%	70°	A	A	A	B
Hydrogen Peroxide (over 10%)	70°	A	A	A	B
I					
Iodine	70°	X	X	X	X
Iron Acetate	70°	I	A	I	I
Iron Hydroxide	70°	I	A	A	I
Iron Salts	70°	I	A	A	B
Iron Sulfate	70°	I	A	A	A
Iron Sulfide	70°	I	A	I	I
Isoamyl Acetate	70°	I	X	I	I
Isoamyl Alcohol	70°	I	A	I	I
Isoamyl Bromide	70°	X	X	X	I
Isoamyl Butyrate	70°	I	X	I	I
Isoamyl Chloride	70°	I	X	I	I
Isoamyl Ether	70°	I	X	I	I
Isoamyl Phthalate	70°	I	X	I	I
Isobutanol	70°	I	A	I	A
Isobutyl Acetate	70°	I	X	I	I
Isobutyl Alcohol	70°	I	A	I	A
Isooctane	70°	I	B	X	I
Isopentane	---	I	B	I	I
Isopropanol	70°	I	A	I	A
Isopropyl Acetate	70°	X	X	X	I
Isopropyl Alcohol	70°	A	A	B	B
Isopropyl Benzene	70°	I	X	I	X

Thermoplastic Hose

I	Temperature (°F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Isopropyl Chloride	---	I	X	I	I
J					
Jet Fuels	---	X	X	X	X
K					
Kerosene	70°	X	B	X	X
Ketones	70°	X	X	X	X
L					
Lead Acetate	70°	A	A	A	B
Lead Sulfate	70°	I	X	I	I
Linseed Oil	70°	A	A	A	X
Lubricating Oils	70°	A	B	B	I
M					
MIBK	70°	I	X	I	X
M.E.K.	70°	X	X	B	X
Magnesium Acetate	70°	I	A	I	I
Magnesium Chloride	70°	A	A	A	A
Magnesium Hydrate	70°	I	A	A	B
Magnesium Hydroxide	70°	A	A	A	A
Magnesium Sulfate	70°	A	A	A	A
Malic Acid	70°	B	A	B	B
Manganese Sulfate	70°	I	A	I	I
Manganese Sulfide	70°	I	A	I	I
Manganese Sulfite	70°	I	A	I	I
Methanol	70°	A	A	A	A
Methallyl Alcohol	70°	I	A	I	I
Methyl (Wood) Alcohol	70°	B	B	A	A
Methyl Acetate	70°	X	X	X	X
Methyl Acetoacetate	70°	I	X	I	I
Methyl Acetone	70°	I	X	I	X
Methyl Amyl Acetate	70°	X	X	X	X
Methyl Amyl Alcohol	70°	I	A	I	I
Methyl Amyl Ketone	70°	I	X	A	I
Methyl Benzene	70°	I	X	I	X

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M	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Methyl Butanol	70˚	I	B	I	X
Methyl Butyl Ketone	70˚	I	X	I	I
Methyl Cellosolve	70˚	I	B	I	I
Methyl Chloride	---	X	X	X	X
Methyl Ethyl Ketone	70˚	X	X	X	X
Methyl Hexyl Ketone	70˚	X	X	X	X
Methyl Isobutyl Ketone	70˚	X	X	X	X
Methyl Isopropyl Ketone	70˚	X	X	X	X
Methyl Normal Amyl Ketone	70˚	X	X	X	X
Methylallyl Chloride	70˚	X	X	X	X
Methyl Propyl Ether	70˚	I	I	A	I
Methyl Propyl Ketone	70˚	I	X	I	I
Methylallyl Acetate	70˚	I	X	I	I
Methylene Bromide	70˚	X	X	X	I
Methylene Chloride	---	X	X	X	X
Mineral Spirits	70˚	I	B	I	I
Monochlorobenzene	70˚	X	X	X	X
Monochlorodibluoromethane	70˚	I	X	I	I
Muriatic Acid	70˚	I	B	A	B
N					
Naphtha	70˚	B	B	B	X
Naphthalene	70˚	B	X	B	X
Natural Gas	No hose is recommended for this service				
Nickel Chloride	70˚	A	A	A	B
Nickel Nitrate	70˚	A	A	A	B
Nickel Sulfate	70˚	A	A	A	A
Nitric Acid 10%	70˚	A	A	A	B
Nitric Acid 20%	70˚	A	B	A	B
Nitric Acid 30%	70˚	B	B	A	B
Nitric Acid 30-70%	70˚	X	X	X	X
Nitro Benzene	70˚	X	X	X	X
Nitrogen Gas	70˚	A	A	A	A
Nitrous Oxide	70˚	A	A	A	B

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O	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Octanol	70˚	I	A	I	B
Octyl Acetate	70˚	I	X	I	I
Oil Petroleum	70˚	A	B	A	I
Oleic Acid	70˚	B	B	B	B
Oleum	70˚	X	X	X	X
Orthodichlorobenzene	70˚	I	X	I	I
Orthodichlorobenzol	70˚	I	X	I	I
Oxalic Acid	70˚	A	A	A	A
Oxygen	No hose is recommended for this service				
Ozone	70˚	B	B	B	B
P					
Palmitic Acid	70˚	B	B	B	B
Papermakers Alum	70˚	I	A	I	I
Paradichlorobenzol	70˚	I	X	I	I
Paraffin	70˚	B	A	B	I
Pentachloroethane	70˚	I	I	X	I
Pentane	70˚	B	B	I	X
Pentanol	70˚	I	A	I	I
Perchloroethylene	70˚	X	X	X	X
Petroleum Ether (Ligroin)	70˚	A	B	I	X
Petroleum - Crude	70˚	A	B	X	X
Petroleum Oils	70˚	A	B	X	X
Phenol	70˚	X	X	X	X
Phenolsulfonic Acid	70˚	I	X	I	I
Phenyl Chloride	70˚	I	I	X	X
Phosphoric Acid 10%	70˚	A	A	A	A
Phosphoric Acid 10%-85%	70˚	B	B	A	B
Polyethylene Glycol	70˚	B	B	A	B
Polypropylene Glycol	70˚	B	B	A	B
Potassium Acetate	70˚	I	A	A	B
Potassium Bisulfate	70˚	A	A	A	B
Potassium Bisulfite	70˚	A	A	A	B
Potassium Carbonate	70˚	A	A	A	A

APPENDIX B

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Thermoplastic Hose

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P	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Potassium Chloride	70˚	A	A	A	A
Potassium Chromate	70˚	A	A	A	B
Potassium Dichromate	70˚	A	A	A	B
Potassium Hydrate	70˚	I	A	I	B
Potassium Hydroxide	70˚	B	A	A	B
Potassium Nitrate	70˚	A	A	A	B
Potassium Silicate	70˚	I	A	I	B
Potassium Sulfate	70˚	A	A	A	B
Potassium Sulfide	70˚	A	A	A	B
Potassium Sulfite	70˚	A	A	A	B
Propanediol	70˚	I	A	I	B
Propanol	70˚	I	A	I	B
Propyl Acetate	70˚	I	X	I	I
Propyl Alcohol	70˚	A	A	B	B
Propyl Chloride	---	X	X	X	X
Propylene Dichloride	70˚	X	X	X	X
Propylene Glycol	70˚	A	I	A	A
S					
Sea Water	70˚	A	A	A	A
Silicate of Soda	70˚	I	B	A	A
Soda Ash	70˚	A	A	A	A
Soda, Caustic	70˚	A	B	A	A
Soda, Lime	70˚	I	B	A	I
Soda, Niter	70˚	I	B	I	A
Sodium Acetate	70˚	A	B	A	B
Sodium Aluminate	70˚	I	A	A	B
Sodium Bisulfate	70˚	A	A	A	A
Sodium Bisulfite	70˚	I	A	A	A
Sodium Carbonate	70˚	A	A	A	A
Sodium Chloride (brine)	70˚	A	A	A	A
Sodium Chromate	70˚	I	A	I	I
Sodium Dichromate	70˚	A	A	A	B
Sodium Hydrate	70˚	I	A	I	I

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S	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Sodium Hydrochlorite	70˚	A	A	B	B
Sodium Hydroxide	70˚	A	A	A	A
Sodium Hypochlorite	70˚	A	A	A	A
Sodium Nitrate	70˚	A	A	A	A
Sodium Silicate	70˚	A	A	A	A
Sodium Sulfate	70˚	A	A	A	A
Sodium Sulfide	70˚	A	A	A	A
Sodium Sulfite	70˚	A	A	A	A
Sodium Thiosulfate	70˚	A	A	A	A
Stannic Chloride	70˚	A	A	A	B
Stannic Sulfide	70˚	I	A	I	I
Stannous Chloride	70˚	I	A	I	I
Stannous Sulfide	70˚	I	A	I	I
Stearic Acid	70˚	A	A	A	A
Sulfonic Acid	70˚	I	B	I	I
Sulfur Dioxide (Liquid)	70˚	X	X	X	X
Sulfuric Acid (Dry)	70˚	A	A	A	A
Sulfuric Acid 25%	70˚	A	A	A	A
Sulfuric Acid 25-50%	70˚	A	A	A	A
Sulfuric Acid 50-96%	70˚	X	X	B	B
Sulfuric Acid Fuming	70˚	X	X	X	X
Sulfurous Acid 10%	70˚	B	B	B	A
Sulfurous Acid 10-75%	70˚	X	X	X	X
T					
Tannic Acid	70˚	B	B	B	A
Tar	---	I	X	I	I
Tartaric Acid	70˚	A	A	A	A
Tertiary Butyl Alcohol	70˚	B	B	B	I
Tetrachlorobenzene	70˚	I	X	I	I
Tetrachloroethane	70˚	I	X	X	X
Tetrachloroethylene	70˚	I	X	X	X
Tetraethylene Glycol	70˚	I	B	I	I
Tetrachloromethane	70˚	I	X	I	X

SPIRAFLEX HOSE CHEMICAL RESISTANCE GUIDE

Thermoplastic Hose

A = May be used for Continuous Service
B = May be used for Intermittent Service
X = Do not use
I = Insufficient data

T	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Tetrachloronaphthalene	70˚	I	X	I	X
Tetrahydrofuran	70˚	X	X	X	X
Tin Chloride	70˚	B	B	B	B
Tin Tetrachloride	70˚	B	B	B	B
THF	70˚	I	X	I	X
Toluene	70˚	X	X	X	X
Toluidine	70˚	I	X	I	I
Toluol	70˚	X	X	X	X
Transmission Oil "A"	70˚	A	B	I	I
Tributyl Phosphate	70˚	X	X	X	X
Trichlorobenzene	70˚	X	X	X	X
Trichloroethane	70˚	I	X	X	X
Trichloroethylene	70˚	X	X	X	X
Trichloropropane	70˚	I	I	X	X
Triethanolamine	70˚	B	B	B	I
Triethylene Glycol	70˚	I	B	I	B
Triphenyl Phosphate	70˚	B	X	I	I
Trisodium Phosphate	70˚	B	B	A	A
Turpentine	70˚	B	B	A	X

Thermoplastic Hose

A = May be used for Continuous Service
B = May be used for Intermittent Service
X = Do not use
I = Insufficient data

U	Temperature (˚F)	Polyurethane/Spirathane	PVC/Pliovic Plus	TPE/Arvac SW	TPR/Green Hornet XF
Urea	70˚	A	A	A	A
Undecanol	70˚	I	A	I	I
V					
V.M. & P. Naptha	70˚	I	B	I	I
Vinyl Acetate	70˚	I	X	I	X
Vinyl Benzene	70˚	I	X	I	X
Vinyl Chloride	---	X	X	X	X
W					
Water	70˚	A	A	A	A
Wood Alcohol	70˚	B	B	B	A
X					
Xylene (Xylol)	70˚	X	X	X	X
Xylidine	70˚	I	X	I	I
Z					
Zinc Carbonate	70˚	I	A	A	B
Zinc Chloride	70˚	A	A	A	B
Zinc Chromate	70˚	A	A	A	I
Zinc Sulfate	70˚	A	A	A	B

ATTACHMENT B.

KELCO CHEMICAL COMPATIBILITY CHART, VITON™

KELCO

CHEMICAL COMPATIBILITY CHART

VITON

Our products can be exposed to a huge variety of chemicals. The data table below is an application guide, and indicates the resistance of the specific thermoplastics we use in the construction of our products, to common chemicals.

The data given should be used cautiously, and as a guide only. Various factors such as concentration, additives, exposure time, temperature and internal mechanical stress levels will all impact on the working life of our plastic parts.

Use the table conservatively and if any doubt exists, do not proceed with the application.

In the table below there are four ratings:

- **A-Excellent** indicates that at ambient temperature and pressure, the material should not be affected.
- **B-Good** indicates that the material is slightly affected but not to the point of being unsuitable.
- **C-Fair** indicates a degree of reaction that is generally considered unsuitable and should not be used.
- **D-Severe Effect** indicates that the material should not be used under any circumstances

All ratings are taken from data measured at ambient temperature and pressure.

CHEMICAL	COMPATIBILITY
Acetaldehyde	D-Severe Effect
Acetamide	B-Good
Acetate Solvent	D-Severe Effect
Acetic Acid	B-Good
Acetic Acid 20%	B-Good
Acetic Acid 80%	B-Good
Acetic Acid, Glacial	D-Severe Effect
Acetic Anhydride	D-Severe Effect
Acetone	D-Severe Effect
Acetyl Chloride (dry)	A-Excellent
Acetylene	A-Excellent
Acrylonitrile	D-Severe Effect
Adipic Acid	A-Excellent
Alcohols:Amyl	A-Excellent
Alcohols:Benzyl	A-Excellent
Alcohols:Butyl	A-Excellent
Alcohols:Diacetone	D-Severe Effect
Alcohols:Ethyl	A-Excellent
Alcohols:Hexyl	C-Fair
Alcohols:Isobutyl	A-Excellent
Alcohols:Isopropyl	A-Excellent
Alcohols:Methyl	C-Fair
Alcohols:Octyl	B-Good
Alcohols:Propyl	A-Excellent
Aluminum Chloride	A-Excellent
Aluminum Chloride 20%	A-Excellent
Aluminum Fluoride	A-Excellent
Aluminum Hydroxide	A-Excellent
Aluminum Nitrate	A-Excellent
Aluminum Potassium Sulfate 10%	A-Excellent
Aluminum Potassium Sulfate 100%	A-Excellent
Aluminum Sulfate	A-Excellent
Alums	A-Excellent
Amines	D-Severe Effect
Ammonia 10%	D-Severe Effect
Ammonia Nitrate	D-Severe Effect
Ammonia, anhydrous	D-Severe Effect
Ammonia, liquid	D-Severe Effect
Ammonium Acetate	A-Excellent
Ammonium Bifluoride	A-Excellent
Ammonium Carbonate	A-Excellent
Ammonium Chloride	A-Excellent
Ammonium Hydroxide	B-Good
Ammonium Nitrate	A-Excellent
Ammonium Persulfate	A-Excellent

Ammonium Phosphate, Dibasic	A-Excellent
Ammonium Phosphate, Monobasic	A-Excellent
Ammonium Phosphate, Tribasic	A-Excellent
Ammonium Sulfate	A-Excellent
Ammonium Sulfite	D-Severe Effect
Amyl Acetate	D-Severe Effect
Amyl Alcohol	A-Excellent
Amyl Chloride	B-Good
Aniline	A-Excellent
Aniline Hydrochloride	A-Excellent
Antifreeze	A-Excellent
Antimony Trichloride	A-Excellent
Aqua Regia (80% HCl, 20% HNO3)	B-Good
Arochlor 1248	A-Excellent
Aromatic Hydrocarbons	A-Excellent
Arsenic Acid	A-Excellent
Arsenic Salts	A-Excellent
Asphalt	A-Excellent
Barium Carbonate	A-Excellent
Barium Chloride	A-Excellent
Barium Cyanide	A-Excellent
Barium Hydroxide	A-Excellent
Barium Nitrate	A-Excellent
Barium Sulfate	A-Excellent
Barium Sulfide	A-Excellent
Beer	A-Excellent
Beet Sugar Liquids	A-Excellent
Benzaldehyde	D-Severe Effect
Benzene	A-Excellent
Benzene Sulfonic Acid	A-Excellent
Benzoic Acid	A-Excellent
Benzol	A-Excellent
Benzyl Chloride	A-Excellent
Bleaching Liquors	A-Excellent
Borax (Sodium Borate)	A-Excellent
Boric Acid	A-Excellent
Brewery Slop	A-Excellent
Bromine	A-Excellent
Butadiene	B-Good
Butane	A-Excellent
Butanol (Butyl Alcohol)	A-Excellent
Butter	A-Excellent
Buttermilk	A-Excellent
Butyl Amine	D-Severe Effect
Butyl Ether	D-Severe Effect
Butyl Phthalate	C-Fair
Butylacetate	D-Severe Effect

Butylene	A-Excellent
Butyric Acid	B-Good
Calcium Bisulfide	A-Excellent
Calcium Bisulfite	A-Excellent
Calcium Carbonate	A-Excellent
Calcium Chlorate	A-Excellent
Calcium Chloride	A-Excellent
Calcium Hydroxide	A-Excellent
Calcium Hypochlorite	A-Excellent
Calcium Nitrate	A-Excellent
Calcium Oxide	B-Good
Calcium Sulfate	A-Excellent
Calgon	A-Excellent
Cane Juice	A-Excellent
Carbolic Acid (Phenol)	A-Excellent
Carbon Bisulfide	A-Excellent
Carbon Dioxide (dry)	B-Good
Carbon Dioxide (wet)	B-Good
Carbon Disulfide	A-Excellent
Carbon Monoxide	A-Excellent
Carbon Tetrachloride	A-Excellent
Carbon Tetrachloride (dry)	A-Excellent
Carbonated Water	A-Excellent
Carbonic Acid	A-Excellent
Catsup	A-Excellent
Chlorinated Glue	A-Excellent
Chlorine (dry)	A-Excellent
Chlorine Water	A-Excellent
Chlorine, Anhydrous Liquid	A-Excellent
Chloroacetic Acid	D-Severe Effect
Chlorobenzene (Mono)	A-Excellent
Chlorobromomethane	A-Excellent
Chloroform	A-Excellent
Chlorosulfonic Acid	D-Severe Effect
Chocolate Syrup	A-Excellent
Chromic Acid 10%	B-Good
Chromic Acid 30%	A-Excellent
Chromic Acid 5%	A-Excellent
Chromic Acid 50%	A-Excellent
Cider	A-Excellent
Citric Acid	A-Excellent
Citric Oils	A-Excellent
Cloroxr (Bleach)	A-Excellent
Coffee	A-Excellent
Copper Chloride	A-Excellent
Copper Cyanide	A-Excellent
Copper Fluoborate	A-Excellent

Copper Nitrate	A-Excellent
Copper Sulfate >5%	A-Excellent
Copper Sulfate 5%	A-Excellent
Cream	A-Excellent
Cresols	A-Excellent
Cresylic Acid	A-Excellent
Cupric Acid	A-Excellent
Cyanic Acid	A-Excellent
Cyclohexane	A-Excellent
Cyclohexanone	D-Severe Effect
Detergents	A-Excellent
Diacetone Alcohol	D-Severe Effect
Dichlorobenzene	C-Fair
Dichloroethane	C-Fair
Diesel Fuel	A-Excellent
Diethyl Ether	D-Severe Effect
Diethylamine	A-Excellent
Diethylene Glycol	A-Excellent
Dimethyl Aniline	D-Severe Effect
Dimethyl Formamide	C-Fair
Diphenyl	A-Excellent
Diphenyl Oxide	A-Excellent
Dyes	A-Excellent
Epsom Salts (Magnesium Sulfate)	A-Excellent
Ethane	A-Excellent
Ethanol	A-Excellent
Ethanolamine	D-Severe Effect
Ether	C-Fair
Ethyl Acetate	D-Severe Effect
Ethyl Benzoate	A-Excellent
Ethyl Chloride	A-Excellent
Ethyl Ether	D-Severe Effect
Ethyl Sulfate	A-Excellent
Ethylene Bromide	A-Excellent
Ethylene Chloride	B-Good
Ethylene Chlorohydrin	A-Excellent
Ethylene Diamine	B-Good
Ethylene Dichloride	A-Excellent
Ethylene Glycol	A-Excellent
Ethylene Oxide	D-Severe Effect
Fatty Acids	A-Excellent
Ferric Chloride	A-Excellent
Ferric Nitrate	A-Excellent
Ferric Sulfate	A-Excellent
Ferrous Chloride	A-Excellent
Ferrous Sulfate	B-Good
Fluoboric Acid	B-Good

Fluorine	C-Fair
Fluosilicic Acid	B-Good
Formaldehyde 100%	D-Severe Effect
Formaldehyde 40%	A-Excellent
Formic Acid	C-Fair
Freon 113	B-Good
Freon 12	B-Good
Freon 22	D-Severe Effect
Freon TF	B-Good
Freonr 11	B-Good
Fruit Juice	A-Excellent
Fuel Oils	A-Excellent
Furan Resin	D-Severe Effect
Furfural	D-Severe Effect
Gallic Acid	A-Excellent
Gasoline (high-aromatic)	A-Excellent
Gasoline, leaded, ref.	A-Excellent
Gasoline, unleaded	A-Excellent
Gelatin	A-Excellent
Glucose	A-Excellent
Glue, P.V.A.	B-Good
Glycerin	A-Excellent
Glycolic Acid	A-Excellent
Gold Monocyanide	A-Excellent
Grape Juice	A-Excellent
Grease	A-Excellent
Heptane	A-Excellent
Hexane	A-Excellent
Honey	A-Excellent
Hydraulic Oil (Petro)	A-Excellent
Hydraulic Oil (Synthetic)	A-Excellent
Hydrazine	A-Excellent
Hydrobromic Acid 100%	A-Excellent
Hydrobromic Acid 20%	A-Excellent
Hydrochloric Acid 100%	A-Excellent
Hydrochloric Acid 20%	A-Excellent
Hydrochloric Acid 37%	A-Excellent
Hydrocyanic Acid	A-Excellent
Hydrocyanic Acid (Gas 10%)	A-Excellent
Hydrofluoric Acid 100%	B-Good
Hydrofluoric Acid 20%	A-Excellent
Hydrofluoric Acid 50%	B-Good
Hydrofluoric Acid 75%	B-Good
Hydrofluosilicic Acid 100%	A-Excellent
Hydrofluosilicic Acid 20%	A-Excellent
Hydrogen Gas	A-Excellent
Hydrogen Peroxide 10%	A-Excellent

Hydrogen Peroxide 100%	A-Excellent
Hydrogen Peroxide 30%	A-Excellent
Hydrogen Peroxide 50%	A-Excellent
Hydrogen Sulfide (aqua)	D-Severe Effect
Hydrogen Sulfide (dry)	D-Severe Effect
Hydroquinone	B-Good
Hydroxyacetic Acid 70%	A-Excellent
Ink	A-Excellent
Iodine	A-Excellent
Isooctane	A-Excellent
Isopropyl Acetate	D-Severe Effect
Isopropyl Ether	D-Severe Effect
Isotane	A-Excellent
Jet Fuel (JP3, JP4, JP5)	A-Excellent
Kerosene	A-Excellent
Ketones	D-Severe Effect
Lacquer Thinners	D-Severe Effect
Lacquers	D-Severe Effect
Lactic Acid	A-Excellent
Lard	A-Excellent
Latex	A-Excellent
Lead Acetate	D-Severe Effect
Lead Nitrate	A-Excellent
Lead Sulfamate	A-Excellent
Ligroin	A-Excellent
Lime	A-Excellent
Linoleic Acid	B-Good
Lithium Chloride	A-Excellent
Lubricants	A-Excellent
Lye: Ca(OH)2 Calcium Hydroxide	B-Good
Lye: KOH Potassium Hydroxide	B-Good
Lye: NaOH Sodium Hydroxide	B-Good
Magnesium Carbonate	A-Excellent
Magnesium Chloride	A-Excellent
Magnesium Hydroxide	A-Excellent
Magnesium Nitrate	A-Excellent
Magnesium Oxide	C-Fair
Magnesium Sulfate (Epsom Salts)	A-Excellent
Maleic Acid	A-Excellent
Maleic Anhydride	A-Excellent
Malic Acid	A-Excellent
Manganese Sulfate	A-Excellent
Mash	A-Excellent
Mayonnaise	A-Excellent
Melamine	A-Excellent
Mercuric Chloride (dilute)	A-Excellent
Mercuric Cyanide	A-Excellent

Mercurous Nitrate	A-Excellent
Mercury	A-Excellent
Methane	A-Excellent
Methanol (Methyl Alcohol)	C-Fair
Methyl Acetate	D-Severe Effect
Methyl Acetone	D-Severe Effect
Methyl Acrylate	D-Severe Effect
Methyl Alcohol 10%	C-Fair
Methyl Bromide	A-Excellent
Methyl Butyl Ketone	D-Severe Effect
Methyl Cellosolve	D-Severe Effect
Methyl Chloride	A-Excellent
Methyl Dichloride	A-Excellent
Methyl Ethyl Ketone	D-Severe Effect
Methyl Ethyl Ketone Peroxide	D-Severe Effect
Methyl Isobutyl Ketone	D-Severe Effect
Methyl Isopropyl Ketone	D-Severe Effect
Methyl Methacrylate	D-Severe Effect
Methylamine	D-Severe Effect
Methylene Chloride	B-Good
Milk	A-Excellent
Mineral Spirits	A-Excellent
Molasses	A-Excellent
Monochloroacetic acid	C-Fair
Monoethanolamine	D-Severe Effect
Mustard	D-Severe Effect
Naphtha	A-Excellent
Naphthalene	A-Excellent
Natural Gas	A-Excellent
Nickel Chloride	A-Excellent
Nickel Nitrate	A-Excellent
Nickel Sulfate	A-Excellent
Nitric Acid (20%)	A-Excellent
Nitric Acid (50%)	A-Excellent
Nitric Acid (5-10%)	A-Excellent
Nitric Acid (Concentrated)	A-Excellent
Nitrobenzene	B-Good
Nitromethane	D-Severe Effect
Nitrous Acid	B-Good
Nitrous Oxide	B-Good
Oils:Aniline	C-Fair
Oils:Bay	A-Excellent
Oils:Bone	A-Excellent
Oils:Castor	A-Excellent
Oils:Cinnamon	A-Excellent
Oils:Citric	A-Excellent
Oils:Clove	A-Excellent

Oils:Coconut	A-Excellent
Oils:Cod Liver	A-Excellent
Oils:Corn	B-Good
Oils:Cottonseed	A-Excellent
Oils:Creosote	A-Excellent
Oils:Diesel Fuel (20, 30, 40, 50)	A-Excellent
Oils:Fuel (1, 2, 3, 5A, 5B, 6)	B-Good
Oils:Ginger	A-Excellent
Oils:Hydraulic Oil (Petro)	A-Excellent
Oils:Hydraulic Oil (Synthetic)	A-Excellent
Oils:Lemon	A-Excellent
Oils:Linseed	A-Excellent
Oils:Mineral	A-Excellent
Oils:Olive	A-Excellent
Oils:Orange	A-Excellent
Oils:Palm	A-Excellent
Oils:Peanut	A-Excellent
Oils:Peppermint	A-Excellent
Oils:Pine	A-Excellent
Oils:Rapeseed	A-Excellent
Oils:Rosin	A-Excellent
Oils:Sesame Seed	A-Excellent
Oils:Silicone	A-Excellent
Oils:Soybean	A-Excellent
Oils:Sperm (whale)	A-Excellent
Oils:Tanning	A-Excellent
Oils:Transformer	A-Excellent
Oils:Turbine	A-Excellent
Oleic Acid	B-Good
Oleum 100%	A-Excellent
Oleum 25%	A-Excellent
Oxalic Acid (cold)	A-Excellent
Ozone	A-Excellent
Palmitic Acid	A-Excellent
Paraffin	B-Good
Pentane	A-Excellent
Perchloric Acid	A-Excellent
Perchloroethylene	A-Excellent
Petrolatum	A-Excellent
Petroleum	A-Excellent
Phenol (10%)	A-Excellent
Phenol (Carbolic Acid)	A-Excellent
Phosphoric Acid (>40%)	A-Excellent
Phosphoric Acid (crude)	A-Excellent
Phosphoric Acid (S40%)	A-Excellent
Phosphorus Trichloride	A-Excellent
Photographic Developer	A-Excellent

Photographic Solutions	B-Good
Phthalic Acid	A-Excellent
Phthalic Anhydride	A-Excellent
Picric Acid	A-Excellent
Plating Solutions, Antimony Plating 130°F	A-Excellent
Plating Solutions, Arsenic Plating 110°F	A-Excellent
Plating Solutions, Brass Plating: High-Speed Brass Bath 110°F	A-Excellent
Plating Solutions, Brass Plating: Regular Brass Bath 100°F	A-Excellent
Plating Solutions, Bronze Plating: Cu-Cd Bronze Bath R.T.	A-Excellent
Plating Solutions, Bronze Plating: Cu-Sn Bronze Bath 160°F	A-Excellent
Plating Solutions, Bronze Plating: Cu-Zn Bronze Bath 100°F	A-Excellent
Plating Solutions, Cadmium Plating: Cyanide Bath 90°F	A-Excellent
Plating Solutions, Cadmium Plating: Fluoborate Bath 100°F	A-Excellent
Plating Solutions, Chromium Plating: Barrel Chrome Bath 95°F	C-Fair
Plating Solutions, Chromium Plating: Black Chrome Bath 115°F	C-Fair
Plating Solutions, Chromium Plating: Chromic-Sulfuric Bath 130°F	C-Fair
Plating Solutions, Chromium Plating: Fluoride Bath 130°F	C-Fair
Plating Solutions, Chromium Plating: Fluosilicate Bath 95°F	C-Fair
Plating Solutions, Copper Plating (Acid): Copper Fluoborate Bath 120°F	A-Excellent
Plating Solutions, Copper Plating (Acid): Copper Sulfate Bath R.T.	A-Excellent
Plating Solutions, Copper Plating (Cyanide): Copper Strike Bath 120°F	A-Excellent
Plating Solutions, Copper Plating (Cyanide): High-Speed Bath 180°F	A-Excellent
Plating Solutions, Copper Plating (Cyanide): Rochelle Salt Bath 150°F	A-Excellent
Plating Solutions, Copper Plating (Misc): Copper (Electroless)	A-Excellent
Plating Solutions, Copper Plating (Misc): Copper Pyrophosphate	A-Excellent
Plating Solutions, Gold Plating: Acid 75°F	A-Excellent
Plating Solutions, Gold Plating: Cyanide 150°F	A-Excellent
Plating Solutions, Gold Plating: Neutral 75°F	A-Excellent
Plating Solutions, Indium Sulfamate Plating R.T.	A-Excellent
Plating Solutions, Iron Plating: Ferrous Am Sulfate Bath 150°F	A-Excellent
Plating Solutions, Iron Plating: Ferrous Chloride Bath 190°F	A-Excellent
Plating Solutions, Iron Plating: Ferrous Sulfate Bath 150°F	A-Excellent
Plating Solutions, Iron Plating: Fluoborate Bath 145°F	A-Excellent
Plating Solutions, Iron Plating: Sulfamate 140°F	A-Excellent
Plating Solutions, Iron Plating: Sulfate-Chloride Bath 160°F	A-Excellent
Plating Solutions, Lead Fluoborate Plating	A-Excellent
Plating Solutions, Nickel Plating: Electroless 200°F	A-Excellent
Plating Solutions, Nickel Plating: Fluoborate 100-170°F	A-Excellent
Plating Solutions, Nickel Plating: High-Chloride 130-160°F	A-Excellent
Plating Solutions, Nickel Plating: Sulfamate 100-140°F	A-Excellent
Plating Solutions, Nickel Plating: Watts Type 115-160°F	A-Excellent
Plating Solutions, Rhodium Plating 120°F	A-Excellent
Plating Solutions, Silver Plating 80-120°F	A-Excellent
Plating Solutions, Tin-Fluoborate Plating 100°F	A-Excellent
Plating Solutions, Tin-Lead Plating 100°F	A-Excellent
Plating Solutions, Zinc Plating: Acid Chloride 140°F	A-Excellent
Plating Solutions, Zinc Plating: Acid Fluoborate Bath R.T.	A-Excellent

ATTACHMENT C

316/316L SS AND VITON™ COMPATIBILITY FOR SPENT DECON SERVICE

Attachment C
316/316L SS and Viton™ Compatibility for Spent Decon Service

The corrosion rate of 316/316L SS in HCl concentrations up to 1 wt% is 0.1 mm/year (See Table 1. Note: Sandvik 3R60 is ASTM TP316L Pipe.

The temporary modification sets the pH Low Low alarm point at 6 which correlates to an HCl concentration of 3.7×10^{-6} wt%. Schedule 40 piping and components are acceptable for the design life of 5-years.

The concern with the 316/316L SS is chloride concentration causing pitting and crevice corrosion, as denoted by the small "p" in the corrosion tables. Mo-bearing Alloy 316 and Alloy 316L may handle waters with up to 2000 ppm Chlorides (See Figure 2). From evaluation of the chloride ion sources bulleted below, none are concerning.

- NaCl content from the OTS caustic scrubber has not impacted the WR class (316 SSL) piping in the OTS recirculation loop which is the same material that will be used in the SDS piping. From previous inspection of this pipe as a result of OTS heat exchanger failure, pitting and crevice corrosion was not concerning after being in service for more than 5 years. This flow from the OTS caustic scrubber blowdown is not sustained and the design life of the 316 SS SDS piping is up to 5-years. See B20 Piping Corrosion Evaluation, 24852-RD-NEC-B20-P0001 (Ref.3).
- Neutralizing ½ of a HD 155mm round produces 30 moles (~ 1.1 kilogram) of chloride ions. This is non concerning for the carbon steel piping but can be an issue for the 316 SS components. To keep the concentration below 2000 ppm, dilution with water with volumes of less than 125 gallons mitigates the concern.
- Dissociation of HCl without neutralization - The SD Tank would have to achieve a pH of 1.25 for the chloride concentration to equal 2000 ppm and that limit is well below our Low Low pH alarm point.

The chemical compatibility of 316L SS is good with only minor effects up to concentration of 20 wt% and at a service temperature of 120 ^{o}F (Figure 1). The hoses will not be subjected to concentrations of NaOH near 20 wt%.

Viton™: Goodyear compatibility chart only denotes 38% wt. %. HCL fuming acid compatibility and recommends Teflon. The concentration maximum of HCL in SDS solution is less than 1 wt.%. Other resource (e.g., Chemours) provide corrosion data for up to 20 wt.% for HCl which clearly shows all types of Viton™ are rated "A" (See Figure 3). Figure 4 shows the corrosion resistance of Viton™ for all concentrations of sodium hydroxide. The SDS hoses will see concentrations up to 1 wt% NaOH. Of the six types of Viton™, four are rated "A" (Viton™ Extreme™ ETP, Viton™ GFLT, F-type, B-type). The other two are rated "B" (Viton™ GLT, A-type).

Attachment C
316/316L SS and Viton™ Compatibility for Spent Decon Service

Table 1 Rates of Corrosion for Various Grades and Allows of Metals for Dilute Concentrations of HCl

Hydrochloric acid, HCl

Conc. %	0.1	0.1	0.2	0.2	0.2	0.2	0.5	0.5	0.5	1
Temp. °C	20 -50	100 =BP	20	50	100 =BP	130	20	50	100 =BP	20
Grade or type of alloy:										
Carbon steel	1	2	1	2			2	2	2	2
13 Cr	1p	1p	1p	1p			2	2	2	2
Sandvik 1802	p	p	p	p			p	p	2	p
Sandvik 3R12	1p	1ps	1p	1p			1p	1p	2	1p
Sandvik 3R60	0p	0ps	0p	0p			0p	0p	2	0p
18Cr13Ni3Mo [1]	0p	0ps	0p	0p			0p	0p	2	0p
17Cr14Ni4Mo [2]	0p	0ps	0p	0p			0p	0p	2	0p
Sandvik 2RK65 ('904L')	0p	0ps	0p	0p			0p	0p	2	0p
Sanicro 28	0ND	0ND					0ND	0ND		0ND
254 SMO			0ND	0ND	0ND		0ND	0ND	1ND	0ND
654 SMO					0ND		0ND	0ND	0ND	0ND
Sandvik SAF 2304	0ND				0ND		0ND	0	2	0ND
Sandvik SAF 2205	0		0ND	0ND	0ND		0ND	0ND		0ND
Sandvik SAF 2507					0ND					0ND
Titanium (Cp Ti)	0	0	0	0		0p	0	0	1	0

[1] ASTM 317L, e.g. Sandvik 3R64
[2] EN 1.4439, e.g. Sandvik 3R68

Sandvik 3R60 is manufacture to ASTM TP316L
Concentration denoted in weight %

Symbol clarification

These corrosion tables use a number of symbols, having the following meanings:

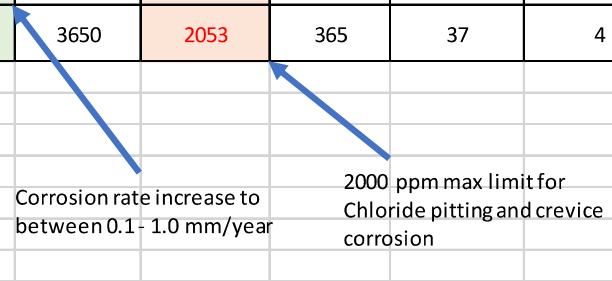
Symbol	Description
0	Corrosion rate less than 0.1 mm/year. The material is corrosion proof.
1	Corrosion rate 0.1—1.0 mm/year. The material is not corrosion proof, but useful in certain cases.
2	Corrosion rate over 1.0 mm/year. Serious corrosion. The material is not usable.
p, P	Risk (severe risk) of pitting and crevice corrosion.
c, C	Risk (Severe risk) of crevice corrosion. Used when there is a risk of localised corrosion only if crevices are present. Under more severe conditions, when there is also a risk of pitting corrosion, the symbols p or P are used instead.
s, S	Risk (Severe risk) of stress corrosion cracking.
ig	Risk of intergranular corrosion.
BP	Boiling solution.
ND	No data. (Used only where there are no actual data to estimate the risk of localised corrosion instead of p or s).

Source: https://www.materials.sandvik/en-us/materials-center/corrosion-tables/hydrochloric-acid/

Attachment C
316/316L SS and Viton™ Compatibility for Spent Decon Service

Table 2 pH and Concentration Relationships for HCl

pH	0	0.55	1	1.25	2	3	4	5	6	7
Molar Conc (moles/L)	1	0.28	0.1	0.056	0.01	0.001	0.0001	0.00001	0.000001	0.0000001
Mass/Volume Conc (g/L)	36.5	10.29	3.65	2.053	0.365	0.0365	0.00365	0.000365	0.0000365	0.00000365
Volume of Solute per Liter of Solution (mL)	24.5	6.9	2.4	1.4	2.4E-01	2.4E-02	2.4E-03	2.4E-04	2.4E-05	2.4E-06
Volume of Water per Liter of Solution (mL)	975.5	993.1	997.6	998.6	999.8	1000	1000	1000	1000	1000
Mass of Solute per Liter of Solution (g)	36.5	10.3	3.7	2.1	3.7E-01	3.7E-02	3.7E-03	3.7E-04	3.7E-05	3.7E-06
Mass of Water per Liter of Solution (g)	975.5	993.1	997.6	998.6	999.8	1000.0	1000.0	1000.0	1000.0	1000.0
Weight %	3.6%	1.0%	0.36%	0.21%	0.036%	0.0036%	0.00036%	0.000036%	0.0000036%	0.00000036%
ppm (Cl^{-1}) from HCL	36500	10287	3650	2053	365	37	4	4.E-01	4.E-02	4.E-03



Attachment C

316/316L SS and Viton™ Compatibility for Spent Decon Service

316L Stainless Steel Chemical Compatibility Chart

ver 10-Jan-2020

Chemical		Chemical	
Potassium Persulfate	A	Shellac, bleached	A
Potassium Phosphate	C	Shellac, orange	A
Potassium Sulfate	A	Silane Gas	A
Potassium Sulfate, 10%	A	Silicone Oil	A
Potassium Sulfide	B	Silver Bromide	D
Potassium Sulfite	A	Silver Chloride	D
Potassium Thiosulfate	C	Silver Nitrate	B
Propane, gas	A	Soap Solutions (stearates)	A
Propane, liquefied	A	Soaps	A
Propionaldehyde	B	Soda Ash (sodium carbonate)	A
Propyl Acetate	A	Sodium Acetate	B
Propyl Alcohol	A	Sodium Aluminate	A
Propylene	A	Sodium Benzoate	D
Propylene Dichloride	A	Sodium Bicarbonate	A
Propylene Glycol	B	Sodium Bisulfate, 10%	C
Propylene Oxide	A	Sodium Bisulfite	B
Pydraul® (hydraulic fluid)	A	Sodium Borate (Borax)	B
Pyridine	A	Sodium Bromide	C
Pyrogallic Acid (pyrogallol)	B	Sodium Carbonate (soda ash)	A
Pyrrole	B	Sodium Chlorate	B
Quinine	A	Sodium Chloride	B
Resorcinol (resorcin, m-Dihydroxybenzene)	D	Sodium Chlorite	A
Resins and Rosins	A	Sodium Chromate	B
Road Tar	A	Sodium Cyanate	D
Roof Pitch	A	Sodium Cyanide	B
RP-1 Fuel	A	Sodium Ferricyanide	A
Rubber Solvents	A	Sodium Ferrocyanide	B
Rum	A	Sodium Fluoride	A
Rust Inhibitors	A	Sodium Hydrogen Sulfite	B
Salad Dressings	A	Sodium Hydrosulfide	B
Salad Oil	A	Sodium Hydrosulfite	D
Salicylic Acid	B[1]	Sodium Hydroxide (Lye, caustic potash)	B
Salt Brine (NaCl saturated)	A[1]	Sodium Hydroxide, 20%	B[1]
Salt Solutions	A	Sodium Hydroxide, 50%	B
Sea Water	C	Sodium Hydroxide, 80%	B
Sewage	A	Sodium Hypochlorite, 5.25%	C

Key to General Chemical Resistance [all data based on 72° (22 °C) unless noted]
A = Excellent – No Effect
B= Good - Minor Effect, slight corrosion or discoloration
C = Fair - Moderate Effect, not recommended
D = Severe Effect, not recommended for ANY use

Explanation of Footnotes 1 – Satisfactory to 120° F (48° C)

It is the sole responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Material compatibility, product ratings and application details should be considered in the selection. Improper selection or use of products described herein can cause personal injury or product damage.

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Figure 1 316L SS Compatibility with Concentration Sodium Hydroxide as Indicated.

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Chloride/Chlorine Levels and Stainless Steel Alloy Selection

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The 304 and 304L (18-8 stainless steel alloys) have been utilized very successfully in fresh waters containing low levels of chloride ion of up to 100 ppm. This level of chloride is considered to be the limit for the 18-8 alloys, particularly if crevices are present. Higher levels of chloride might cause crevice corrosion and pitting. The 18-8 alloys are not recommended for exposure to marine environments which have much higher levels of chloride.

The resistance of the stabilized Alloys 321 to pitting and crevice corrosion in the presence of chloride ion is similar to that of Alloy 304 or 304L stainless steels because of similar chromium content. And therefore 100 ppm chloride in aqueous environments is considered to be the limit for the stabilized alloys, particularly if crevices are present.

For more severe conditions of higher chloride level, lower pH and/or higher temperatures, alloys with Mo (molybdenum), such as Alloy 316, should be considered. The Mo-bearing Alloy 316 and Alloy 316L may handle waters with up to about 2000 ppm of chloride.

Another factor to consider is the amount of free Chlorine (Cl2) (usually derived from sodium hypochlorite) which is added to water (well water, drinking water, swimming pool water, etc.) to kill bacteria. Cl2 (chlorine) is a very potent oxidizer (reason it kills bacteria) and therefore high levels of Chlorine may accelerate chloride corrosion of stainless steels. 304 and 304L, 321 SS may be used for "water applications" with up to 2 ppm chlorine, while 316 and 316L alloys may "take" up to 4 ppm.

If looking for information about Chlorine Transfer Hoses, please click here.

If you have any questions or comments, please contact us.

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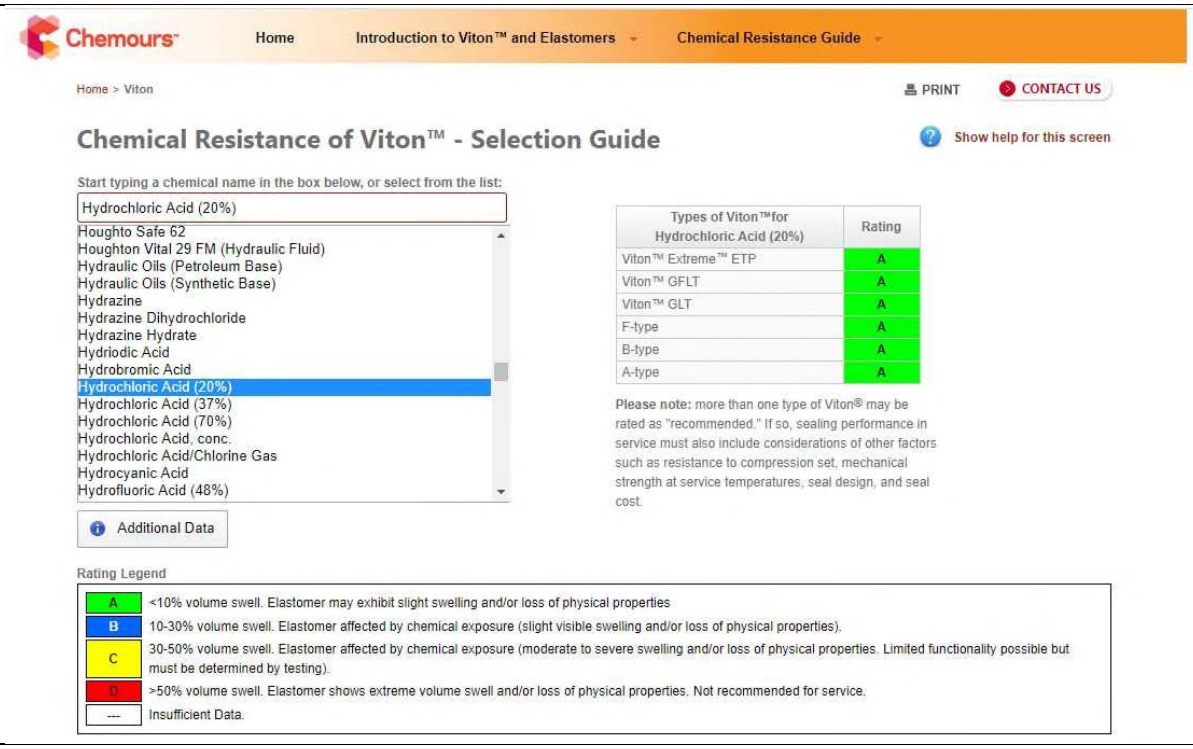
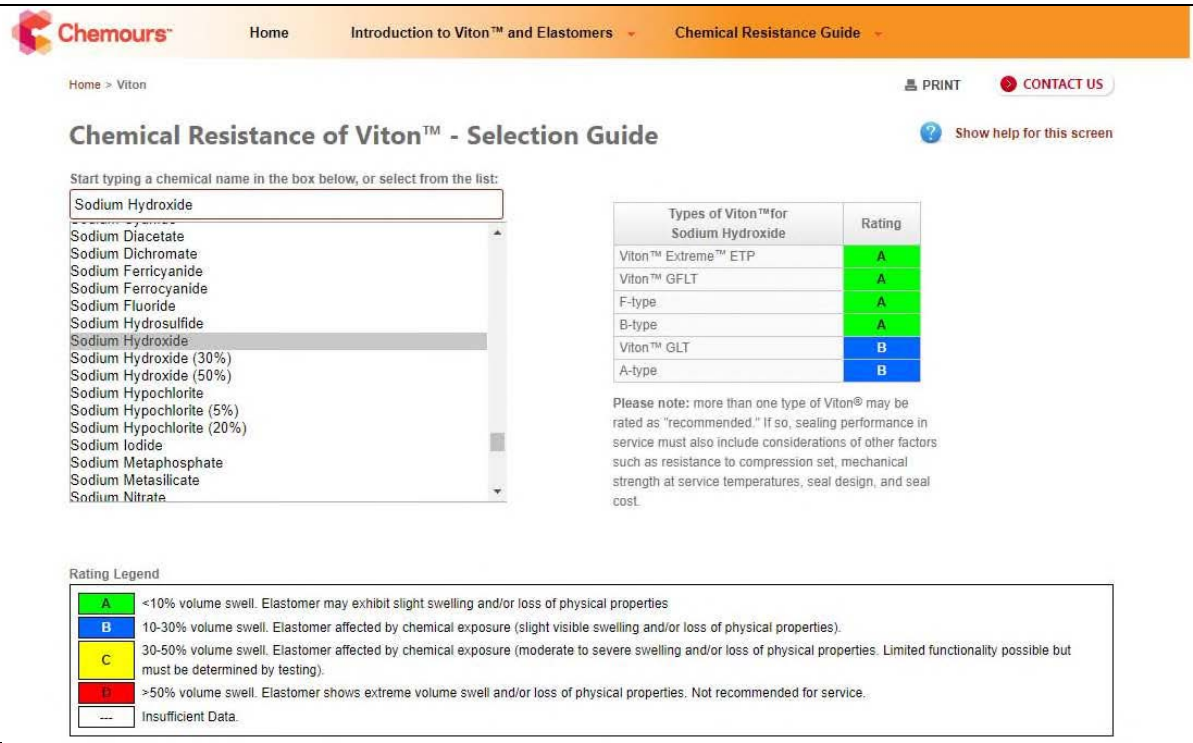
Figure 2 Chlorine/Chorine Levels and Stainless-Steel Alloy Selection



Source: http://chemours-site.force.com/CRG_VitonGuide

Figure 3 Chemical Resistance of Viton™ for 20% Hydrochloric Acid



Source: http://chemours-site.force.com/CRG_VitonGuide

Figure 4 Chemical Resistance of Viton™ for Sodium Hydroxide

ATTACHMENT D.

ASSESSMENT OF ORGANIC COMPONENTS OF SDS

Attachment D

ASSESSMENT OF ORGANIC COMPONENTS OF SDS

The materials and solutions added to the SDS are defined in the PCAPP Waste Analysis Plan (WAP, 24852-G01-GBL-V0007) in Table D-5-1 with more specific detail provided in Paragraph D-5d (5). Specifically,

> *The Spent Decontamination Holding Tanks aggregate the following waste streams: spent decontamination/rinse solutions from the APB, ERB, and medical facility; condensate from APB air handling units, steam lines, hot process water, and autoclave; blowdown from the OTS scrubber; process liquids, including hydrolysate, that are generated during maintenance, repair, and decontamination activities; cleanup after incidental spills of fluids from industrial equipment in the immediate area of a spent decon system sump (e.g., propylene glycol, or lubricating fluids from the metering pumps in the Tox Room.) The quantity of the liquids entering the sumps from incidental spills from industrial equipment during maintenance activities will be maintained to be one gallon or less.*

Additionally, the SDS may contain streams referenced in Section D-8 of the WAP, including Spent Decontamination Solutions from the APB, spill residue, and some tank, stump, and strainer sludges. Enhanced Reconfiguration Building (ERB) and medical facility waste are segregated from the APB SDS and are not included in this assessment. The materials described may contain organic and/or acidic components depending on the specific generating activity. Occasionally larger volumes of wash water (WW) or hydrolysate added to the SDS following specific spill or clean-up activities. It should be noted that due to interference with the agent monitoring systems, the use of chlorinated industrial chemicals (solvents, lubricants, etc) are generally excluded from use in the Agent Processing Building (APB) and their contribution to chlorine in the SDS is negligible. The overwhelming source of chlorinated compounds in SDS and WW is agent and agent breakdown products. Although HD treatment and degradation products are provided in Table D-2-2 of the WAP, data from PCAPP operations is available to further characterize the contents of the system.

Assessment of Compatibility with Organic Components of SDS, WW, and SDS/WW

While the SDS is not normally sampled or analyzed prior to processing in the Agent Neutralization Reactor (ANR), data was collected during and after Revised Agent Neutralization Processing Strategy testing conducted in 2018. SDS and WW batches are not treated at elevated temperature, the analytical results of hydrolysate SDS and WW batches can be used to understand those waste streams. A summary table of Volatile and Semivolatile organic analytical results for SDS, WW and SDS/WW batch types are included to provide the range of chemicals that might be processed through the SDS. The major component in all liquid types these analyses is thiodiglycol with lower levels of 1,4 oxathiane and 1,4 dithiane. Thiodiglycol is compatible with Teflon Fluoroethylene propylene (FEP) based on U.S Army testing (test report enclosed with this submission). Thiodiglycol is also similar in structure to diethylene glycol which is recommended as compatible with hose components/materials. Although not included in the Goodyear compatibility tables (Attachment 1), as heterocyclic compounds both 1,4 oxathiane and 1,4 dithiane pose no compatibility issues with the FEP or Viton® hose components.

Hi-Per hoses are not recommended for use by the manufacturer for neat (pure or concentrated) ethylene oxide and vinyl chloride; this is likely because each of these compounds is a gas at atmospheric

(PCAPP) conditions. At the low levels observed in hydrolysate there is no concern with compatibility with the hose materials/components.

PCAPP Hydrolysate Components as Identified During Revised and After Agent Neutralization Processing Strategy Tests

Chemical Information		Unit	Batch Type		
CAS #	**Analyte**		**SDS/WW**	**SDS**	**WW**
15980-15-1	OX	ppm	236.4	227.8	236.9
505-29-3	DT	ppm	899.1	502.5	922.9
111-48-8	TDG	ppm	12949.6	11272.2	15324.3
VOCs					
100-41-4	Ethylbenzene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
91-20-3	Naphthalene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
79-01-6	Trichloroethene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
87-61-6	1,2,3-Trichlorobenzene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
71-43-2	Benzene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
95-63-6	1,2,4-Trimethylbenzene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
95-47-6	o-Xylene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
1330-20-7, 106-42-3	m&p-Xylene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
123-91-1	1,4-Dioxane	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
75-00-3	Chloroethane	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
108-88-3	Toluene	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
591-78-6	2-Hexanone	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
78-93-3	2-Butanone [MEK]	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
67-64-1	Acetone	ppm	trace, < 1ppm	trace, < 1ppm	trace, < 1ppm
75-21-8	Ethylene Oxide	ppm	59.4	1.5	52.1
75-01-4	Vinyl Chloride	ppm	12.6	17.6	14.9
107-06-2	1,2-Dichloroethane	ppm	35.8	32.6	41.0
75-15-0	Carbon Disulfide	ppm	trace, < 1ppm	ND	trace, < 1ppm
106-88-7	1,2-Epoxybutane	ppm	trace, < 1ppm	ND	trace, < 1ppm
98-82-8	Isopropylbenzene	ppm	trace, < 1ppm	ND	trace, < 1ppm
120-82-1	1,2,4-Trichlorobenzene	ppm	trace, < 1ppm	ND	trace, < 1ppm
106-46-7	1,4-Dichlorobenzene	ppm	trace, < 1ppm	ND	trace, < 1ppm
127-18-4	Tetrachloroethene	ppm	trace, < 1ppm	ND	trace, < 1ppm
95-50-1	1,2-Dichlorobenzene	ppm	ND	ND	ND
87-68-3	Hexachlorobutadiene	ppm	ND	ND	ND
75-05-08	Acetonitrile	ppm	trace, < 1ppm	ND	trace, < 1ppm
107-02-8	Acrolein	ppm	ND	ND	ND
107-13-1	Acrylonitrile	ppm	ND	ND	ND
107-18-6	Allyl Alcohol	ppm	ND	ND	ND
107-05-1	Allyl Chloride	ppm	ND	ND	ND
100-44-7	Benzyl Chloride	ppm	ND	ND	ND

Attachment D
Assessment of Organic Components of SDS

Chemical Information		Unit	Batch Type		
CAS #	**Analyte**		**SDS/WW**	**SDS**	**WW**
75-27-4	Bromodichloromethane	ppm	ND	ND	ND
75-25-2	Bromoform	ppm	ND	ND	ND
74-83-9	Bromomethane	ppm	ND	ND	ND
106-99-0	1,3-Butadiene	ppm	ND	ND	ND
56-23-5	Carbon Tetrachloride	ppm	ND	ND	ND
108-90-7	Chlorobenzene	ppm	ND	ND	ND
110-75-8	2-Chloroethylvinylether	ppm	ND	ND	ND
67-66-3	Chloroform	ppm	ND	ND	ND
74-87-3	Chloromethane	ppm	ND	ND	ND
126-99-8	Chloroprene	ppm	ND	ND	ND
95-49-8	2-Chlorotoluene	ppm	ND	ND	ND
106-43-4	4-Chlorotoluene	ppm	ND	ND	ND
124-48-1	Dibromochloromethane	ppm	ND	ND	ND
106-93-4	1,2-Dibromoethane	ppm	ND	ND	ND
96-12-8	1,2-Dibromo-3-chloropropane	ppm	ND	ND	ND
74-95-3	Dibromomethane	ppm	ND	ND	ND
541-73-1	1,3-Dichlorobenzene	ppm	ND	ND	ND
1476-11-5	cis-1,4-dichloro-2-butene	ppm	ND	ND	ND
110-57-6	trans-1,4-dichloro-2-butene	ppm	ND	ND	ND
75-71-8	Dichlorodifluoromethane	ppm	ND	ND	ND
75-34-3	1,1-Dichloroethane	ppm	ND	ND	ND
75-35-4	1,1-Dichloroethene	ppm	ND	ND	ND
156-59-2	cis-1,2-dichloroethene	ppm	ND	ND	ND
156-60-5	trans-1,2-dichloroethene	ppm	ND	ND	ND
78-87-5	1,2-Dichloropropane	ppm	trace, < 1ppm	ND	trace, < 1ppm
10061-01-5	cis-1,3-dichloropropene	ppm	ND	ND	ND
10061-02-6	trans-1,3-dichloropropene	ppm	ND	ND	ND
594-20-7	2,2-Dichloropropane	ppm	ND	ND	ND
60-29-7	Diethyl Ether	ppm	ND	ND	ND
106-89-8	Epichlorohydrin	ppm	ND	ND	ND
97-63-2	Ethyl Methacrylate	ppm	ND	ND	ND
74-88-4	Iodomethane	ppm	ND	ND	ND
75-09-2	Methylene Chloride	ppm	trace, < 1ppm	ND	trace, < 1ppm
80-62-6	Methyl Methacrylate	ppm	ND	ND	ND
1634-04-4	Methyl tert-butyl ether	ppm	ND	ND	ND
108-10-1	4-Methyl-2-Pentanone	ppm	ND	ND	ND

Chemical Information		Unit	Batch Type		
CAS #	**Analyte**		**SDS/WW**	**SDS**	**WW**
76-01-7	Pentachloroethane	ppm	ND	ND	ND
100-42-5	Styrene	ppm	ND	ND	ND
630-20-6	1,1,1,2-Tetrachloroethane	ppm	ND	ND	ND
79-34-5	1,1,2,2-Tetrachloroethane	ppm	ND	ND	ND
71-55-6	1,1,1-Trichloroethane	ppm	ND	ND	ND
79-00-5	1,1,2-Trichloroethane	ppm	ND	ND	ND
96-18-4	1,2,3-Trichloropropane	ppm	ND	ND	ND
526-73-8	1,2,3-Trimethylbenzene	ppm	trace, < 1ppm	ND	trace, < 1ppm
108-05-4	Vinyl Acetate	ppm	ND	ND	ND
593-60-2	Vinyl Bromide	ppm	ND	ND	ND
SVOCs					
110-86-1	Pyridine	ppm	ND	ND	ND
108-95-2	Phenol	ppm	ND	ND	ND
95-57-8	2-Chlorophenol	ppm	ND	ND	ND
106-46-7	1,4-Dichlorobenzene	ppm	ND	ND	ND
95-50-1	1,2-Dichlorobenzene	ppm	ND	ND	ND
95-48-7	2-Methylphenol (o-Cresol)	ppm	ND	ND	ND
67-72-1	Hexachloroethane	ppm	ND	ND	ND
621-64-7	N-Nitroso-di-n-propylamine	ppm	ND	ND	ND
108-39-4, 106-44-5	p&m-Cresol (4- & 3-Methylphenol)	ppm	ND	ND	ND
98-95-3	Nitrobenzene	ppm	ND	ND	ND
88-75-5	2-Nitrophenol	ppm	ND	ND	ND
105-67-9	2,4-Dimethylphenol	ppm	ND	ND	ND
120-83-2	2,4-Dichlorophenol	ppm	ND	ND	ND
87-68-3	Hexachlorobutadiene	ppm	ND	ND	ND
59-50-7	4-Chloro-3-methylphenol	ppm	ND	ND	ND
77-47-4	Hexachlorocyclopentadiene	ppm	ND	ND	ND
88-06-2	2,4,6-Trichlorophenol	ppm	ND	ND	ND
95-95-4	2,4,5-Trichlorophenol	ppm	ND	ND	ND
606-20-2	2,6-Dinitrotoluene	ppm	ND	ND	ND
83-32-9	Acenaphthene	ppm	ND	ND	ND
51-28-5	2,4-Dinitrophenol	ppm	ND	ND	ND
100-02-7	4-Nitrophenol	ppm	ND	ND	ND
121-14-2	2,4-Dinitrotoluene	ppm	ND	ND	ND
86-73-7	Fluorene	ppm	ND	ND	ND

Attachment D
Assessment of Organic Components of SDS

Chemical Information		Unit	Batch Type		
CAS #	**Analyte**		**SDS/WW**	**SDS**	**WW**
122-39-4	Diphenylamine	ppm	ND	ND	ND
118-74-1	Hexachlorobenzene	ppm	ND	ND	ND
87-86-5	Pentachlorophenol	ppm	ND	ND	ND
85-01-8	Phenanthrene	ppm	ND	ND	ND
120-12-7	Anthracene	ppm	ND	ND	ND
206-44-0	Fluoranthene	ppm	ND	ND	ND
129-00-0	Pyrene	ppm	ND	ND	ND
117-84-0	Di-n-octyl phthalate	ppm	ND	ND	ND
50-32-8	Benzo (a) pyrene	ppm	ND	ND	ND

ATTACHMENT E.
COMPATIBILITY OF PLASTICS WITH MUSTARD (HD), THIODIGLYCOL, VX HYDROLYSIS PRODUCTS, DS-2, HTL, AND TETRACHLOROETHYLENE

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18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Compatibility	DS-2	Decontaminants
Plastics	HTH	Solubility parameter
Mustard (HD)	Tetrachloroethylene	Chemical resistance
Thiodiglycol	ASTM D471	
VX hydrolysis products	Immersion testing	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Selected plastics were tested for compatibility with mustard (HD), thiodiglycol, various VX hydrolysis products, DS-2, HTH, and tetrachloroethylene using a total immersion technique based upon American Society for Testing and Materials (ASTM) D471. The immersion tests were conducted for 1, 6, and 24 hours at 23°, 35°, and 50°C. Changes in appearance, weight, thickness, and integrity of plastic samples were used as criteria for determining the compatibilities of plastics with test chemicals. Plastics most compatible with mustard (HD) were Aclar and Halar followed by Teflon (TFE and FEP), polyethylene, Mylar, and Kynar whereas polystyrene, Lexan, polyvinylchloride and cellulose acetate were least compatible. In

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20. ABSTRACT (Contd)

thiodiglycol and in ethyl methylphosphonic acid, only cellulose acetate was not compatible. Four plastics (polystyrene, polyvinylchloride, polyethylene and Lexan) were not compatible with VX mercaptan while polystyrene and polyethylene were most incompatible with VX disulfide. In DS-2, Lexan, polyvinylchloride, cellulose acetate, acrylic, Aclar, Mylar, and Kynar were incompatible while polyethylene and Teflon (TFE and FEP) were not visibly affected. The plastic most affected by 10% HTH was cellulose acetate while Teflon (TFE) and Kynar showed no visible changes. Tetrachloroethylene (a decontaminant component) was incompatible with polystyrene, Lexan, polyvinylchloride, polyethylene, cellulose acetate, and Aclar.

PREFACE

The research described in this report was conducted under Task 1L162706A553, Technical Area 3-5 during the period from October 1979 to March 1980. The experimental data are contained in notebooks 10,061 (pages 7 through 75), 9786 (pages 73 through 119) and 9991 (pages 3 through 30).

The use of trade names in this report does not constitute an official endorsement or approval of the use of such commercial hardware or software. This report may not be cited for the purpose of advertisement.

Acknowledgments

The authors thank Sp/4 Iris K. Wilcher for her excelient technical assistance.

CONTENTS

LIST OF TABLES

COMPATIBILITY OF PLASTICS WITH MUSTARD (HD), THIODIGLYCOL, VX HYDROLYSIS PRODUCTS, DS-2, HTH, AND TETRACHLOROETHYLENE

1. INTRODUCTION

Since plastics are used extensively in military equipment, it is important to determine which plastics can tolerate exposure to a variety of chemicals which may be encountered in the field.

An earlier study conducted at Chemical Systems Laboratory (CSL) (1) focused upon the compatibilities of selected plastics with some specific components of the all-purpose decontaminants DS-2[2] and CD-1[3].

Decontaminant DS-2 has the composition given below (para 2.1). CD-1 is ethanolamine, 55% by volume, 2-hydroxy-1-propylamine, 45% by volume and lithium hydroxide, monohydrate, 2.5% by weight.

The objective of the present study is to compare the compatibilities of various classes of plastics with chemical agent, agent breakdown products, all-purpose decontaminants, and components under worst case immersion conditions.

Because toxic chemicals were utilized, test procedures and evaluation criteria were adopted that were compatible with operations conducted exclusively in a safety-approved chemical hood maintained under negative pressure.

Studies of this kind encompassing a broad spectrum of polymers, elastomers, chemical agents, agent breakdown products, all-purpose decontaminants and their components may contribute to the selection or development of chemically resistant materials for general or specific field use. Information gained in this study that is germane to the characterization, selection, and development of chemically resistant plastics may be incorporated in a materials handbook for the use of development and design engineers.

2. MATERIALS AND METHODS

2.1 Solvents Tested

Mustard (HD) (chemical agent)
Thiodiglycol (HD hyrolysis product)
Ethyl methylphosphonic acid (VX hydrolysis product)
Diisopropylaminoethyl mercaptan (VX hydrolysis product)
Diisopropylaminoethyl disulfide (VX mercaptan oxidation product)
DS-2 (all-purpose decontaminant)
- 70% diethylenetriamine
- 28% 2-methoxyethanol
- 2% NaOH

HTH (10% calcium hypochlorite, as aqueous slurry)
Tetrachloroethylene (a component of an all-purpose decontaminant)

2.2 Plastics Tested

Teflon (TFE) (polytetrafluoroethylene), DuPont de Nemours
Teflon (FEP) (polyfluoroethylenepropylene), DuPont de Nemours
Aclar (polychlorotrifluoroethylene), Allied Chemical Corp
Kynar (polyvinylidenefluoride)
Halar (ethylene-chlorotrifluoroethylene copolymer)
Polyethylene
Polyvinylchloride, Commercial Plastics Inc.
Acrylic (polymethylmethacrylate), Rohm & Haas
Mylar (polyethyleneglycolterephthalate), DuPont de Nemours
Lexan (polycarbonate), General Electric Co., Polymers Product Dept.
Cellulose acetate, Commercial Plastics Inc.
Polystyrene, Commercial Plastics Inc.

2.3 Special Precautions

All tests were conducted in a safety-approved chemical filtered hood maintained under negative pressure with an airflow rate of 150 feet per minute. Operations were performed using Edmont-Wilson (29-845) protective gloves, long-handle tongs, forceps, safety glasses, clean laboratory clothing and aprons. Gloves were changed every 15 minutes. The two-man system was used throughout all experiments.

Contaminated test utensils, equipment, and plastic samples were decontaminated by immersion in 10% HTH (containing 10% methanol) for 24 hours followed by immersion in fresh 5% bleach for an additional 24 hours.

2.4 Test Method

Plastic samples (1- x 2-cm or 1- x 2-inch sections) were clipped at the corners for identification purposes, rinsed with methanol, blotted dry with Kimwipes^{R*}, measured for thickness with a micrometer (Scherr-Tumco Inc.), examined visually for initial appearance and integrity, and weighed ($\pm$0.0002 gm) in preweighed weighing bottles. The characterized samples were tested (in triplicate) by immersion in test solvents for 1, 6, and 24 hours at 23°, 35°, and 50°C using a modified version of American Society for Testing and Materials (ASTM) D471[5]. Small plastic sections (1- x 2-cm) were tested in glass test tubes containing 2 ml of test solvent. Triplicate samples were separated by two small rods (120-mils x 900-mils). Large plastic sections (1- x 2-inches), used in testing decontaminants and components of decontaminants, were tested in round-bottom wide-neck flasks containing 100 ml of test solvent. Wire springs were utilized to secure ground glass stoppers to the test tubes containing the test solvents and plastic samples. Test tubes were placed in thermostatically controlled incubator blocks (Pierce "Reactitherm")^{R**} while round-bottom flasks were placed in a thermostatically controlled circulating water bath (Masterline^{R}, Forma Scientific). After incubation at various exposure times and temperatures, the containers containing the test solvents and test plastics were removed and allowed to cool for 5 minutes. The plastic samples were removed individually with long forceps (10-inch) and passed quickly through a series of three methanol rinses. The rinsed plastic samples were blotted dry on Kimwipes^{R*},

*Kimwipes^{R} Registered Trademark of Kimberly Clark.
**Reactitherm^{R} Trademark of Pierce Chemical Co., Rockford, Illinois

placed in preweighed bottles, weighed, measured for thickness, and examined for visual appearance and integrity.

2.5 Evaluation Criteria.

Quantitative changes in thickness or weight exceeding three standard deviations of the accuracy of the measurement were designated significant. Changes in thickness or weight less than 5% were considered to be slight. Visible changes in opaqueness, or color were considered to be changes in appearance. Obvious changes in flexibility, softness, fragility, deformation and laminar peeling etc, were considered to be changes in the integrity of the plastic. Plastics that dissolved completely or plasticized to a liquid gel, were considered to have also undergone changes in thickness, weight, appearance, and integrity and were assigned an incompatibility rating of 5. Plastics that underwent changes in thickness, weight, appearance, and integrity but did not dissolve completely were given an incompatibility rating of 4. If only one categorical change occurred in a plastic (change in weight for example), an incompatibility rating of 1 was assigned. If that one change was slight, a rating of 1_s was given. If slight changes occurred in two categories, a scores of 2_s was given, etc. Use of this incompatibility rating system permits the simultaneous comparison of several plastics in various test solvents. Quantitative comparisons can be made for certain plastics through the use of weight and thickness change data recorded in tables A-1 to A-30.

3. RESULTS

3.1 The Effects of Mustard (HD) on Plastics

Mustard (HD) dissolved or plasticized polystyrene, completely after one hour at 23°C (table A-1, appendix. All tables will be found in the appendix.) Under the same conditions, Lexan cleaved into two distinct layers and became extremely fragile (table A-2) while polyvinylchloride became pliable, and soft (table A-3). Cellulose acetate showed no changes in integrity but gained 5.17% in weight and 4.97% in thickness after one hour at 23°C (table A-4). Polyethylene slightly gained weight after one hour at 35°C with no other changes (table A-5). After immersion for 24 hours at 50°C, the plastics not affected by mustard (HD) were Aclar and Halar (table A-6). Plastics slightly affected were Teflon (TFE), Teflon (FEP), polyethylene, Mylar, and Kynar (table A-6).

3.2 The Effects of Thiodiglycol on Plastics

The only plastic affected by thiodiglycol after 24 hours at 50°C was cellulose acetate (which developed a soft surface and gained 41.3% in weight) (table A-7).

3.3 The Effects of Ethyl Methylphosphonic Acid on Plastics

Even after 24 hours at 50°C, the only plastic showing detectable change after immersion in ethyl methylphosphonic acid was cellulose acetate with a 1.4% increase in weight (table A-8).

3.4 The Effects of Diisopropylaminoethyl Mercaptan on Plastics

Diisopropylaminoethyl mercaptan completely dissolved or plasticized polystyrene after six hours at 23°C (table A-9). Under the same conditions of time and

temperature, polyethylene gained 2.3% in thickness and 5.5% in weight (table A-10). After 24 hours at 23°C, polyvinylchloride slightly increased in thickness and weight (table A-11) while Lexan became hazy and expanded slightly (table A-12). The plastics not affected after immersion in diisopropylaminoethyl mercaptan for 24 hours at 50°C included Teflon (TFE), Teflon (FEP), Aclar, Kynar, Halar, Mylar, and cellulose acetate (table A-13).

3.5 The Effects of Diisopropylaminoethyl Disulfide on Plastics

Upon exposure of diisopropylaminoethyl disulfide for 24 hours at 23°C, polystyrene became hazy and lost 3.2% thickness (table A-14) while polyethylene gained 3.2% weight (table A-15). Plastics showing no changes after immersion in diisopropylaminoethyl disulfide for 24 hours at 50°C included Teflon (TFE), Halar, Mylar, and Lexan (table A-16). Teflon (FEP), Aclar, Kynar, polyvinylchloride, and cellulose acetate showed only small changes in thickness under the same conditions (table A-16).

3.6 The Effects of DS-2 on Plastics

DS-2 completely dissolved or plasticized Lexan after one hour at 23°C (table A-17). Under the same conditions of time and temperature, cellulose acetate became opaque, more pliable, and increased 108% in weight (table A-18) while polyvinylchloride became black and curled (table A-19). Mylar became hazy, textured, and lost 3.7% in weight (table A-20) while acrylic (polymethylmethacrylate) acquired a white surface film (table A-21). Plastics showing no changes after immersion in DS-2 for 24 hours at 50°C include Teflon (TFE), Teflon (FEP), and polyethylene (table A-22). Plastics slightly affected were Aclar, Kynar, and polystyrene (table A-22).

3.7 The Effects of 10% HTH (Calcium Hypochlorite) on Plastics

Cellulose acetate was the only plastic tested that was affected by immersion in 10% HTH for one hour at 23°C. The plastic developed a surface film and gained 3.08% in weight (table A-23). All plastics tested, with the exceptions of Teflon (TFE) and Kynar were variously affected by HTH after 24 hours at 50°C (table A-24). Most of the plastics acquired surface films that could be removed by wiping. Cellulose acetate was affected most extensively. The plastic became frosted, rough, and lost 12.2% in thickness and 14.7% in weight (table A-24).

3.8 The Effects of Tetrachloroethylene on Plastics

Tetrachloroethylene attacked some plastics after one hour at 23°C. Lexan became white, and increased 13.3% in thickness and 7.2% in weight (table A-25) while polyethylene gained 2.7% thickness and 24.6% weight (table A-26). Polyvinylchloride acquired haze and increased 2.8% in thickness and 5.0% in weight (table A-27). Aclar became flexible and gained 4.1% weight (table A-28) while cellulose acetate gained 1.1% weight (table A-29). All of the plastics tested were affected by tetrachloroethylene after immersion for 24 hours at 50°C. The plastics least affected, however, were Teflon (TFE), Teflon (FEP), Mylar, and polymethylmethacrylate (table A-30). Plastics strongly affected by tetrachloroethylene (under these conditions, in the order of highest incompatibility), were polystyrene > polyvinylchloride > Lexan > polyethylene > Aclar (table A-30).

3.9 Overall Compatibilities of Plastics in Test Solvents After 24 Hours at 50°C

The plastics most compatible with the group of solvents after 24 hours at 50°C were Teflon (TFE), Teflon (FEP), Aclar, Kynar, Halar, polyethylene, and Mylar (table A-31). The plastics most incompatible with the group of solvents were polystyrene, Lexan, cellulose acetate, and polyvinylchloride.

4. DISCUSSION

Polystyrene, Lexan, polyvinylchloride, and cellulose acetate are extremely incompatible with heavy mustard contamination. The incompatibility of these plastics with mustard (HD) may be rationalized by reference to their similar solubility parameters.[6, 7, 8, 9]

The observation that cellulose acetate was the only plastic incompatible with thiodiglycol emphasizes the radical change in the solvent properties of a molecule such as mustard (HD), when two chlorine atoms are displaced by hydroxyl groups. The highly polar resultant thiodiglycol molecule can only affect the most polar plastics (preferably those with many strong dipoles which can function as electrostatic donors to H-bonds). Cellulose acetate has the greatest concentration of such dipoles in the group of polymers studied.

Interestingly (in common with thiodiglycol), ethyl methylphosphonic acid (a hydrolysis product of VX) had virtually no effects on the plastics tested. Diisopropylaminoethyl mercaptan (a second hydrolysis product of VX) did noticeably attack polystyrene, polyvinylchloride, Lexan, and polyethylene. Diisopropylaminoethyl disulfide (an oxidation product of VX mercaptan) actually affected more of the test plastics than did VX mercaptan. Yet, the disulfide did not noticeably attack Lexan, and it attacked polyvinylchloride less severely than the mercaptan (reversing the previous order of cited effects). This pattern of relative effects could not be rationalized intuitively by simple comparison of polarities of solvents and polymers. Neither is it resolvable simply by consideration of molecular size (such as might play a role in the frictional component of diffusivity). We conclude that a complex combination of molecular properties related to size, shape, polarity, etc., are responsible for variations in both solubility and diffusivity. Our results, then, reflect the complex summation of molecular structural effects on the latter two physical coefficients.

DS-2 exerted detrimental effects on all plastics tested with the exception of Teflon (TFE), Teflon (FEP), and polyethylene. This is in general agreement with results obtained by Quinn, Davis, and Welcher[1] for the diethylenetriamine component of DS-2. Those workers suggested that reductive amines may induce base catalyzed loss of HF or reductive loss of vicinally bonded Cl and F in chemical reactions with Kynar and Aclar and induce aminolysis of functional ester groups in the case of acrylic, Mylar, and Lexan[1].

Most plastics were affected by 10% HTH but less than by DS-2. One common effect was the development of a slight surface film although the film could be easily removed by wiping with paper towels. Cellulose acetate appeared to be the plastic most severely affected by HTH.

Tetrachloroethylene (a component of an all-purpose decontaminant)[10] affected every plastic tested and caused as many categorical changes in plastics as did

mustard (HD). Most plastics that were severely affected by mustard (HD) were equally affected by tetrachloroethylene. This is not surprising since the solubility parameters for mustard (HD) and tetrachloroethylene are 10.6[6] and as high as 9.9[8] respectively.

5. CONCLUSIONS

Overall results indicate that polystyrene, Lexan, polyvinylchloride, and cellulose acetate are the plastics most incompatible with the group of solvents tested. Teflon (TFE), Teflon (FEP), Kynar, and Halar are the plastics most compatible with the group of solvents tested.

The solvents were most generally incompatible with plastics in the order: mustard (HD)>tetrachloroethylene>DS-2>VX mercaptan>VX disulfide>10% HTH>thiodiglycol>ethyl methylphosphonic acid.

The present study has contributed valuable new information regarding the compatibility of plastics with selected test solvents. Additional tests, involving a broader range of plastics against a wider variety of agents, agent breakdown products, and decontaminants, would help facilitate the selection and development of chemically resistant polymers.

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Table A-1. The Effects of Mustard (HD) on Polystyrene at 23°, 35°, and 50°C

Categorical changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	DIS*	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Integrity	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Thickness	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Weight	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

* = Dissolved beyond recovery

Table A-2. The Effects of Mustard (HD) on Leman at 23°, 35° and 50°C

Categorical changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned white	NT*	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white
Integrity	Split; fragile; broken	NT	Split; fragile; broken	Split; fragile; broken	Split; fragile; broken	Split; fragile; broken	Split; fragile; broken	Split; fragile; broken	Split; fragile; broken
Thickness	+113.12% ± 1.09% †	NT	+94.65% ± 1.07%	+84.82% ± 1.09%	+87.24% ± 1.11%	+80.11% ± 1.03%	+186.45% ± 1.09%	+80.50 ± 1.08%	NM**
Weight	+ 66.79% ± 1.02%	NT	+72.76% ± 1.17%	+53.99% ± 1.03	+32.86% ± 1.08%	+37.33% ± 1.01%	- 11.50% ± 1.05%	-11.90% ± 1.05%	-45.89% ± 1.08%

* = Not tested

** = Not measured

† = Three standard deviations

Table A-3. The Effects of Mustard (HD) on Polyvinylcholoride at 23°, 35° and 50°C

Categorical changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 hr	6 Hrs	24 Hrs
Appearance	Turned clearer	Turned clearer	Turned clearer	Turned clearer	Turned clearer	Turned yellow	Turned yellow	Turned yellow	Turned yellow
Integrity	Rubbery pliable impressible	NT*	Swollen rubbery	Swollen rubbery wrinkled	Swollen rubbery wrinkled	Swollen rubbery wrinkled	Swollen rubbery wrinkled	Swollen (2 x size) rubbery	Swollen split curled rubbery
Thickness	+66.21 ± 1.02% †	NT	+80.86% ± 1.03%	+62.70% ± 1.02%	+64.34% ± 1.01%	+72.92% ± 1.01%	+82.44% ± 1.01%	+100.% ± 1.08%	NM**
Weight	+68.78% ± 0.90%	NT	+206.95% ± 0.93%	+159.68% ± 0.90%	+307.01% ± 0.90%	+284.16% ± 0.91%	+204.20% ± 0.90%	+417.93% ± 0.87%	+180.13% ± 0.90%

* = Not tested

** = Not measured

† = Three standard deviations

Table A-4. The Effects of Mustard (HD) on Cellulose Acetate at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned clearer	NT[a]	Turned clearer	Turned clearer	Turned clearer	Turned yellow	Turned yellow	Turned yellow	Turned yellow
Integrity	NC[b]	NT	Impress[c]	Impress	Impress	Swollen; wrinkled; impress	Wrinkled; flexible; impress	Wrinkled; stiff; impress	Swollen; impress; curled
Thickness	+4.97% ±1.06%[d]	NT	+38.44% ± 1.07%	+38.14% ± 1.08%	+41.95% ± 1.07%	+49.12% ± 1.06%	+61.55% ± 1.08%	+108.7d% ± 1.06%	+8.13% ±1.02%
Weight	+5.17% ±1.06%	NT	+49.85% ± 1.02%	+35.41% ± 0.99%	+60.29% ± 0.99%	+53.91% ± 0.97%	+69.66% ± 0.99%	+70.83% ± 0.[illegible]	+102.[illegible] ± 1.02

a = Not tested

b = No changes

c = Impressible

d = Three standard deviations

Table A-5. The Effects of Mustard (HD) on Polyethylene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NT*	NT	NT	NC**	NC	NC	NC	NC	NC
Integrity	NT	NT	NT	NC	NC	NC	NC	NC	NC
Thickness	NT	NT	NT	NC	NC	NC	NC	NC	NC
Weight	NT	NT	NT	+2.13% ±1.32% †	+2.84% ±1.26%	+2.65% ±1.19%	+4.15% ±1.20%	+3.47% ±1.13%	+2.23% ±1.17%

* = Not tested

** = No changes

† = Three standard deviations

Table A-6. The Effects of Mustard (HD)

Plastic	Changes in appearance, 24 Hrs				
	APPR[a]	INTG[b]	TH[c]	WT[d]	
Teflon (TFE)	NC[e]	NC	+1.33% ±1.07%[g]	NC	
Teflon (FEP)	NC	NC	NC	-0.62% ±0.54%	
Aclar	NC	NC	NC	NC	
Kynar	Turned hazier	NC	+3.63% ±2.04%	+2.00% ±1.38%	
Halar	NC	NC	NC	NC	
Polyethylene	NC	NC	NC	+2.23% ±1.17%	
Polyvinylchloride	Turned white yellow	Swollen; split, soft; impress[i]	NM[h]	+180.13% ± 0.90%	
Mylar	NC	NC	NC	+2.70% ±0.90%	
Lexan	Turned white	Split; fragile;	NM	+45.89% ± 1.08%	
Cellulose acetate	Turned light yellow	Swollen; curled; impress	+81.30% ± 1.02%	+102.98% ± 1.02%	
Polystyrene	DIS[j]	DIS	DIS	DIS	

a = Appearance
b = Integrity
c = Thickness
d = Weight
e = No changes
f = Not tested

on Plastics at 50°C

integrity, thickness, and weight

6 Hrs				1 Hr			
APPR	INTG	TH	WT	APPR	INTG	TH	WT
NT[f]	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NC	NC	NC	NC	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NC	NC	NC	+3.47% ±1.13%	NC	NC	NC	+4.15% ±1.20%
Turned light yellow	Swollen (2x); soft; impress	+100.00% ± 1.08%	+417.93% ± 0.87%	Turned light yellow	Swollen; rubbery; impress	+82.44% ± 1.01%	+204.20% ± 0.90%
NC	NC	+1.05% ±1.04%	+0.95% ±0.86%	NT	NT	NT	NT
Turned white	Split; fragile	+80.50% ± 1.08%	-11.90% ± 1.05%	Turned white	Split; fragile;	+186.45% ± 1.09%	-11.50% ± 1.05%
Turned light yellow	Swollen; wrinkled; impress	+108.78% ± 1.06%	+70.83% ± 0.93%	Turned light yellow	Wrinkled; impress	+ 61.55% ± 1.08%	+69.60% ± 0.99%
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

g = Three standard deviations

h = Not measured

i = Impressible

j = Dissolved

Appendix

Table A-7. The Effects of Thiodiglycol on Plastics at 50°C for 24 Hours

Plastic	Changes observed			
	Appearance	Integrity	Thickness	Weight
Teflon (TFE)	NC*	NC	NM**	NC
Teflon (FEP)	NC	NC	NM	NC
Aclar	NC	NC	NM	NC
Kynar	NC	NC	NM	NC
Halar	NC	NC	NM	NC
Polyethylene	NC	NC	NM	NC
Polyvinylchloride	NC	NC	NM	NC
Mylar	NC	NC	NM	NC
Lexan	NC	NC	NM	NC
Cellulose acetate	NC	Soft surface	NM	± 41.3% ± 1.1% †
Polystyrene	NC	NC	NM	NC

* = No changes ** = Not Measured † = Three standard deviations

Table A-8. The Effects of Ethyl Methylphosphonic Acid on Plastics at 50°C for 24 Hours

Plastic	Changes observed			
	Appearance	Integrity	Thickness	Weight
Teflon (TFE)	NC*	NC	NM**	NC
Teflon (FEP)	NC	NC	NM	NC
Aclar	NC	NC	NM	NC
Kynar	NC	NC	NM	NC
Halar	NC	NC	NM	NC
Polyethylene	NC	NC	NM	NC
Polyvinylchloride	NC	NC	NM	NC
Mylar	NC	NC	NM	NC
Lexan	NC	NC	NM	NC
Cellulose acetate	NC	NC	NM	- 1.4% ± 1.1% †
Polystyrene	NC	NC	NM	NC

* = No changes ** = Not measured † = Three standard deviations

Table A-9. The Effects of Diispropylaminoethyl Mercaptan on Polystyrene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 hrs	24 Hrs
Appearance	Turned Hazy	DIS*	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Integrity	Soft Surface	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Thickness	-23.6% ± 1.0%**	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Weight	-46.0% ± 1.1%	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

* = Dissolved beyond recovery

** = Three standard deviations

Table A-10. The Effects of Diisopropylaminoethyl Mercaptan on Polyethylene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NC*	NC	NC	NC	NC	NC	NC	NC	NC
Integrity	NC	NC	NC	NC	NC	NC	NC	NC	NC
Thickness	NC	+2.3% ±1.0%**	+1.9% ±1.0%	NC	+2.6% ±1.0%	+1.6% ±1.0%	+3.3% ±1.0%	+4.2% ±1.0%	NC
Weight	+2.3% ±1.3%	+5.5% ±1.2%	+6.6% ±1.2%	+4.6% ±1.2%	+11.6% ± 1.2%	+9.7% ±1.2%	+15.5% ± 1.2%	+17.9% ± 1.2%	+17.0% ± 1.3%

* = No changes
** = Three standard deviations

Table A-11. The Effects of Diisopropylaminoethyl Mercaptan on Polyvinylchloride at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NC*	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy
Integrity	NC	NC	NC	NC	NC	NC	NC	NC	NC
Thickness	NC	NC	+1.7% ± 1.0%**	+1.7% ±1.0%	+5.3% ±1.0%	+9.5% ±1.0%	+16.2% ± 1.0%	+41.4% ± 1.0%	+33.4% ± 1.4%
Weight	NC	NC	+1.2% ±0.9%	NC	+1.3% ±1.0%	+9.8% ±0.9%	+12.0% ± 0.9%	+39.2% ± 0.9%	+41.4 ± 0.9%

* = No changes

** = Three standard deviations

Table A-12. The Effects of Diisopropylaminoethyl Mercaptan on Lexan at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NT*	NT	Turned hazy	NC**	Turned hazy	Turned hazy	Looked frosty	Looked frosty	Looked frosty
Integrity	NT	NT	NC	NC	NC	NC	NC	NC	NC
Thickness	NT	NT	+1.5% ±1.1% +	+1.4% ±1.1%	+3.3% ±1.1%	NC	NC	NC	NC
Weight	NT	NT	NC	NC	+1.3% ±1.0%	NC	NC	+1.5% ±1.2%	+5.6% ±1.1%

* = Not tested

** = No changes

\+ = Three standard deviations

Table A-13. The Effects of Diisopropylaminoethyl Mercaptan

Plastic	Changes			
	24 Hrs			
	APPR[a]	INTG[b]	TH[c]	WT[d]
Teflon (TFE)	NC[e]	NC	NC	NC
Teflon (FEP)	NC	NC	NC	NC
Aclar	NC	NC	NC	NC
Kynar	NC	NC	NC	NC
Halar	NC	NC	NC	NC
Polyethylene	NC	NC	NC	+17.0% ± 1.3%[g]
Polyvinylchloride	Hazy	NC	+33.4% ± 1.4%	+41.4% ± 0.9%
Mylar	NC	NC	NC	NC
Lexan	Frosty	Textured	NC	+6.6% ±1.1%
Cellulose acetate	NC	NC	NC	NC
Polystyrene	DIS[h]	DIS	DIS	DIS

a = Appearance

b = Integrity

c = Thickness

d = Weight

on Plastics at 50°C

observed

6 Hrs				1 Hr			
APPR	INTG	TH	WT	APPR	INTG	TH	WT
NT[f]	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NC	NC	+4.2% ±1.0%	+17.9% ± 1.2%	NC	NC	+3.3% ±1.0%	+15.5% ± 1.2%
Hazy	NC	+41.4% ± 1.0%	+39.3% ± 0.9%	Hazy	NC	+16.2% ± 1.0%	+12.0% ± 0.9%
NT	NT	NT	NT	NT	NT	NT	NT
Frosty	Textured	NC	+1.5% ±1.2%	Frosty	Textured	NC	NC
NT	NT	NT	NT	NT	NT	NT	NT
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

e = No changes

f = Not tested

g = Three standard deviations

h = Dissolved

Appendix

Table A-14. The Effects of Diisopropylaminoethyl Disulfide on Polystyrene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NT[a]	NC[b]	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned white	Turned white	DIS[c]
Integrity	NT	NC	NC	NC	NC	NC	NC	NC	DIS
Thickness	NT	-1.65% ±0.99%[d]	-3.21% ±0.97%	NC	+2.65% ±0.99%	+5.07% ±1.00%	+18.68% ± 1.02%	+ 69% ±1.00%	DIS
Weight	NT	NC	NC	NC	NC	+6.04% ±1.11%	±18.40% ± 1.11%	±63.05% ± 1.11%	DIS

a = Not tested

b = No changes

c = Dissolved

d = Three standard deviations

Table A-15. The Effects of Diisopropylaminoethyl Disulfide on Polyethylene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NT*	NC**	NC	NC	NC	NC	NC	NC	NC
Integrity	NT	NC	NC	NC	NC	NC	NC	NC	NC
Thickness	NT	NC	NC	NC	NC	NC	NC	NC	+1.63% ±0.98% †
Weight	NT	NC	+3.21% ±1.20%	NC	+4.34% ±1.23%	+6.81% ±1.23%	+7.80% ±1.24%	+11.08% ± 1.27%	+12.26% ± 1.26%

* = Not tested

** = No changes

† = Three standard deviations

Table A-16. The Effects of Diisopropylaminoethyl Disulfide

Plastic	Changes				
	24 Hrs				
	APPR[a]	INTG[b]	TH[c]	WT[d]	
Teflon (TFE	NC[e]	NC	NC	NC	
Teflon (FEP)	Trans-lucent	NC	+1.07% ±1.03%[g]	NC	
Aclar	NC	NC	-5.97% ±1.82%	NC	
Kynar	NC	NC	-2.43% ±1.88%	NC	
Halar	NC	NC	NC	NC	
Polyethylene	NC	NC	+1.63% ±0.98%	+12.20% ± 1.26%	
Polyvinylchloride	NC	NC	-2.67% ±1.01%	NC	
Mylar	NC	NC	NC	NC	
Lexan	NC	NC	NC	NC	
Cellulose acetate	NC	NC	-2.39% ±1.04%	NC	
Polystyrene	DIS[h]	DIS	DIS	DIS	

a = Appearance

b = Integrity

c = Thickness

d = Weight

on Plastics at 50°C

observed							
6 Hrs				1 Hr			
APPR	INTG	TH	WT	APPR	INTG	TH	WT
NT[f]	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NC	NC	NC	+11.08% ± 1.27%	NC	NC	NC	+7.80% ±1.24%
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

e = No changes

f = Not treated

g = Three standard deviations

h = Dissolved

Appendix

Table A-17. The Effects of DS-2 on Lexan at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hr	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	DIS*	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Integrity	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Thickness	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Weight	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS

* = Dissolved beyond recovery

Table A-18. The Effects of DS-2 on Cellulose Acetate at 23°, 35°, and 50°C

Categorical changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Became opaque	Turned white	Became translucent	Became opaque	Became translucent	Became translucent	Became translucent	Became translucent	Turned light yellow
Integrity	Pliable	Pliable	Shriveled; textured; pliable	Pliable; warped	Pliable; shriveled	Flaky; pliable; shriveled	Pliable; warped	Pliable; cracked	Pliable; shriveled
Thickness	NM*	NM	NM	NM	NM	NM	NM	NM	NM
Weight	±108.0**	+239.7%	+345.4%	+146%	+266.9%	+307.2%	+119.2%	+275.3%	+256.2%

* = Not measured

** = Percent change (± 0.1% based upon an initial weight of 0.4112 grams)

Table A-19. The Effects of DS-2 on Polyvinylchloride at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	$23^{0}C$			$35^{0}C$			$50^{0}C$		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned black	Turned black	Turned black	Turned black	Turned black	Turned black	Turned black	Turned black	Turned black
Integrity	Curled	Curled	Curled	Curled	Curled	Curled	Curled	Curled	Curled
Thickness	NM*	NM	NM	NM	NM	NM	NM	NM	NM
Weight	NC**	+3.2% †	+20.3	+2.8%	+24.4%	+40.5%	+24.0%	+31.6%	+51.8%

* = Not measured

** = No changes

† = Percent change (±. 14% based upon initial weight of 0.4325 grams)

Table A-20. The Effects of DS-2 on Mylar at 23°, 35°, 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	23 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy	Turned hazy
Integrity	Textured	Textured	Textured	Textured	Textured	Textured	Textured	Textured	Textured; flaking
Thickness	NM*	NM	NM	NM	NM	NM	NM	NM	NM
Weight	-3.7%**	-8.6%	-47.8%	-5.3%	-19.9%	-47.9%	-8.6%	-19.3%	-47.9%

* = Not measured

** = Percent change (± 0.1% based upon an initial weight of 0.4763 grams)

Table A-21. The Effects of DS-2 on Acrylic (Polymethyl Methacrylate) at 23°, 35° and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Developed white film	Developed white film	Developed white film	Developed white film	Developed white film	Developed white film	Developed white film	Turned light yellow	Turned light yellow
Integrity	NC*	NC	NC	NC	NC	NC	NC	NC	NC
Thickness	NM**	NM	NM	NM	NM	NM	NM	NM	NM
Weight	NC	-0.08% †	-0.12%	-0.03%	+0.04%	+1.07%	+0.12%	+7.48%	+18.66%

* = No changes

** = Not measured

† = Percent change (± 0.01% based upon initial weight of 9.7347 grams)

Table A-22. The Effects of DS-2

Plastic	Changes			
	24 Hrs			
	APPR[a]	INTG[b]	TH[c]	WT[d]
Teflon (TFE)	NC[e]	NC	NM[f]	NC
Teflon (FEP)	NC	NC	NM	NC
Aclar	Amber	NC	NM	+3.6% ±0.17%[g]
Kynar	Brown	NC	NM	NC
Polyethylene	NC	NC	NM	NC
Polyvinylchloride	Black	Pliable	NM	+51.8% ± 0.13%
Mylar	Hazy	Flaking	NM	-47.9% ± 0.13%
Lexan	DIS[h]	DIS	DIS	DIS
Cellulose acetate	White	Pliable	NM	+256.2% ± 0.14%
Polystyrene	White	NC	NC	NC
Polymethylmethacrylate	Yellow	NC	NM	+18.7% ± 0.01%

a = Appearance
b = Integrity
c = Thickness
d = Weight

on Plastics at 50°C

observed

6 Hrs				1 Hr			
APPR	INTG	TH	WT	APPR	INTG	TH	WT
NC	NC	NM	NC	NC	NC	NM	NC
NC	NC	NM	NC	NC	NC	NM	NC
Amber	NC	NM	+1.6% ±0.17%	NC	NC	NM	NC
Brown	NC	NM	NC	Brown	NC	NM	NC
NC	NC	NM	NC	NC	NC	NC	NC
Black	Pliable	NM	+31.6% ± 0.13%	Black	Pliable	NM	+24.0% ± 0.13%
Hazy	Textured	NM	-19.3% ± 0.13%	Hazy	NC	NM	-8.6% ±0.13%
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
White	Pliable	NM	+275.3% ± 0.14%	White	Pliable	NM	+119.2% ± 0.14%
White	NC	NC	NC	White	NC	NC	NC
Yellow	NC	NM	+7.5% ±0.01%	NT	NT	NT	NT

e = No changes

f = Not measured

g = Three standard deviations

h = Dissolved beyond recovery

Table A-23. The Effects of 10% HTH (Calcium Hypochlorite) on Cellulose Acetate at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Developed surface film	Developed surface film	Developed surface film	Developed surface film	Developed surface film	Developed surface film	Developed surface film	Developed surface film	Looked frosty
Integrity	NC*	NC	NC	NC	NC	Textured	NC	NC	Textured
Thickness	NC	NC	NC	+2.1% ±1.1%**	+1.6% ±1.1%	+1.6% ±1.1%	NC	-1.1% ±1.05%	-12.2% ± 1.1%
Weight	+3.08% ±0.15%	+4.16% ±0.15%	+2.67% ±0.15%	+4.16% ±0.15%	+3.66% ±0.15%	+0.46% ±0.15%	+4.61% ±0.15%	+1.16% ±0.15%	-14.7% ± 0.15%

* = No changes

** = Three standard deviations

Table A-24. The Effects of 10% HTH (Calcium Hypochlorite) on Plastics at 50°C for 24 Hours

Plastic	Changes observed			
	Appearance	Integrity	Thickness	Weight
Teflon (TFE)	NC*	NC	NC	NC
Teflon (FEP)	Hazy	NC	NC	NC
Aclar	Surface film	NC	NC	NC
Kynar	NC	NC	NC	NC
Polyethylene	Surface film	NC	NC	+0.28% ±0.19% **
Polyvinylchloride	Surface film	NC	NC	+0.20% ±0.14%
Mylar	Surface film	NC	NC	+0.28% ±0.14%
Lexan	Surface film	NC	NC	-0.24% ±0.18%
Cellulose Acetate	Frosty	Textured	-12.2% ± 1.1%	-14.7% ± 0.15%
Polystyrene	Surface film	NC	+1.75% ±0.88%	+0.25% ±0.15%
Polymethylmethacrylate	Surface film	NC	+0.1% ±0.04%	+0.54% ±0.01%

* = No changes

** = Three standard deviations

Table A-25. The Effects of Tetrachloroethylene on Lexan at 23°, 35°, 50°C

Categorical Changes	Changes observed								
	$23^{o}C$			$35^{o}C$			$50^{o}C$		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white	Turned white
Integrity	NC*	NC	NC	Flexible	Warped	Warped	Flexible	Pliable	Pliable
Thickness	+13.3% ±1.1%**	+29.1% ± 1.1%	+35.9% ± 1.1%	+33.9% ± 1.1%	+36.5% ± 1.1%	+34.9% ± 1.1%	+33.7% ± 1.1%	+36.3% ± 1.1%	+32.5% ± 1.1%
Weight	+ 7.2% ± 0.16%	+45.8% ± 0.18%	+43.5% ± 0.17%	+44.6% ± 0.17%	+47.5% ± 0.17%	+45.1% ± 0.18%	+45.1% ± 0.17%	+45.7% ± 0.17%	+43.3% ± 0.2%

* = No changes

** = Three standard deviations

Table A-26. The Effects of Tetrachloroethylene on Polyethylene at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NC*	NC	NC	NC	NC	NC	NC	NC	NC
Integrity	NC	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable
Thickness	+2.7%** ±1.0%	+2.0% ±1.0%	+1.3% ±1.0%	+4.5% ±1.0%	+3.0% ±1.0%	+1.6% ±1.0%	+2.7% ±1.0%	+3.3% ±1.0%	+3.2% ±1.0%
Weight	+24.6% ± 0.19%	+27.3% ± 0.19%	+20.4% ± 0.20%	+32.6% ± 0.19%	+35.3% ± 0.20%	+39.2% ± 0.20%	+48.2% ± 0.19%	+40.6% ± 0.19%	+38.0% ± 0.19%

* = No changes

** = Three standard deviations

Table A-27. The Effects of Tetrachloroethylene on Polyvinylchloride at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	Turned hazy	Turned hazy	Turned white	Turned hazy	Turned white	Turned white	Turned white	Turned white	Turned white
Integrity	NC*	Pliable	Pliable	NC	Pliable	Pliable	Curled	Curled	Curled
Thickness	+2.3% ±1.0%**	+25.3% ± 1.0%	+38% ±1.0%	+23.8% ± 1.0%	+35.7% ± 1.0%	+33.0% ± 1.0%	+33.4% ± 1.0%	+31.7% ± 1.0%	+27.7% ± 1.0%
Weight	+5.0% ±0.15%	+22.6% ± 0.14%	+63.6% ±0.14%	+34.1% ± 0.15%	+66.3% ± 0.15%	+61.2% ± 0.14%	+72.6% ± 0.14%	+49.1% ± 0.13%	+62.7% ± 0.15%

* = No changes

** = Three standard deviations

Table A-28. The Effects of Tetrachloroethylene on Aclar at 23°, 35°, and 50°C

Categorical changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NC*	NC	NC	NC	NC	NC	NC	NC	Turned light yellow
Integrity	Flexible	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable	Pliable
Thickness	NC	+15.6% ± 1.9%**	+10.3% ± 1.9%	+10.6% ± 1.9%	+8.2% ±1.9%	+9.4% ±1.9%	+8.8% ±1.9%	+15.3% ± 1.9%	+9.7% ±1.9%
Weight	+4.1% ±0.14%	+12.7% ± 0.17%	+12.3% ± 0.17%	+11.5% ± 0.17%	+13.3% ± 0.17%	+12.7% ± 0.17%	+13.1% ± 0.18%	+12.6% ± 0.17%	+12.4% ± 0.17%

* = No changes

** = Three standard deviations

Table A-29. The Effects of Tetrachloroethylene on Cellulose Acetate at 23°, 35°, and 50°C

Categorical Changes	Changes observed								
	23°C			35°C			50°C		
	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs	1 Hr	6 Hrs	24 Hrs
Appearance	NC[a]	NC	NC	NC	NC	NC	NC	NC	NC
Integrity	NC	NC	Pliable	NC	NC	NC	NC	NC	Flexible
Thickness	NC	+2.8% ±1.1%[†]	+4.8% ±1.1%	NC	+3.1% ±1.1%	+8.1% ±1.1%	+3.1% ±1.1%	+7.3% ±1.1%	+4.8% ±1.1%
Weight	+1.1% ±0.15%	+4.8% ±0.15%	+9.5% ±0.15%	+1.9% ±0.15%	+8.15% ±0.15%	+15.0% ± 0.15%	+5.1% ±0.15%	+15.7% ± 0.15%	+15.3% ± 0.15%

a = No changes

† = Three standard deviations

Table A-30. The Effects of Tetrachloroethylene on

Plastic	Changes			
	24 Hrs			
	APPR[a]	INTG[b]	TH[c]	WT[d]
Teflon (TFE)	NC[e]	NC	NC	+1.5% ±0.10%[f]
Teflon (FEP)	NC	NC	+1.1% ±1.0%	+1.1% ±0.10%
Aclar	Yellow	Pliable	+9.7% ±1.9%	+12.4% ± 0.17%
Kynar	NC	NC	NC	+ 1.1% ± 0.19%
Polyethylene	NC	Pliable	+3.2% ±1.0%	+38.0% ± 0.19%
Polyvinylchloride	White	Curled	+27.7% ± 1.0%	+62.7% ± 0.15%
Mylar	NC	NC	NC	+0.3% ±0.1%
Lexan	White	Pliable	+32.5% ± 1.1%	+3.3% ± 0.2%
Cellulose acetate	NC	Pliable	+4.8% ±1.1%	+15.3% ± 0.2%
Polystyrene	DIS[h]	DIS	DIS	DIS
Polymethylmethacrylate	White	NC	+0.10% ±0.04%	+0.02% ±0.01%

a = Appearance

b = Integrity

c = Thickness

d = Weight

Plastics at 50°C

observed							
6 Hrs				1 Hr			
APPR	INTG	TH	WT	APPR	INTG	TH	WT
NC	NC	NC	+1.0% ±0.03%	NT[g]	NT	NT	NT
NC	NC	NC	+0.6% ±0.03%	NT	NT	NT	NT
NC	Pliable	+15.3% ± 1.9%	+12.6% ± 0.17%	NC	Pliable	+8.8% ±1.9%	+13.1% ± 0.18%
NC	NC	NC	+0.7% ±0.19%	NC	NC	NC	+ 0.21% ± 0.19%
NC	Pliable	+3.3% ±1.0%	+40.8% ± 0.19%	NC	Pliable	+2.7% ±1.0%	+48.1% ± 0.19%
White	Curled	+31.7% ± 1.0%	+49.1% ± 0.13%	White	Curled	+33.4% ± 1.0%	+72.62% ± 0.14%
NC	NC	NC	+0.22% ±0.14%	NT	NT	NT	NT
White	Pliable	+36.3% ± 1.1%	+45.7% ± 0.17%	White	Flexible	+33.7% ± 1.1%	+45.1% ± 0.17%
NC	NC	+7.3% ±1.1%	+13.7% ± 0.15%	NC	NC	+3.1% ±1.1%	+5.1% ±0.15%
NT	NT	NT	NT	NT	NT	NT	NT
NT	NT	NT	NT	NT	NT	NT	NT

e = No changes

f = Three standard deviations

g = Not tested

h = Dissolved beyond recovery

Appendix

Table A-31. Overall Compatibilities of Plastics with Test Solvents After 24 Hours at 50°C

Plastic	Test Solvents and Number of Categorical Changes[a]							
	Mustard (HD)	Thiodiglycol	Ethyl methyl-phosphonic Acid	Diisopropylamino-ethyl mercaptan	Diisopropylamino-ethyl disulfide	DS-2	HTH (10%)	Tetrachloro-ethylene
Teflon (TFE)	1_s[b]	0[c]	0	0	0	0	0	1_s
Teflon (FEP)	1_s	0	0	0	2_s	0	1_s	2_s
Aclar	0	0	0	0	1_s	2	1_s	4
Kynar	3_s	0	0	0	1_s	1	0	1_s
Halar	0	0	0	0	0	NT[d]	NT	NT
Polyethylene	1_s	0	0	1	2	0	2_s	3
Polyvinylchloride	4	0	0	3	1_s	3	2_s	4
Mylar	1_s	0	0	0	0	3	2_s	1_s
Lexan	4	0	0	2	0	5	2_s	4
Cellulose acetate	4	3	1_s	0	1_s	3	4	3
Polystyrene	5[e]	0	0	5	5	1_s	3_s	5
Polymethylmethacrylate	NT	NT	NT	NT	NT	2	3_s	2_s

a = Changes in appearance, integrity, thickness, or weight.

b = Slight change (less than 5%).

c = No changes

d = Not tested

e = Dissolved beyond recovery

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Aberdeen Proving Ground, MD 21005

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ATTN: Code 443 1
800 N. Quincy Street
Arlington, VA 22217

Commander
Naval Explosive Ordnance Disposal Facility
ATTN: Army Chemical Officer
Code AC-3 1
Indian Head, MD 20640

Chief, Bureau of Medicine & Surgery
Department of the Navy
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Washington, DC 20372

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Marine Corps Development and Education Command
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Quantico, VA 22134

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Wright-Patterson AFB, OH 45433

Commander
Aeronautical Systems Division
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ATTN: ASD/AESD 1
Wright-Patterson AFB, OH 45433

HQ AFLC/LOWMM 1
Wright-Patterson AFB, OH 45433

HQ, AFSC/SDNE 1
Andrews AFB, MD 20334

HQ AMD/RD
ATTN: Chemical Defense OPR 1
Brooks AFB, TX 78235

HQ AFISC/SEV 1
Norton AFB, CA 92409

NORAD Combat Operations Center
ATTN DOAN 1
Cheyenne Mtn Complex, CO 80914

Air Force Aerospace Medical Research Laboratory
ATTN: AFAMRL/HE
Dr. C.R. Replogle 1
Wright-Patterson AFB, OH 45433

USAF SAM/RZW 1
Brooks AFB, TX 78235

HQ AFTEC/SGB 1
Kirtland AFB, NM 87117

OUTSIDE AGENCIES

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ATTN: TACTEC 1
505 King Avenue
Columbus, OH 43201

Toxicology Information Center, WG 1008
National Research Council 1
2101 Constitution Ave., NW
Washington, DC 20418

US Public Health Service
Center for Disease Control
ATTN: Lewis Webb, Jr. 1
Building 4, Room 232
Atlanta, GA 30333

Enclosure 16

Design and Installation of New Tank System or Components
(6 CCR 1007-3 § 264.192)

Design and Installation of New Tank System or Components
(6 CCR 1007-3 Section 264.192)

In accordance with 6 CCR 1007-3 § 264.192, Design and Installation of New Tank System or Components, this summary describes how the redesign of the Spent Decontamination System described in Permit Modification Request B001 meets the regulatory requirements. This assessment only pertains to the APB tank system ancillary equipment used downstream of the hold tanks and in Category A services. The tanks themselves, sumps, trenches, secondary containment, and the ancillary equipment used to transfer fluid from Category B and C services to the tanks were not affected by the changes presented in B001.

Design Standards [6 CCR 1007-3 § 264.192(a)(1)]

Piping is designed in accordance with ASME B31.3. It is stainless steel (316/316L) and titanium grade 2 for Category A waste streams. The piping downstream of the hold tanks is stainless steel (316/316L). The materials for the piping associated with this system are specified on the P&IDs. Non-piping components utilized by the new design meet the pressure and temperature requirements of the system. Additionally, hoses (and their connections) have been pressure tested in accordance with ASME B31.3.

Hazardous Characteristics of the Waste [6 CCR 1007-3 § 264.192(a)(2)]

Spent decon from category A sumps is likely to contain unreacted agent in water. The wastes are also composed of dilute concentrations of hydrochloric acid from agent as a reactant product and sodium hydroxide from pH adjustments. These waste streams also include CDS™ and/or Clorox2® solution used for localized decontamination of materials and equipment. The bulk pH range can vary between 3 to 14. These wastes are routed to the agent neutralization system.
Spent decon from Category B and C waste streams have an alkaline pH. These waste streams do not contain liquid agent and are routed to the spent decon hold tanks.

Spent decon solution is a listed RCRA waste, K901, K902, and K903 and may exhibit the RCRA characteristics D001, D002, D003, D004-D011, D022, D028, D029, D034, D039, D040, D043.

External Corrosion Protection for Metal Components in Contact with Soil or Water [6 CCR 1007-3 § 264.192(a)(3)]

The APB tank system ancillary equipment will not be in contact with soil or water. Therefore, the requirements of 6 CCR 1007-3 § 264.192(a)(3) are not applicable to this tank system.

Protection from Vehicular Traffic for Underground Tank System Components [6 CCR 1007-3 § 264.192(a)(4)]

The APB tank system ancillary equipment has no underground components. Therefore, the requirements of 6 CCR 1007-3 § 264.192(a)(4) are not applicable to this tank system.

Design Considerations [6 CCR 1007-3 § 264.192(a)(5)]

The design considerations for tank foundations, tank system anchoring, and frost heave (specified as part of 264.192 (a)(5)), are not affected by the changes specified in Permit Modification Request B001.

Materials of Construction

The materials of construction and their chemical compatibility are detailed in Justification for Changes of this Permit Modification.

Assessment [6 CCR 1007-3 § 264.192(a)]

The APB tank system ancillary equipment referenced herein has sufficient structural integrity and is acceptable for storing and/or treating hazardous waste. The foundation, structural support, seams, connections, and pressure controls are adequately designed, and the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.