APPLICATION SUPPLEMENT

Application for a Performance-Based, Multi-Site Radioactive Materials License to Operate a High-Pressure Slurry Ablation Remediation System

Docket Number: 40-38417

Issuing Agency:
U.S. Nuclear Regulatory Commission

July 2025

Prepared by:

DISA Technologies, Inc.
1010 Falcon Avenue
Mills, WY 82644
and

Environmental Restoration Group, Inc.
8809 Washington Street, NE
Suite 150
Albuquerque, NM 87113

REVISION HISTORY AND APPROVAL

Rev.	Nature of changes	Approval	Date
0	Original release	SJC	7/31/2025

Prepared by: Stephen J. Cohen 07/31/2025

Stephen J. Cohen, Radiation Safety Officer — Date

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ATTACHMENTS

Attachment 1 – Health and Safety Plan Table of Contents

Attachment 2 – Job Safety Analysis form

Attachment 3 – Water Treatment System Information

1 INTRODUCTION

On March 21, 2025, DISA Technologies, Inc. (DISA) submitted to the U.S. Nuclear Regulatory Commission (NRC) staff its Application for a Performance-Based, Multi-Site Radioactive Materials License to Operate a High-Pressure Slurry Ablation (HPSA®) Remediation System technology (DISA, 2025a) (Agencywide Documents Management and Access System [ADAMS] Accession No ML25087A094). The purpose of the HPSA® technology is to remediate uranium mine waste. By letter dated June 2, 2025, The staff issued several requests for additional information (RAIs) to support its review of DISA's application (ML25141A028) (NRC, 2025). DISA responded to these RAIs in letter dated June 16, 2025 (ML25167A328) (DISA, 2025b).

The NRC staff reviewed the information Disa provided and believed it did not include sufficient details for staff to make the safety decisions required to complete the application review. Therefore, the staff scheduled a regulatory audit to most efficiently resolve the information needs. The staff scheduled audit meetings on the following dates:

- July 15, 2025
- July 18, 2025
- July 22, 2025
- July 25, 2025
- July 29, 2025

During these audit meetings, the staff and DISA personnel discussed and resolved information needs to allow the staff to render a decision. This report serves as an application supplement, that memorializes the resolution of these information needs. DISA is also submitting standard operating procedures and a quality assurance plan under different documents.

This document is organized by the issues that the NRC staff presented and that DISA resolved. DISA prepared this document during the two-week audit period, and the NRC staff reviewed is concurrently to ensure that issues were being addressed to the staff's satisfaction.

2 CONFIRMATION OF COMPLIANCE WITH RELEASE CRITERIA

DISA's unrestricted release criteria will be the 25 mrem/year dose limit in 10 CFR 20.1402 and the 500 mg/kg source material exemption limit in 10 CFR 40.13. DISA will determine compliance with the release criteria using either concentration data (for the exemption limit), concentration-based screening criteria, or dose modeling. Regarding dose modeling, the NRC staff commented that DISA needs to provide scenarios that would form the basis of dose modeling used to confirm that the release criteria have been met, particularly the 10 CFR 20.1402 dose limit. This section will provide the concentration-based criteria and details regarding dose modeling scenarios.

2.1 NUMERIC CRITERIA FOR DEMONSTRATING COMPLIANCE

DISA has calculated numeric screening criteria for all scenarios presented in Section 2.3. These criteria are in the form of a radionuclide concentration above background that represent a dose of 25 mrem/year. For each scenario, the radium-226 concentration that will result in a dose of 25 mrem/year was calculated. Then, the radium benchmark dose (RBD) approach was used to calculate screening criteria for natural uranium (via uranium-238) and thorium-230. The results of this analysis are presented in Table 2-1. Note – These screening criteria represent the concentrations above background concentrations that are equivalent to 25 mrem/yr for a 5 ft thick, 10,000 m^2 area.

Table 2-1: Radionuclide Concentrations Equivalent to 25 mrem/yr per Scenario

Scenario	Ra-226, pCi/g	U-238, mg/kg[1]	Natural Uranium, mg/kg[3]	Th-230, pCi/g
Resident Farmer	1.7	556[2]	1,151[2]	12
Resident Gardener	4.1	866	1,792	30
Rural Resident	5.3	970	2,008	42
Rancher	12	2,360	5,445	86
Recreationalist	63	8,000	16,562	295

1. Uranium-238 specific activity to calculate limit is 3.36E-7 Ci/g.

2. Uranium concentrations are presented here for the sole purpose of completing the sum of fractions calculations described in Section 2.2 for unrestricted release doses. The total mass concentration of uranium and/or thorium that will be allowed to remain on a treatment site must be below 500 mg/kg.

3. Note: U-238 activity is approximately half of natural uranium activity (48.3%).

2.2 SUM OF FRACTIONS APPROACH WHEN USING NUMERIC CRITERIA

Numerical criteria developed for determining compliance with the 25 mrem/year criterion are primarily based on the radium-226 concentration in pCi/g above

background found within the clean coarse material. However, other radionuclides, such as natural uranium and thorium-230, may be found in the clean coarse material, as well. The manner in which Disa derived concentration limits for these other radionuclides is the radium benchmark dose procedure described in 10 CFR 40, Appendix A, Criterion 6(6). According to Criterion 6(6), if more than one radionuclide is contributing to radiation dose, the sum of the ratios of the radionuclide concentrations to the concentration limits, as calculated using the radium benchmark dose method, will not exceed "1". If the sum of fractions exceeds "1", then DISA will proceed to dose modeling using site-specific data to show compliance with the 25 mrem/year dose limit. Therefore, the numerical criteria in the table above will be used during sum-of-fractions calculations. Despite the Table 2-1 numerical values reported for natural uranium and thorium-230, the source material concentrations (natural uranium + thorium-230) within the clean coarse material must be lower than 500 mg/kg.

2.3 DOSE MODELING

DISA performed dose modeling using RESRAD to calculate the screening criteria presented in Table 2-1. Dose modeling was performed based on certain scenarios depending upon the criteria presented in Section 2.3.1. DISA utilized scenario descriptions from NUREG-1757, Volumes 1 (Appendix B) (NRC, 2006) and 2 (Section 5.0, various appendices) (NRC, 2022), RESRAD Version 6 Manual (ANL, 2001) , and NUREG-1549 (NRC, 1998) to formulate a set of scenarios that would encompass the types of sites that DISA would remediate under its license (NRC, 2006). Where possible RESRAD default values were updated to be consistent with DanD recommended values for their residential scenario (Table I.11, NUREG 1757 Vol. 2, Appendix I and Table 6.1 in NUREG/CR-5512 (McFadden, et. al, 2001). Disa used conservative values when adjusting defaults. For example, the thickness of the contaminated zone in all models is assumed to be 5 ft. This is consistent with the average maximum depths of common crops grown in the U.S. using U.S. Department of Agriculture (USDA) data (Bianchi, 2019).

2.3.1 Method of Determination

DISA will determine which dose modeling scenario to use by analyzing each site based on the following criteria. DISA provided examples of scenarios that may be associated with each criterion; however, these examples are not firm determinations.

1. Natural setting:
    a. Mountains
    b. Floodplains
    c. Plains
    d. Geology and Soil Cover
    e. Topography
2. Current Land Use of the Treatment Site. Examples are as follows:
    a. Land Ownership

b. Zoning Maps:
    i. Public Lands
    ii. General Agriculture
    iii. General Industrial
    iv. General Commercial
    v. General Business
    vi. General Residential
    vii. Special Use – Mining, Utilities, Landfills, etc.
    viii. Planned Development
c. Actual Land Use: may differ from zoning. For example, much of the land zoned as General Agriculture in Montrose County, Colorado, is not used for agriculture. Also, public land zoning, limits the type of land uses.
d. Adjacent Zoning, Land Use, and Ownership

Results of this analysis will either point to one scenario or a short-list of scenarios. In the case of a short-list of scenarios, DISA will consider the most reasonable scenario based on its judgement.

2.3.2 Resident Farmer

The Resident Farmer scenario will rarely be used as very few uranium mine waste sites would occur near agricultural land uses. This scenario accounts for exposure involving residual radioactivity that is initially in surficial soil. A farmer moves onto the site and grows some of the required sustenance. However, this scenario assumes that water is tapped from an aquifer under the site, and that fish are caught from a pond filled with water from the aquifer. These pathways are not reasonable as the primary means of irrigation and cattle watering is surface water offtakes or ponds created from precipitation runoff (potentially contaminated). Therefore, the pathways include:

1. External exposure from soil;
2. Inhalation to (re)suspended soil;
3. Ingestion of soil;
4. Ingestion of plant products grown in contaminated soil; and
5. Ingestion of animal products grown onsite (using feed and water derived from potentially contaminated sources).

DISA will use this scenario for sites that occur in relatively flat topography that renders itself capable of sustaining agriculture and where agricultural land uses are adjacent to DISA's treatment sites.

2.3.3 Resident with Garden

The Resident with Garden scenario is considered the conservative bounding case for all mine waste sites except those where agriculture could reasonably be expected to occur at the site.

The pathways include:

1. External exposure from soil;
2. Inhalation to (re)suspended soil;
3. Ingestion of soil;
4. Ingestion of some plant products grown in contaminated soil; and
5. Ingestion of some animal products grown onsite (using feed and water derived from potentially contaminated sources).

The resident gardener scenario will utilize where topography, geologic setting, climate and other evidence indicates that gardening can occur on a treatment site and gardening does occur adjacent to treatment site.

2.3.4 Rancher

This scenario accounts for exposure involving residual radioactivity that is initially in the surficial soil. A rancher moves temporarily onto the site and allows cattle to graze on the land. However, this scenario assumes that no crops are grown and that cattle are watered by surface water runoff from precipitation (potentially contaminated) and surface water offtakes. DISA assumes that the rancher occupancy and breathing rate is consistent with the RESRAD "Industrial Worker" occupancy (see RESRAD Ver. 6 Manual, Table 2-3). Pathways for this scenario include:

1. External exposure from soil
2. Inhalation to (re)suspended soil
3. Ingestion of soil
4. Ingestion of animal products grown onsite (using water derived from potentially contaminated sources)

DISA will use this scenario on public and private lands where ranching occurs adjacent to a site, and where site topography lends itself to ranching.

2.3.5 Rural Resident

The rural resident scenario considers a receptor living on the site but does not include pathways related to gardening or livestock production. The decision regarding whether or not gardening/livestock is to be considered in this scenario will be based on site reconnaissance and/or aerial imagery. DISA has observed that areas around uranium mine waste sites contain residences with no gardens or livestock. However, If gardens or livestock are observed through either of the aforementioned methods, then the resident gardener scenario will be used. For dose modeling, the pathways considered are like the recreational scenario; however, the occupancy time is consistent with the resident farmer scenario.

1. External exposure from soil
2. Inhalation to (re)suspended soil

3. Ingestion of soil

2.3.6 Recreationist

Recreational land use addresses exposure to people who spend a limited amount of time at or near a site while playing, fishing, hunting, hiking, or engaging in other outdoor activities. Recreational exposure will account for hunting seasons where appropriate. Due to the assumption that activities likely will generate more dusting, the mass loading factor was set to 10 times the default RESRAD value (i.e., 0.001 m^3/y rather than the default 0.0001 m^3/y) This scenario assumes that drinkable water will be brought in from offsite, and no ponds will be available for fishing within the reclamation area. Therefore, the pathways are as follows:

1. External exposure from soil
2. Inhalation to (re)suspended soil
3. Ingestion of soil
4. Ingestion of meat (if hunting is an applicable land use). **Note:** This pathway may be excluded if hunting in the area is unlikely or prohibited.

DISA will use this scenario for those sites that exhibit natural settings that are not conducive to resident farmer, resident gardener, rural resident, or rancher scenarios and/or where ranching and farming are not adjacent to DISA's remediation sites. It is anticipated that the vast majority of sites will be considered under the recreationalist scenario.

2.3.7 Outlier Scenarios

Considering the potential large number of sites that DISA may treat, it is possible that DISA may encounter site conditions that do not fit into the scenarios presented above. In those cases, DISA will incorporate the new conditions into a model scenario, calculate screening values, and present the new scenario and associated screening values in the pre-mobilization notification. For example, fish ingestion is an unlikely exposure pathway at DISA's treatment sites. However, if site conditions indicate that the fish pathway is reasonable, then it will be included in DISA's dose modeling, and the screening criteria will be adjusted.

2.3.8 Contingencies for Exceeding Screening Criteria

This section presents tiers of contingencies to be considered if radionuclide concentrations in the clean coarse material do not meet the screening criteria. The first level of compliance with the 10 CFR 20.1402 unrestricted release criteria is to meet the screening criteria presented in Table 2-1. If such compliance cannot be achieved through analysis of clean coarse material samples, then the following tiers of contingencies will be invoked:

- Tier 1 – Site-Specific Dose Modeling - If these criteria cannot be met, DISA will perform site-specific dose modeling, that incorporates measurements, to demonstrate compliance with the unrestricted release criteria.
- Tier 2 – If site-specific modeling does not produce an acceptable result, Disa will utilize soil mixing to produce an acceptable dose.

DISA will utilize soil mixing guidance found in NUREG-1757, Volume 1, Revision 2. Soil mixing proposals would require the submittal of additional information in the demobilization notification. The information needed for a soil mixing approval has been adapted from Section 15.13.3 of NUREG-1757 and states the following:

1. A summary discussion of the overall decommissioning of the site that includes the use of HPSA® to treat uranium mine waste and the doses remaining in the clean coarse material. Discussion should include the manner in which intentional mixing will help achieve the unrestricted release criterion.
2. Information on the locations of surface contamination that define the areas of for which intentional mixing will be utilized.
3. Information on the configuration of the "footprint" of the areas of contamination prior to the mixing operation and the final area comprised of the intentionally mixed soil.
4. Information on any locations of uncontaminated surface soil that will be incorporated into the footprint. DISA does not anticipate transporting offsite soil to a treatment site for soil mixing.
5. Information on the intentional mixing activities to be conducted by the licensee or contractors, including the machinery to be used and the methods to be employed with the equipment to achieve a homogeneous mix of soil. Information should be included on important features and parameters of machinery operation that control the homogeneity of the resultant mix, such as mixing time, discharge time, number of mixing blades or paddles, and the maximum particle size.
6. NUREG-1757 requires Information on any slag or other larger non-soil like waste materials that will be included in the soil that is intentionally mixed, and how it will be rendered compatible with the mixing machinery (e.g., maximum particle size), if necessary. No non-soil materials will be used for soil mixing.
7. Information on the method to be used to ensure that the mixing operation has resulted in a sufficiently homogeneous mixture to achieve the goals of the decommissioning project. This should include any instrumentation that may be used in support of the machinery used for mixing, as well as any proposed surveying and/or sampling and analysis that is employed. DISA will perform walkover gamma scans to assess the homogeneity of the soil mixing area and will collect samples for laboratory analysis to ensure that the unrestricted release criterion is met.

2.3.9 Dose Model Parameter Values

RESRAD template scenarios were used as a starting point for each DISA scenario. Default values for these scenarios are presented in the RESRAD manual (e.g., Section 2.4 of User's Manual for RESRAD Version 6, July 2001). The RESRAD Resident-Farmer and the Recreationalist scenarios form the basis of site-specific models with some models including adopted parameter values from the Industrial RESRAD scenario. These base scenarios are then modified for the site-specific models described above. As previously stated, where possible, default RESRAD values are replaced with DandD default values for the resident scenario, and, in all cases, the depth of the contaminated zone is conservatively assumed to be 5 ft. This is consistent with the average maximum depths of common crops grown in the US using USDA data (Bianchi, 2019). Additionally, for the recreational scenario, a mass-loading factor of 0.001 m^3/y was used to account for activities that will create more dust. This is 10 times greater than the default value used for the other scenarios.

Table 2-2 below provides details that describe the site-specific scenarios, the RESRAD scenario basis, key parameter values, and which site-specific values will be updated in all cases. In all cases, the contaminated area is 10,000 square meters, which is the maximum area considered in the RESRAD code. Complete RESRAD output files will be made available to NRC and/or included as an attachment to this document. The output files include all input values as well.

Table 2-2. Dose Assessment Scenarios and Key Parameter Values

DISA Scenario	Pathways	Occupancy	Inhalation Rate, m^3/yr	Contaminated Food Fractions	Site-specific Parameters for Scenarios
Resident Farmer	• External exposure from soil • Inhalation to (re)suspended soil • Ingestion of soil • Ingestion of plant products grown in contaminated soil • Ingestion of animal products grown onsite	Indoor - 0.66[c] Outdoor - 0.11[c]	6,684[c]	Plant = 0.5 Milk = 1.0 Meat = 1.0 Aquatic = 0	• Soil concentrations • Thickness of contaminated zone • Density of contaminated zone • Mass-loading factor Occupancy, breathing rate
Resident Gardener	• External exposure from soil • Inhalation to (re)suspended soil • Ingestion of soil • Ingestion of some plant products grown in contaminated soil • Ingestion of some animal products grown onsite	Indoor - 0.66[c] Outdoor - 0.11[c]	6,684[c]	Plant = 0.1 Milk = 0.1 Meat = 0.1 Aquatic = 0	
Rancher	• External exposure from soil • Inhalation to (re)suspended soil • Ingestion of soil • Ingestion of animal products grown onsite	Indoor - 0.17[a] Outdoor - 0.06[a]	11,400	Plant = 0 Milk = 0 Meat = 1.0 Aquatic = 0	
Rural Resident	• External exposure from soil • Inhalation to (re)suspended soil • Ingestion of soil	Indoor - 0.66[c] Outdoor - 0.11[c]	6,684[c]	Plant = 0 Milk = 0 Meat = 0 Aquatic = 0	

DISA Scenario	Pathways	Occupancy	Inhalation Rate, m^3/yr	Contaminated Food Fractions	Site-specific Parameters for Scenarios
Recreationalist	• External exposure from soil • Inhalation to (re)suspended soil • Ingestion of soil • Ingestion of meat (if hunting is an applicable land use)	Outdoor - 0.04[b]	14,000[b]	Plant = 0 Milk = 0 Meat = 1.0 (or 0) Aquatic = 0	

3 POST-TREATMENT DOSE ASSESSMENT

3.1 PRE-MOBILIZATION BATCH TESTING

DISA will perform laboratory testing of uranium mine waste at its Mills, Wyoming, facility to determine the effectiveness of HPSA® at remediating the waste, to determine the operational parameters, and to measure the quality of the clean coarse material (radionuclide content, leachability testing, and toxicity testing). Regarding the clean coarse material, five samples will be collected during testing and analyzed for (natural uranium, radium-226, thorium-230) to calculate a standard deviation. This standard deviation will be used as input into Pro-UCL to calculate the number of samples that should be collected from the clean coarse material during waste treatment. If no standard deviation is calculated, then 1 sample every 4 days will be collected assuming the use of a 50 ton per hour HPSA® unit.

3.2 FINAL STATUS SURVEYS

Decommissioning and releasing sites for unrestricted release will involve conducting Final Status Surveys (FSSs). An FSS is a combination of sampling and analysis, GPS-gamma surveys, and dose modeling. Information gathered from the FSS will be used to create the Post-Treatment Risk Assessment, which will utilize sample analytical and calculated doses for comparison to DISA's proposed release criteria. For sampling, DISA intends to collect clean coarse material samples as this material is generated from the HPSA® treatment process.

3.3 POST-TREATMENT SAMPLING AND ANALYSIS

DISA will collect grab samples of materials as they are being generated using HPSA®. Many samples will be analyzed by portable X-ray fluorescence (XRF) equipment, larger equipment at the Mills, WY, facility laboratory (large XRF equipment and an ICP-OES). However, only samples analyzed by a commercial, accredited laboratory will be used for final decision making. Collection frequencies for laboratory samples are discussed below.

3.3.1 Justification for Clean Coarse Sampling Frequency

DISA's choices when sampling the clean coarse material are: (1) collecting samples while the clean coarse material is being generated, or (2) sampling this material after treatment is completed prior to demobilization. Sampling the clean coarse material while the process is ongoing is preferable since DISA can get early indications of any treatment issues and make subsequent corrections. The assumption for the stated rate is that the clean coarse material will be relatively homogenous because of the mixing, crushing, grinding, slurrying, and ablating that occurs during treatment.

To address the NRC staff's RAI, Disa attempted to utilize ProUCL to calculate a sample size that could be used per 40,000 tons and would satisfy the staff's concern of statistical validity. However, Disa does not have the data to estimate the standard deviation of the clean coarse material. Therefore, Disa proposes the following:

1. Laboratory testing, prior to mobilization, will include analysis of 5 samples of clean coarse material to estimate the standard deviation of a site.
2. This standard deviation will be used to calculate the sample size, in ProUCL, using the Estimating Mean function. This function is size/area independent, but Disa will assume it's for 40,000 tons.
3. As an example, assuming a 95% confidence interval, an allowable error margin of 10, and a standard deviation of 20 units, the sample size is 18 samples per 40,000 tons. This equals approximately 1 sample every 4 days of treatment with a 50 ton per hour unit.
4. The no. of samples/40,000 tons will be presented in the pre-mobilization notification along with the ProUCL output.
5. DISA commits to collecting a minimum of 5 samples of clean coarse material for sites that contain less than 40,000 tons of uranium mine waste.

3.3.2 Justification for Fines Concentrates Sampling Frequency

The sampling frequency for the fines concentrates is 1 sample per 10 to 20 tons, which is approximately 1 to 2 samples for roll-off container. Similar to the clean coarse material, the fines concentrates will be relatively homogenous. Therefore, the proposed sampling frequency will be sufficient to prepare shipping papers, prepare the demobilization notifications, quantify source material for the Additional Protocol requirements, and provide information regarding the HPSA® effectiveness.

3.3.3 Analytes and Analytical Methods

DISA is proposing the following analytes and analytical methods for its clean coarse material and water matrices, which will be performed by Pace Analytical in Sheridan, Wyoming. DISA notes that it will use the Synthetic Precipitation Leaching Procedure (SPLP) for radionuclides, and it will use the Toxic Characteristic Leaching Procedure (TCLP) for the RCRA 8 metals. The limits for the TCLP metals are as follows (40 CFR 261):

- Arsenic = 5.0 mg/L
- Barium = 100.0 mg/L
- Cadmium = 1.0 mg/L
- Chromium = 5.0 mg/L
- Lead = 5.0 mg/L
- Mercury = 0.2 mg/L
- Selenium = 1.0 mg/L

- Silver = 5.0 mg/L

It should be noted that no standard exists for determining the leachability hazard for radium-226, thorium-230, or natural uranium. Therefore, DISA agrees to use the 10 CFR 20, Appendix B, Table 2 – Effluent Concentration values to determine if SPLP leachability is acceptable. These values are:

- Radium-226 = 60 pCi/L
- Th-230 = 100 pCi/L
- Natural Uranium = 0.43 mg/L based on 300 pCi/L limit

1. Clean Coarse Material and Fines Concentrates
    a. Uranium – EPA Method 200.8, Reporting Limit – 1 mg/kg
    b. Vanadium - EPA Method 200.8, Reporting Limit – 5 mg/kg
    c. Radium-226 – EPA Method 901.1 (Gamma Spectroscopy), Reporting Limit 0.2 pCi/g
    d. Thorium-230 – Method ACW01 (Alpha Spectroscopy), Reporting Limit 0.2 pCi/g
    e. TCLP RCRA Metals (Clean Coarse Material only) – EPA Method 6010 C
        i. Arsenic – Reporting Limit - 0.2 mg/L
        ii. Barium - Reporting Limit - 0.5 mg/L
        iii. Cadmium - Reporting Limit - 0.05 mg/L
        iv. Chromium - Reporting Limit - 0.01 mg/L
        v. Lead - Reporting Limit - 0.2 mg/L
        vi. Selenium - Reporting Limit - 0.05 mg/L
        vii. Silver - Reporting Limit - 0.2 mg/L
    f. TCLP Mercury (Clean Coarse Material Only) – EPA Method 7470A, Reporting Limit – 0.005 mg/L
2. Treated Process Water Samples
    a. Total RCRA Metals – All EPA 200.8
        i. Arsenic, Reporting Limit - 0.005 mg/L
        ii. Barium, , Reporting Limit - 0.005 mg/L
        iii. Cadmium, Reporting Limit - 0.002 mg/L
        iv. Chromium, Reporting Limit - 0.01 mg/L
        v. Lead, Reporting Limit - 0.001 mg/L
        vi. Selenium, Reporting Limit - 0.005 mg/L
        vii. Silver, Reporting Limit - 0.003 mg/L

b. Uranium, EPA Method 200.8, Reporting Limit - 0.0003 mg/L
c. Vanadium, EPA Method 200.8, Reporting Limit - 0.02 mg/L
d. Mercury, EPA Method 245.1, Reporting Limit - 0.001 mg/L
e. Radium-226, Method SM 7500 Ra-B, Reporting Limit - 0.2 pCi/L
f. Thorium-230, Method ACW10, Reporting Limit - 0.2 pCi/L

3.3.4 Sample Data Analysis

DISA will utilize the data from clean coarse material sampling and analysis to calculate the 95% upper confidence limit (UCL) for the data set. This UCL will be used to compare to the numeric criterion presented in Section 2.1. If dose modeling is required, then the UCL will be used to estimate the source term in dose models. Regarding water samples, analytical samples of post-treatment process water will be collected. Sample results will be compared the effluent limits in 10 CFR 20, Appendix B. These limits are presented above in Section 3.3.3.

3.4 INFORMATION REGARDING METHOD SM 7500 RA-B

Method SM 7500 Ra-B measures alpha-emitting radium isotopes by the rate of ingrowth and decay of their progeny in a barium sulfate precipitate. The method uses various chemicals include EDTA, which, because of its slight acidity, will keep other alpha-emitting isotopes in solution. The NRC staff has raised questions regarding the validity of SM 7500 Ra-B, which is based on ASTM D-2460, because of potential interferences from radium-223 and radium-224. According to Pace Analytical, radium-223 does not occur to any significant extent in natural materials. Regarding radium-224, its half-life is approximately 3.4 days; therefore, if a sample is held long enough, radium-224 will decay out and radium-226 will grow in. Pace Analytical stated that it waits 14 days for radium-224 to decay, which is sufficient to complete the analysis for radium-226. Pace stated its confidence with method SM 7500 Ra-B and commits to using it for DISA's HPSA® treatment projects.

4 POST-TREATMENT SITE STABILIZATION

After treatment is completed, DISA will stabilize the site using general standards from typical mining reclamation rules such as those found in the Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board for Hard Rock, Metal, And Designated Mining Operations, Effective July 15, 2022. The following sections describe the general measures to be taken to stabilize the treatment site. These measures will be identified in the pre-mobilization notification.

4.1 POST-TREATMENT LAND USE

The post-treatment land use will be identified in the pre-mobilization notification and will provide a general guide for stabilizing treatment sites. Choice of land uses include recreational, wildlife, and rangeland. DISA will not stabilize a site to promote general agriculture, cropland, or residential uses. Note that, in rare cases, a treatment site may occur adjacent to an existing mine pit. If allowed, DISA will fill the mine pit with the clean coarse material. However, DISA will not be responsible for highwall stability or overall mine reclamation, except to protect DISA's employees and contractors. DISA will also not stabilize a site to promote pond formation and will not create streams or wetlands on treatment sites.

4.2 GENERAL STABILIZATION MEASURES

DISA's post-treatment stabilization efforts will be executed using the following reclamation guidelines:

1. Grading should be implemented to create a final topography appropriate to the final land use.
2. When backfilling is a part of the plan, DISA should use the clean coarse material for that purpose. Unless necessary for site stability, DISA will not compact the clean coarse material to engineering standards to support construction or other commercial or industrial purposes.
3. All grading should be done in a manner to control erosion and siltation of downgradient lands and water bodies, to protect areas outside the treatment site from slides and other damage.
4. All backfilling and grading should be completed as soon as feasible after the treatment process.
5. Any drill or auger holes that are discovered during treatment that were part of the previous mining operations shall be plugged with non-combustible material, which shall prevent harmful or polluting drainage.
6. Maximum slopes and slope combinations should be compatible with the configuration of surrounding conditions and selected land use. Slopes will be created that are stable considering the physical characteristics of the clean coarse material.

7. DISA will not create any lakes or ponds during treatment or post-treatment stabilization.
8. All clean coarse material to remain onsite should be handled in such a manner so as to prevent any unauthorized release of pollutants to the surface drainage system.
9. No unauthorized release of pollutants to groundwater should occur from any clean coarse materials remaining onsite or from the fines concentrates to be recycled offsite.

4.3 GENERAL SURFACE WATER GUIDELINES

DISA's post-treatment stabilization efforts will be executed using the following surface water protection guidelines:

1. Hydrology and Water Quality: Disturbances to the prevailing hydrologic balance of the treatment site and of the surrounding area and to the quantity or quality of surface water after treatment should be minimized by measures, including, but not limited to:
    a. compliance with applicable water laws and regulations governing injury to existing water rights;
    b. compliance with applicable water quality laws and regulations, including water quality standards;
    c. compliance with applicable dredge and fill requirements; and
    d. removing temporary or large siltation structures from drainage ways after disturbed areas are revegetated and stabilized, if required.
2. All surface areas of the treatment site should be stabilized and protected so as to effectively control erosion. Stabilization and erosion control will follow standard sediment and erosion control practices found in the National Menu of Best Management Practices (BMPs) for Stormwater-Construction (EPA, 2025).
3. If necessary, DISA will obtain stormwater control or sediment and erosion control permits from local authorities.

4.4 WILDLIFE

All aspects of the treatment and stabilization process should consider the safety and protection of wildlife on or near the treatment site, and along all access roads to the treatment site. Special attention should be given to critical periods in the life cycle of those species which require special consideration (e.g., elk calving, migration routes, peregrine falcon nesting, grouse strutting grounds). DISA notes that Federal and state authorizations for its treatment projects will likely include stipulations for work to cease to be minimized during certain time periods due to wildlife protection needs. DISA does not intend to engage in habitat creation. However, if opportunities for habitat creation

or improvement present themselves, DISA should consider engaging in such activities. DISA will protect habitat as required by law and regulation.

4.5 REVEGETATION

DISA's post-treatment stabilization efforts will be executed using the following surface revegetation guidelines:

1. In areas where revegetation is necessary, DISA should revegetate the treatment site in such a way as to establish a diverse, effective, and long lasting vegetative cover that is capable of self-regeneration without continued dependence on irrigation, soil amendments or fertilizer. Revegetation should emphasize the use of species native to the treatment site region. Greater emphasis on non-native species may be proposed for range uses.
2. If DISA's choice of reclamation is for rangeland, the land should be restored to slopes commensurate with the proposed land use and should not be too steep to be traversed by livestock. The area may be seeded either by hand, or power, or by the aerial method.
3. Revegetation should provide for the greatest probability of success in plant establishment and vegetation development by considering environmental factors such as seasonal patterns of precipitation, temperature and wind; soil texture and fertility; slope stability; and direction of slope faces.

5 NON-RADIOLOGICAL EMERGENCIES

This section discusses non-radiological emergencies that could occur at DISA's waste treatment sites and the manner in which DISA will address those concerns.

5.1 DISA'S HEALTH AND SAFETY PLAN

DISA maintains an occupational health and safety program, the manual of which is entitled, "Health and Safety Plan, High-Pressure Slurry Ablation and Testing Laboratory, Revision 2" (DISA, 2025c). This document covers many occupational health and safety issues (non-radiological). Attachment 1 contains the table of contents for the latest version.

Because each site has its individual safety issues, DISA's Health and Safety Officer (HSO) and RSO will complete a Job Safety Analysis (JSA), for each site. The typical JSA form is included as Attachment 2. The JSA will provide site-specific occupational and radiation safety information including identification of nearest medical facility, wildfire response (typically evacuation), spill response, and others. Also, crews will be provided with a satellite communication device or satellite internet (Starlink©) to enable communications when in remote areas.

5.2 NON-RADIOLOGICAL ACCIDENTS

Typical non-radiological accidents will involve medical injuries/illnesses, release of gasoline or diesel, wildfire evacuations, and fires on site. The JSA will provide information to respond to medical injuries/illnesses. DISA personnel will be trained in CPR/first aid to render assistance prior to emergency services arriving onsite. Regarding emergency services, DISA will contact the appropriate emergency services prior to initiating treatment work at any site to ensure that they are aware of our locations and activities. DISA employees will also be equipped with satellite internet or other communications capabilities to contact emergency services will in isolated areas.

Fire extinguishers will be located near every HPSA® unit and generators to allow for a rapid response in the event of a site fire. DISA site crews will be trained to operate the fire extinguishers and firefighting. To prevent the spread of a fire beyond DISA's work site, Crews will use any water available to reduce the likelihood of a site fire becoming an uncontrolled wildfire. If DISA crews are required to use process water for firefighting, DISA will survey soil for contamination and remove soil if contamination is detected.

If a gasoline/diesel spill occurs, DISA will use spill containment equipment to contain the spill and excavate contaminated soil. Contaminated soil will be contained in drums or other such containers that are capable of being transported. Contaminated soil will be transported to an appropriately permitted disposal facility.

6 RADIATION SAFETY TECHNICIAN SPECIFIC TRAINING

Radiation Safety Technicians (RSTs) are known as RSO-designees in License documents because they will execute functions that are typically performed by the Radiation Safety Officer (RSO). This RSO-designee function will only occur at DISA treatment sites. Because the RST will serve as this designee role, RSTs will be trained in specific functions that are typically RSO functions. Although the RSO, will not be present on treatment sites full-time, RSOs will perform periodic inspections depending on the length and complexity of a project. Typical RSO inspection intervals are weekly, monthly, decommissioning/demobilization, or mobilization/startup.

6.1 TRAINING

All RSTs will take an introduction to radiation safety course and will also complete an RSO training class. Training certificates will be maintained in DISA's corporate headquarters in Mills, Wyoming. RSTs will also possess a bachelor's degree in engineering or science.

6.2 PROJECT SPECIFIC TRAINING

Because RSTs are considered RSO-designees, RSTs will be trained to perform specific RSO functions at DISA treatment sites. Below is a list of job functions, at a minimum, on which RSTs will be trained:

- Air monitoring systems: establishing, collecting filters
- Contamination surveys
- Equipment function checks
- Daily tailgate meetings
- Exposure surveys
- Isolating and signing radiation areas
- Release surveys
- Daily and weekly inspections
- Sample collection and shipment

RSTs will practice on a mock treatment site to ensure that they will understand their job functions prior to executing their duties at a real treatment site. The RSO will sign off on the training for the RSTs. DISA will maintain procedures for all of these activities for use by the radiation protection staff.

7 NOTIFICATIONS

7.1 PRE-MOBILIZATION NOTIFICATIONS

DISA has committed to providing pre-mobilization and demobilization notifications to the NRC staff. In addition to the information provided regarding these notifications in the application, DISA includes the following:

1. For the pre-mobilization notification, DISA will provide a contact schedule, whereby at certain times or events, DISA will contact the NRC staff to inform them of activities. The contact schedule will include the following events:
    a. Mobilization
    b. Commencement of treatment
    c. 50% completion of treatment
    d. Within one week of completion
    e. Expected demobilization
2. DISA will include the dose assessment scenario and the associated threshold that will be used for calculating doses for compliance with the 20.1402 unrestricted release criterion
3. DISA will also provide the analysis used for selecting the dose modeling scenarios.

The full scope of the pre-mobilization notification is as follows:

1. Estimate the quantity of gravel and resulting number of truck shipments that would be needed per 10 miles of road.
2. Schedule for NRC touchpoints.
3. Dose assessment scenario that applies residential farmer, resident garden, rancher, or recreational. Also include the analysis used to select the scenario.
4. The no. of samples/40,000 tons of coarse material post-HPSA treatment will be presented in the pre-mobilization notification along with the ProUCL output. Automatically assume that 5 samples will be collected if the total uranium mine waste mass is less than 40,000 tons.
5. Evaluate the assumptions used in Appendix A of Environmental Assessment prepared by the NRC staff. If some of the assumptions are not valid, then the staff may be required to prepare a site-specific Environmental Assessment.
6. Specific location for that project site.
7. A description of the site to include anticipated land disturbance activities (i.e., constructing temporary roadways, grading of soil for equipment placement, approximate volume of soils/waste rock to be processed, and whether large volumes of soil/waste rock will be moved at the project site to facilitate treatment.

8. Preliminary data developed by the applicant for each project site to include concentrations of U and Th in the waste rock and the surface soils prior to mobilization, waste rock volumes expected to be processed and the anticipated number of treatment units, and survey data used to establish background radiation levels that will be used in subsequent public dose calculations.
9. Information developed by the licensee regarding consultations with property owners, resource experts, and local or state government representatives concerning any native or endangered species at the project site as well as cultural or historical information of interest and existing and proposed future land use.
10. Approximate mass of source material that the applicant will possess (this can later be refined for inventory and material accountability).
11. Anticipated date(s) of mobilization and start of operations as well as the anticipated duration of operations.
12. Methodology used to determine that the project site will meet release criteria including the extent of residual radioactivity remaining at the site from operations and justifications based on land use in the vicinity of the site and other site characteristics for scenarios and parameters used to calculate dose to demonstrate 10 CFR 20 Subpart E release criterion are met.
13. An updated site-specific decommissioning cost estimate, as applicable.
14. A certification that financial assurance for decommissioning has been provided in an amount that is at least that of the updated decommissioning cost estimate.
15. Outlier scenarios. DISA will incorporate the outlier scenario conditions into a model scenario, calculate screening values, and present the new scenario and associated screening values in the pre-mobilization notification.
16. A description of the expected post-treatment stabilization method.

7.2 DEMOBILIZATION NOTIFICATIONS

The NRC staff and DISA personnel agree that the demobilization notification will be submitted within 30 days after demobilizing from a treatment site. Because DISA will be collecting samples of the clean coarse material as it is being generated, DISA will have early indications regarding whether the radionuclide concentrations will meet the screening criteria and whether site leachability and toxicity test results will meet the appropriate standards. The following is the complete scope of the demobilization notification:

1. Dose assessment results and radionuclide concentration results for clean coarse material, fines concentrates, and process water.
2. Results of the Synthetic Precipitation Leaching Procedure (SPLP) analysis for the clean coarse material.
3. Results of the Toxic Characteristic Leaching Procedure (TCLP) analysis for the clean coarse material.
4. Presentation of release criterion, screening criteria, and applicable effluent standards.
5. Comparisons of doses and concentrations to the criteria and standards presented in Item 3 above.
6. Determination that process water may be discharged onsite or decision to take the process water offsite.
7. Description of how process water was discharged onsite, if applicable.
8. Facility-specific site number to be created by Disa.
9. Name, location, geographic coordinates of the site.
10. Owner and owner's contact information.
11. Actual volume of abandoned mine waste treated.
12. Name of the actual licensed recycling, disposal, or storage facility receiving fine concentrates.
13. Mass of mineral-rich material transported to the recycling facility.
14. Description of how coarse material was handled following processing.
15. Final determination on clean coarse material. Did concentrations meet the screening criteria for the scenario specified in the PMN. If not, describe the final survey data and methodology used to determine that the project site meets release criteria, including the extent of residual radioactivity remaining at the site from operations and justifications based on land use in the vicinity of the site and other site characteristics for scenarios and parameters used to calculate dose to demonstrate 10 CFR 20 Subpart E release criterion are met.

8 AIR MONITORING

DISA has committed to air monitoring at its treatment sites. Air monitoring will include air particulates, radon, and environmental gamma. However, the experience of DISA's technical staff indicates that these parameters will not create an important pathway for radiological dose at uranium mine waste sites. Therefore, DISA proposes to assess air monitoring data for the first 12 months of operations across multiple sites. If the data indicates that air particulates, radon, and environmental gamma do not create important radiological dose pathways, then DISA will propose the elimination or reduction of all or parts of the air monitoring through a review by its Safety and Environmental Review Panel. If DISA is working on one large site, DISA will propose the elimination or reduction of air monitoring through a SERP review for that particular site only.

SOP-08, Air Sampling, contains provisions for placing air monitors (including radon and environmental gamma) along the perimeter of a treatment site and also providing air sampling in the work areas. Such air monitoring can be accomplished by stationary samplers or lapel samplers, as well as additional radon detectors (track-etch or continuous) and gamma dosimeters (optically stimulated luminescence detectors). The need for this monitoring will be assessed and will be discontinued if the data shows that it's warranted. Regardless of whether or not air particulates, radon, and gamma are important dose pathways, DISA may elect to continue perimeter monitoring, if warranted, to demonstrate that public doses are below limits.

9 WATER SAMPLING, TREATMENT, AND DISCHARGE

9.1 SAMPLING

The NRC staff requested more information regarding process water sampling prior to discharge. Process water will be sampled either after DISA has completed the treatment at a site and is seeking to discharge the water or during treatment to demonstrate that the constituents in process water will meet standards. To sample a process water tank, DISA will collect three grab samples of process water, per HPSA unit, and analyze the water. Grab samples will be collected from different parts of the water column. Because the water to be discharged has already been treated by a treatment system, DISA expects the process water to be homogeneous. Alternatively, DISA will install a sample port downstream of the filtration system and collect samples as the water is being treated. In this manner, the samples will be more consistent because it will be thoroughly mixed when exiting the treatment system.

9.2 TREATMENT

The NRC staff requested more information regarding the type of water treatment technology to be used at DISA treatment. Attachment 3 contains information regarding the proposed water treatment system. The NRC staff also requested information regarding the discharge of water at DISA treatment sites. DISA expects to possess approximately 5,000 gallons of water per each 50 ton per hour treatment unit. DISA will either remove this water from the treatment site and reuse it or discharge it to the ground. DISA will use sprinkler type nozzles to release water to a treatment site and will irrigate seed at the same time. DISA commits to releasing water in a manner that will not cause runoff from the site to existing waterways.

9.3 DISCHARGE

Disa also confirms that it will use the Appendix B, Table 2 effluent limits to discharge treated water to the ground surface. However, in some cases, DISA would seek to discharge water to a sanitary sewer or a sewage treatment plant. In these cases, DISA would use the Appendix B, Table 3 sanitary sewer limits.

10 PILOT TEST

DISA has previously proposed a maximum 7,500-ton pilot test to be executed after licensing has been completed. DISA has re-evaluated the size of the pilot test and has determined the following:

The pilot test can only be completed using DISA's current 10-ton per hour (tph) unit since the uranium remediation 50-tph unit has not been completed.

1. Assuming 10 tph, 6 hours of treatment per day, and 5 days per week, DISA can treat 300 tons per week.
2. At that rate, DISA would require 25 weeks to treat 7,500 tons of uranium mine waste.

Therefore, DISA is proposing a 1,500-ton pilot test, which would require 5 weeks to complete. Below are pictures of the 10-tph unit. Once the pilot test is completed and all the data have been received, DISA's Safety and Environmental Review Panel (SERP) will review the data and render a decision on its effectiveness and safety including the final doses or compliance with the numeric criterion. After the SERP's decision, the report and decision document, will be submitted to the NRC staff for review and approval. DISA will collect a minimum of 5 samples of the clean coarse material to determine compliance with the numeric criterion and the 20.1402 unrestricted dose limit.

Figure 11-1: 10 TPH Unit Collision Skid

Figure 11-2: 10 TPH Unit Mixing Skid

Figure 11-3: 10 TPH Unit Crushing/Grinding Skid

11 PERFORMANCE-BASED LICENSE CONDITION

DISA and the NRC staff discussed modifications to the Performance-Based License Condition to make it more applicable to DISA's operations. Toward that end, DISA is proposing the following:

Change, Test and Experiment License Condition

a. The licensee may, without obtaining a license amendment pursuant to 10 CFR 40.44, and subject to conditions specified in (b) of this condition:
   i. Make changes in the type of equipment used in HPSA® as described in the license application (as updated);
   ii. Make changes in the procedures as described in the license application (as updated); and
   iii. Conduct tests or experiments not described in the license application (as updated).
b. The licensee shall obtain a license amendment pursuant to 10 CFR 40.44 prior to implementing a proposed change, test, or experiment if the change, test, or experiment would:
   i. Result in a radiological release scenario that has not been previously addressed in the license application (as updated);
   ii. Result in more than a minimal increase in the likelihood of a radiological release from structures and equipment evaluated in the license application (as updated);
   iii. Result in a departure from the method of evaluation described in the license application (as updated) used in establishing the final safety evaluation report (FSER), or environmental assessment (EA) or technical evaluation reports (TERs) or other analyses and evaluations for license amendments.
c. Additionally, the licensee must obtain a license amendment unless the change, test, or experiment is consistent with NRC's previous conclusions, or the basis of, or analysis leading to, the conclusions of actions, designs, or design configurations analyzed and selected in the site or facility SER, TER, and EA. This would include all supplements and amendments, and TERs, EAs, EISs issued with amendments to this license.
d. The licensee's determinations concerning (b) and (c) of this condition shall be made by a Safety and Environmental Review Panel (SERP). The SERP shall consist of a minimum of three individuals. One member of the SERP shall have expertise in management and shall be responsible for financial approval for changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and one member shall be the radiation safety officer (RSO) or equivalent, with the responsibility of

assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP, as appropriate, to address operational and technical aspects. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.

e. The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall include written safety and environmental evaluations made by the SERP that provide the basis for determining that changes comply with (b) of this condition. The licensee shall furnish, in an annual report to the NRC, a description of such changes, tests, or experiments, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit to the NRC changed pages, which shall include both a change indicator for the area changed, e.g., a bold line vertically drawn in the margin adjacent to the portion actually changed, and a page change identification (date of change or change number or both), to the operations plan and reclamation plan of the approved license application (as updated) to reflect changes made under this condition.

12 FINANCIAL ASSURANCE

DISA proposes using a surety bond to fulfill its financial requirements presented in 10 CFR 40.36(e)(2). DISA will have the bond secured prior to starting its first treatment project and this first bond will be in the amount that is required to perform treatment projects for the first year. DISA will update its bond annually, 30 days prior to the license anniversary, ensuring that the bond amount equals that which is required for the projects to be treated the following year. The surety bond will also account for projects where the bond may be released because the NRC staff has approved the demobilization notification. DISA will submit copies of its surety bond to the NRC staff by the due date. An accounting system will also be maintained to track the bond amount and the projects that this amount covers.

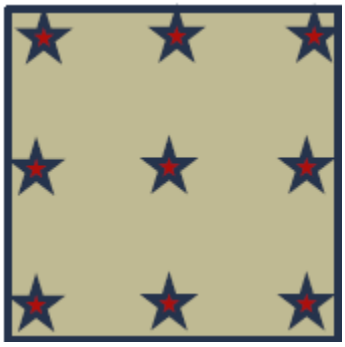
13 BACKGROUND VERSUS BASELINE

In its response to RAI 9, DISA used the term “baseline”, at times, instead of “background”. However, the term “background” is the appropriate term, so DISA is presenting and amended response to RAI 9 here using the appropriate terminology.

Background surveys will be performed by locating 5-m x 5-m sample plots outside the area of the waste pile. Disa has observed, at almost all waste piles it has surveyed, that background gamma concentrations occur between 10,000 and 15,000 counts per minute and these background counts occur close the outside edge of waste pile areas. Therefore, Disa will seek background sample plot locations within 0.25-mile upgradient and upwind of a uranium mine waste pile/area.

Background surveys will be conducted by performing walkover GPS-gamma scans then collecting nine shallow surface samples in the orientation presented below.

Figure 13-1: Typical Background Soil Sampling Pattern



Soil samples will be collected from the top 6 inches. All nine individual soil samples will be blended into one composite sample for analysis of natural uranium, thorium-230, and radium-226. Gamma measurements will be averaged to calculate one overall background gamma count rate. Gamma and the other parameters previously mentioned will be used to estimate the background Total Effective Dose Equivalent (TEDE) and the post-remediation TEDE for each site to determine the final screening criteria and unrestricted release dose rate (background + 55 mrem/year).

Disa disagrees that FC 83-23 forms the basis of 10 CFR 20.1402. FC 83-23 is guidance that is dated May 1987. This guidance contains concentration based standards for radionuclides and external radiation. However, 10 CFR 20.1402 is a dose based standard that was promulgated in 62 FR 39088, July 21, 1997. Therefore, the acceptable soil contamination levels in FC 83-23 are inapplicable to Disa’s license application. Furthermore, Disa’s remediation projects will not include buildings; therefore, the

surface contamination limits of Table 1 in FC 83-23 will also not apply to the unrestricted release of Disa's remediated sites.

Disa's compliance with 10 CFR 20.1402 will be based on the analytical data to determine if radionuclide constituents meet the Table 2-1 screening criteria, the 500 mg/kg exemption limit, the SPLP limits, and the TCLP limits. If necessary, site-specific dose modeling will be used to calculate doses to determine compliance with the 25 mrem/year criterion. This complies with the definition of surveys found in 10 CFR 20.1003, which states the following:

> Survey means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of radioactive material and ***measurements or calculations*** of levels of radiation, or concentrations or quantities of radioactive material present. (emphasis added)

These measurements or calculations are required by 10 CFR 20 Subpart F.

14 REVISED DOSE CALCULATIONS

14.1 DISA REGULATORY AUDIT RESPONSES – PUBLIC DOSE (SECTION 7.0)

In response to questions from the NRC staff, DISA updated occupancy factors and recalculated occupational doses. Specifically, DISA updated the 1/40 occupancy factor used during operational dose modeling to a more conservative 1/20 factor. The following tables reflect the updated results. Note that only updated tables have been included below.

Table 14-1: Assumed Occupancy Time for Workers (Application Table 7-3)

Individual Type	Hours/ Day	Months	Days	Hours	Occupancy Fraction
Occupational	8	9	270	2160	0.25
Public[a]	-	-	-	-	0.05
[a.] Based on guidance in NUREG-1556 Volume 12 Appendix J Table J-1 occupancy factor of 1/20.					

Table 14-2: Modeled External Dose Rates and Annual Doses (Application Table 7-4)

Case	Type	Dose Rate (mrem/hr)	Annual Dose (mrem)	Annual Dose Limit (mrem)	% of limit
Maximum	*Occupational*	4.54	9808	5,000	196%
	Public	0.05	22	100	22%
Average	*Occupational*	0.40	870	5,000	17%
	Public	0.02	6.7	100	6.7%
Median	*Occupational*	0.11	246	5,000	5%
	Public	0.01	4.4	100	4.4%

Table 14-3: Multiple HPSA Units and Extended Fines Storage Area (Application Table 7-5)

Source Term	Dose Rate at Boundary[a] (mrem/hr)	Total Dose[b] (mrem)
HPSA Units (Tier 5, four units)	0.02	10.3
Extended Fines Storage Area (Tier 5, 64 storage trailers/bins)	0.02	6.4
[a] 50-foot boundary distance assumed [b] Total external dose rate is a product of calculated dose rate and occupancy scenario described in Table 7-3.		

14.2 PUBLIC DOSE DURING OPERATIONS – MILDOS UPDATES

DISA updated, the MILDOS model for internal dose estimates during operations address NRC staff questions. Receptors representing public doses were moved closer to the operations to be consistent with conservative restricted area boundaries. Assumptions for external dose models assumed restricted area boundaries were 50 feet (15.2 meters) from operations (i.e., members of the public cannot access operational areas closer than 50 feet). The MILDOS model is now consistent with this assumed restricted area boundary (Affected receptors are #1, 3, 4, and 8).

The internal dose model results reported in the license application (Section 7.3) conservatively assumed an occupancy factor of 1. It did not assume the same occupancy (1/40 or 1/20) as the external dose models. To increase consistency and provide more representative results, the agreed upon occupancy factors (1/4 for occupational, 1/20 for public) have been included in this updated analysis. Therefore, the results indicate more representative receptor locations and occupancy factors. Updated application report tables and figures are included here.

Table 14-4: Internal Dose Model Receptors (Application Table 7-8)

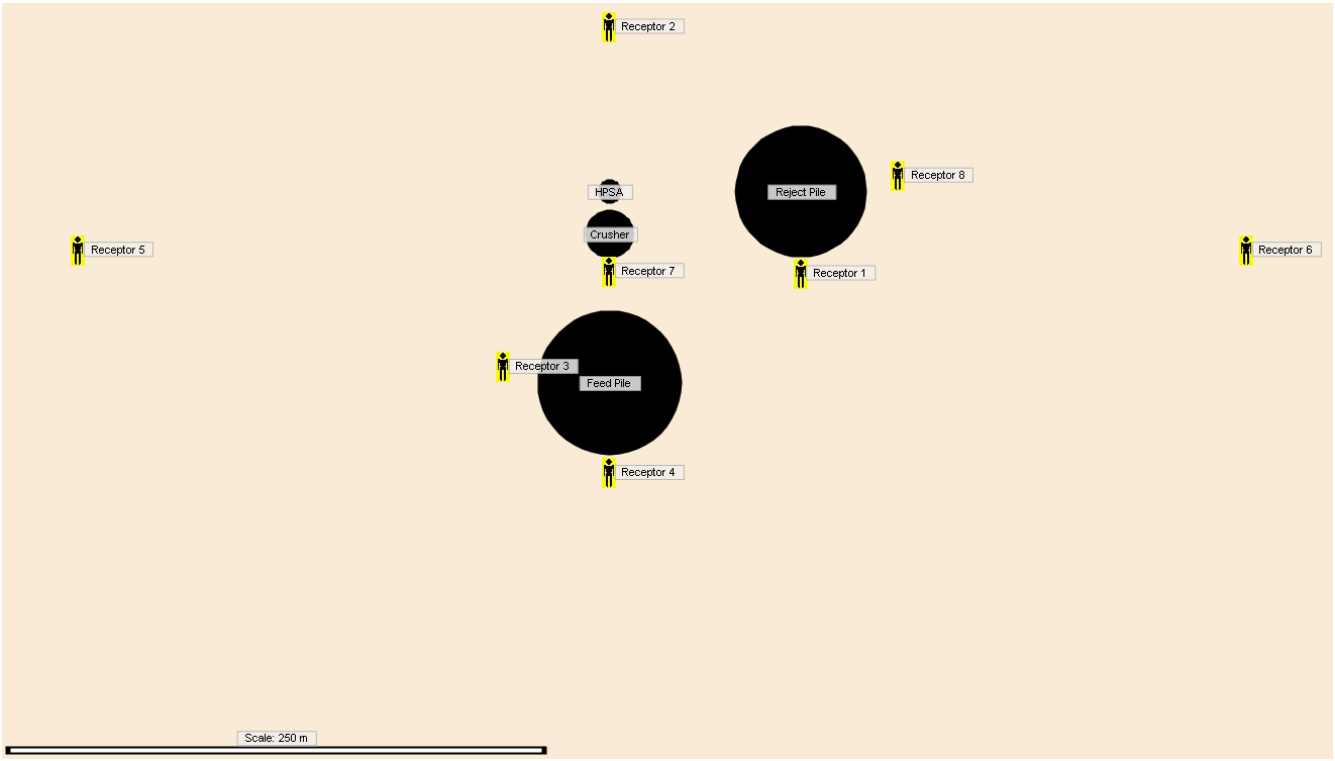
Receptor	Type	x (m)	y (m)	z (m)
1*	Public	90	-26	1
2	Public	0	90	1

Receptor	Type	x (m)	y (m)	z (m)
3*	Public	-50	-70	1
4*	Public	0	-120	1
5	Public	-250	-15	1
6	Public	300	-15	1
7	Occupational	0	-25	1
8*	Public	136	20	1
* Indicates updated receptor location to be located 50 feet from edge of source term.				

Table 14-5: Model Receptor Annual Internal Dose Results (Application Table 7-9)

Receptor	Receptor Type	Total Annual Dose (mrem)
1*	Public	0.4
2	Public	0.1
3*	Public	0.4
4*	Public	0.5
5	Public	< 0.1
6	Public	< 0.1
7	Occupational	5.6
8*	Public	0.4
* Indicates updated receptor location to be located 50 feet from edge of source term.		

Figure 14-1: MILDOS Source and Receptor Locations (Application Figure 7-3)



15 STANDARD OPERATING PROCEDURES

The NRC staff requested that DISA revise its Standard Operating Procedures (SOPs) to provide more detail regarding the manner in which air monitoring and contamination surveys will be conducted. SOPs-08 and -12 were revised to address these requests. However, DISA has revised most of its SOPs to update them based on updated information provided in its RAI responses and this application supplement. These SOPs will be submitted to the NRC staff under separate documents.

16 REFERENCES

1. ANL, 2001. User's Manual for RESRAD Version 6. Argonne National Laboratory, Environmental Assessment Division. July 2001.
2. Bianchi, 2019. Bianchi, W. Plant Uptake of Radionuclides and Toxic Chemicals from Contaminated Soils Below a Shallow Soil Cover. USDA Agricultural Research Service. August 2019. (https://www.committeetobridgethegap.org/hunters-point-reports/BianchiReport.pdf).
3. DISA, 2025a. Application for a Performance-Based, Multi-Site Radioactive Materials License to Operate a High-Pressure Slurry Ablation (HPSA®) Remediation System technology. March 21, 2025. ADAMS Accession No ML25087A094.
4. DISA, 2025b. Response to the U.S. NRC Staff's Requests for Additional Information. June 16, 2025. ADAMS Accession No. ML25167A328
5. DISA, 2025c. Health and Safety Plan, High-Pressure Slurry Ablation and Testing Laboratory, Revision 2. June 2025
6. EPA, 2025. National Menu of Best Management Practices (BMPs) for Stormwater. https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater-construction. Accessed July 2025.
7. McFadden, et. al, 2001. McFadden, K., Brosseau, D.A., Beyeler, W.E., Updegraff, C.D. Residual Radioactive Contamination From Decommissioning: User's Manual DandD Version 2.1 (NUREG/CR-5512, Volume 2). Sigma Software, LLC, Sandia National Laboratory, and Gram, Inc. April 2001. ADAMS Accession No. ML010940257.
8. NRC, 1998. NUREG-1549, Decision Methods for Dose Assessment to Comply With Radiological Criteria for License Termination. June 1998. ADAMS Accession No. ML993490098
9. NRC, 2006. Consolidated Decommissioning Guidance, Decommissioning Process for Materials Licensees, Volume 1, Revision 2. September 2006. ADAMS Accession No. ML22194A859.
10. NRC, 2022. Consolidated Decommissioning Guidance, Characterization, Survey, and Determination of Radiological Criteria, Volume 2, Revision 2. ADAMS Accession No. ML22194A859.
11. NRC, 2025. Request for Additional Information on Disa Technologies, Inc. License Application for a Performance-Based, Multi-Site Radioactive Materials License to Operate a High-Pressure Slurry Ablation Remediation System, Revision 3, Docket 40-38417. June 2, 2025. ADAMS Accession No. ML25141A028.

ATTACHMENT 1 – HEALTH AND SAFETY PLAN TABLE OF CONTENTS

Appendix and Attachments

ATTACHMENT 2 – JOB SAFETY ANALYSIS FORM

HASP Job Safety Analysis

The Job Safety Analysis (JSA) must be completed for all projects where there is potential for:

- A high rate of injury or illness.
- Potential to cause severe or disabling injury.
- Emergency procedures or medical facility locations differ from those in the corporate Health and Safety Plan.
- Where one simple human error could lead to a severe accident or injury.

GENERAL INFORMATION		
JSA ID:	**Developed by:**	
Site:	**Project:**	**Primary Location:**
Start Date:	**Stop Date:**	**Approval Date:**
Client:	**Work Order Number:**	

PROJECT DESCIPTION (Background and history of contract, services required, permits and licenses required. What are the client's needs that are driving the project? What does the project need to achieve?)

JHA STEP/TASK, HAZARD, AND CONTROLS		
Step/Task	**Hazard**	**Control**

ATTACHMENT 3 – WATER TREATMENT SYSTEM INFORMATION

FIL-TREK CORPORATION
55 Stafford Court
Cambridge, ON N1T 1B3

P (519) 623-7448
F (519) 623-8807

MERA FELT

Single Layer Felt Bag Filters

- Single Layer Felt Filter Bags
- Nominally Rated

Cost effective single layer filter bags available in a wide variety of micron ratings, sizes and media.

SUITABLE USES

Air & Gas | Desalination | Coolant | Water | Electronics | Coatings

Oil & Gas | Chemical | Pulp & Paper | Power | Marine | Equipment

ADDITIONAL FEATURES

- Reliable retention ratings from 1µm to 200µm range at 90% efficiency.
- All industry standard sizes available.
- Plastic flanged bags are welded while steel ring flanged are sewn.
- Polypropylene and Polyester media meet FDA regulations for food contact under CFR21, Section 177.1520.
- Silicone free construction.
- Capable of removing both solid and gelatinous particulate.
- Glazed/singed finish on polypropylene and polyester reduces fibre shedding.
- Broad chemical capabilities.
- Excellent for pre-filter applications.

For more information, e-mail: info@fil-trek.com or visit Fil-Trek.com

MERA FELT

Single Layer Felt Bag Filters

- Single Layer Felt Filter Bags
- Nominally Rated

STANDARD SPECIFICATIONS

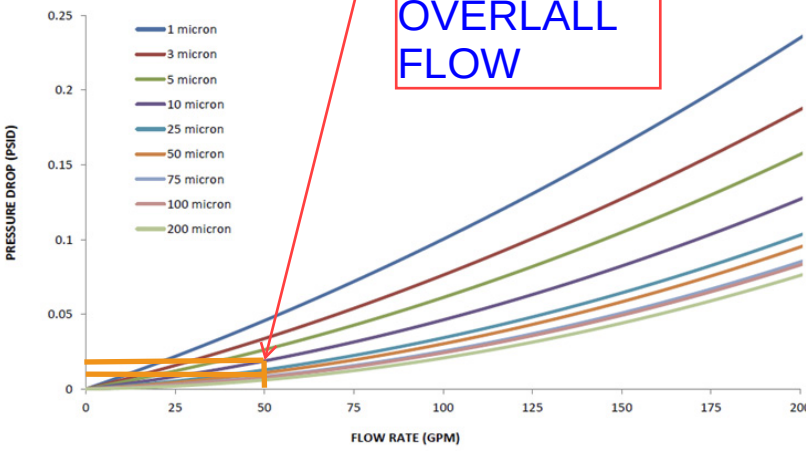
MAXIMUM DIFFERENTIAL PRESSURE	35 PSIG – Dirty 10-15 PSIG – Optimum Change Out
MAXIMUM OPERATING TEMPERATURE	Polypropylene – 200°F (93°C) Polyester – 275°F (135°C) Nomex – 425°F (218°C) Teflon – 500°F (260°C)
DIMENSIONS	See table

MATERIALS OF CONSTRUCTION

Media	Polypropylene Polyester Nomex (High Temperature) Teflon
Flange/Collar	Polyethylene (Standard flange) Additional options: Galvanized steel Stainless steel Polypropylene
MICRON RATINGS	1, 3, 5, 10, 25, 50, 75, 100, 200

FLOW CHART

50 GPM PER BAG AT 50 GPM OVERLALL FLOW



BAG DIMENSIONS & SURFACE AREA

BAG SIZE	DIAMETER	LENGTH	SURFACE AREA (FT^2)
1	7.06"	16.5"	2.0
2	7.06"	32"	4.5
3	4.30"	8"	0.5
4	4.30"	14"	1.0
5	6.10"	20"	2.8
7	5.70"	15"	1.5
8	5.70"	32"	2.0
9	5.70"	32"	3.0
12	8.40"	34"	5.5

PRODUCT NOMENCLATURE

MF	PO	10	2	PS	-
SERIES	MEDIA	MICRON	SIZE	FLANGE	OTHER
MF – Mera Felt	**PO** – Polypropylene **PE** – Polyester **NX** – Nomex **TF** – Teflon	1 3* 5 10 25 50 75 100 200**	1 2 3 4 5 7 8 9 12	**PS** – Plastic sure seal (Std) **CS** – Galvanized steel ring **SS** – Stainless steel ring **PO** – Polypropylene ring **DS** – Drawstring	None (Blank) **EB** – Edge binding **A** – Auto seams **TTA** – Turn, top stitch, auto seam **SB** – Spun bond cover **MC** – Mesh cover

**3 micron not available in Nomex or Teflon media **200 micron not available in Teflon media*

FIL-TREK

55 Stafford Court, Cambridge, ON N1T 1B3 **P** (519) 623-7448 **F** (519) 623-8807

For more information, e-mail: info@fil-trek.com or visit Fil-Trek.com

FIL-TREK CORPORATION
55 Stafford Court
Cambridge, ON N1T 1B3
P (519) 623-7448
F (519) 623-8807

SL SERIES

Single Bag Filter Housings

- Side Line Single Bag Filter Housing
- ASME Design/Industrial Design
- SS304 and SS316 are NSF/ANSI 61 certified

Economic multi-purpose ASME code ("U" & "UM") and non-code design bag filter housings.

SUITABLE USES

Air & Gas · Desalination · Coolant · Water · Electronics · Coatings
Oil & Gas · Chemical · Pulp & Paper · Power · Marine · Equipment

MEDIA	Accepts 1 single (P1) or double length (P2) bag filter.
CONFIGURATION	Side in/bottom out. *Other configurations available.**
DESIGN PRESSURE /TEMPERATURE	150psig (10.3bar) @ 400°F (204.4C).
AVAILABLE MATERIALS	Carbon or Stainless Steel 304 or 316*. Also available in LDX2101, C276, AL6XN, 2205, 2507 & Monel 400. **NSF/ANSI 61 certification available for SS304 and SS316 (S4SL/S6SL).*
ADDITIONAL FEATURES	Swing bolt closure allows for quick bag change out.

NSF Certified to NSF/ANSI 61

Custom sizes, configurations, materials of construction and other options may be available. Please contact Fil-Trek

For drawings, flow charts, custom applications and filter cartridge information please visit www.fil-trek.com.

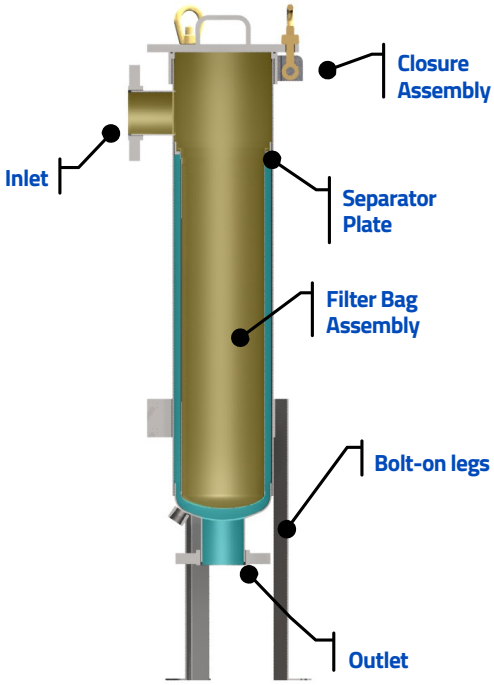
SL SERIES

Single Bag Filter Housings

- Side Line Bag Filter Housing
- ASME Design/Industrial Design
- Universal

HOUSING SPECIFICATIONS

Inlet/Outlet	2" Flange - 3" Flange 2" – 3" 150# NPT
Inlet/Outlet Connection Types	FNPT Flange Ferrules
Clean Drain	½" NPT
Vent	½" NPT
Gauges	½" NPT
Basket	⅛" on 3/16" perforated plate **Other basket options available*
Certifications	U, UM, CE, NB, CRN



MODEL FLOW RATES

MODEL	BAG SIZE	FLOW RATE (GPM)
SL111-2P	1	110
SL111-2F	1	110
SL111-3P	1	240
SL111-3F	1	240
SL112-2P	2	110
SL112-2F	2	110
SL112-3P	2	240
SL112-3F	2	240

Flow rates are based on water at 2psid through empty housing with basket. Actual flow rate is dependant on fluid viscosity, micron rating, and media type. For actual flow rates based on your process, please contact Fil-Trek Corporation.

MATERIAL OF CONSTRUCTION

MATERIAL OF CONSTRUCTION	MAX. OPERATING PRESSURE (PSI @250°F)	MAX. DESIGN TEMP.
Carbon Steel	150 psi (10.3bar)	400°F (204.4°C)
304 Stainless Steel*	150 psi (10.3bar)	400°F (204.4°C)
316 Stainless Steel*	150 psi (10.3bar)	400°F (204.4°C)

**NSF/ANSI 61 certification available for SS304 and SS316 (S4SL/S6SL).*

55 Stafford Court, Cambridge, ON N1T 1B3 **P** (519) 623-7448 **F** (519) 623-8807
For more information, e-mail: info@fil-trek.com or visit Fil-Trek.com

SL SERIES

Single Bag Filter Housings

- Side Line Bag Filter Housing
- ASME Design/Industrial Design
- Universal

HOUSING OPTIONS

*Indicates standard configuration

Configuration Options	**(-) – Side in/Bottom out***
	A – Side in/side out
	D – Side in/out Same Side
Basket Options	**(-) – ⅛" on 3/16" perforated basket***
	MB___– Mesh lined basket
	(insert mesh size in blank space)
Finish Options	**(-) – Paint "National Blue"** *(std for CS)* *
	(-) – Bead Blast *(std for SS304/SS316)* *
	EP1 – Electro polish Inside/Outside
	EP2 – Inside only
	EP3 – Outside only
	PP – Passivation
O-Ring Options	**(-) – Buna-N***
	ED – EPDM
	VI – Viton
	SI – Silicone
	TEV – Teflon encapsulated Viton
Accessories	Direct Reading Gauge
	DP Gauge
	Safety Relief Valves
	Vent Valves
	Drain Valves
	Air Eliminator
	Omega Springs
	Balloon/Liquid Displacer
	Bag Magnets

MODEL DIMENSIONAL DETAILS

MODEL	WEIGHT (lbs)	A	B	C
SL111-2P	65	21⅛"	6"	37 9/16"
SL111-2F	65	21⅛"	8"	37 9/16"
SL111-3P	65	21⅛"	6"	37 9/16"
SL111-3F	65	21⅛"	8"	37 9/16"
SL112-2P	75	34⅞"	6"	50¾"
SL112-2F	75	34⅞"	8"	50¾"
SL112-3P	75	34⅞"	6"	50¾"
SL112-3F	75	34⅞"	8"	50¾"

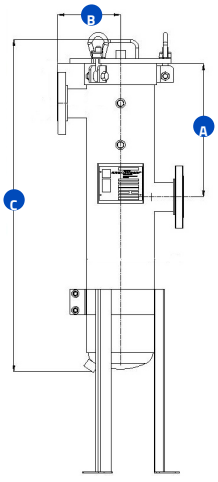
Dimensions above are based on standard configuration 'C', side in-bottom out. Contact factory for weights and dimensions for all other model configurations

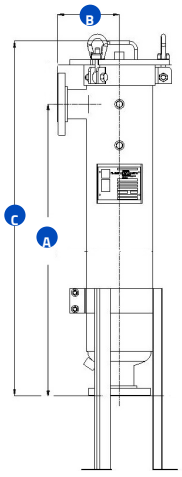
CONFIGURATION OPTIONS

Style A
Side in/Side out

Style C
Side in/Bottom Out
SL Standard Design

Style D
Side in/Side Out
Same side





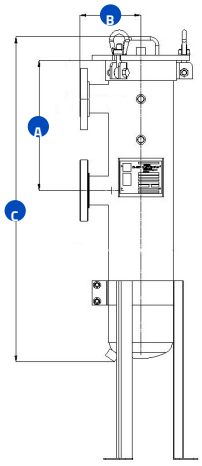


CHART LEGEND

A INLET TO OUTLET

B CENTRE TO FACE

C OVERALL LENGTH

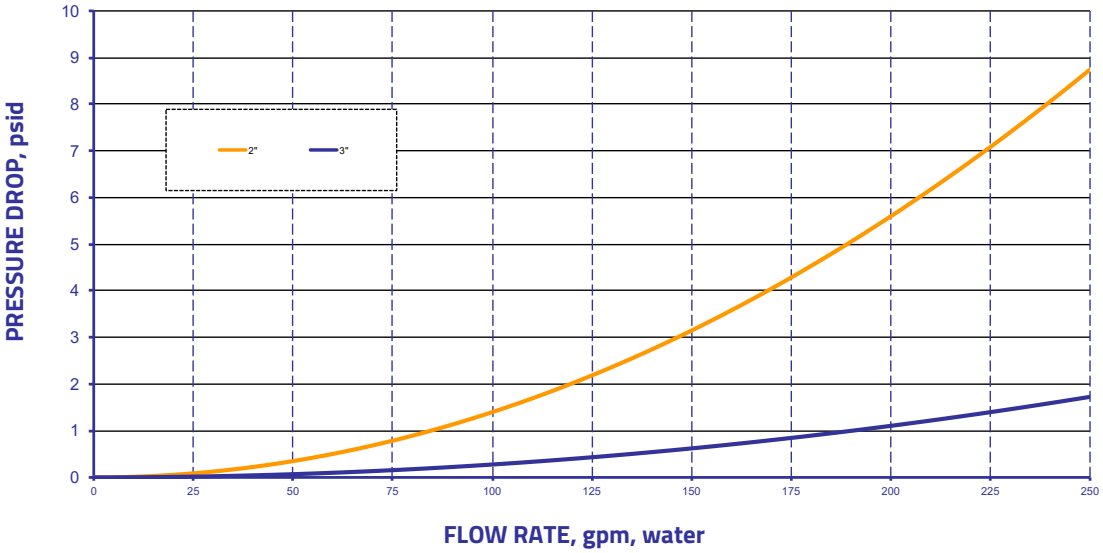
FIL-TREK
55 Stafford Court, Cambridge, ON N1T 1B3 **P** (519) 623-7448 **F** (519) 623-8807
For more information, e-mail: info@fil-trek.com or visit Fil-Trek.com

SL SERIES

Single Bag Filter Housings

- Side Line Bag Filter Housing
- ASME Design/Industrial Design
- Universal

FLOW CHARTS



PRODUCT NOMENCLATURE

S4	SL	1	12	3F	SW	-
MATERIAL	**MODEL**	**# OF BASKETS**	**BASKET LENGTH**	**CONNECTION TYPE**	**CLOSURE STYLE**	**OPTIONS**
(-) – Carbon **S4** – SS304** **S6** – SS316**	**SL -** ASME Code* **ESL -** Non-Code	**1**	**11** - Size 1 **12** - Size 2	**2P** - 2" NPT **2F** - 2" Flange **3P** - 3" NPT **3F** - 3" Flange	**SW** - Swing Bolt	See "Housing Options" for options

**SL series is an ASME code stamped housing. This vessel is also available in an industrial non-code design. For non-code, add the prefix "E" to the SL in the part number.*

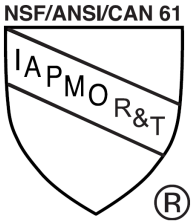
***NSF/ANSI 61 certification available for SS304 and SS316 (S4SL/S6SL).*

FIL-TREK

55 Stafford Court, Cambridge, ON N1T 1B3 **P** (519) 623-7448 **F** (519) 623-8807

For more information, e-mail: info@fil-trek.com or visit Fil-Trek.com

Date Issued 11/02/2020



This HWS-402As Oxidation Media is certified by IAPMO R&T to NSF/ ANSI/CAN 61 for material safety.

Headwater Technologies
9807 Valley View Road
Eden Prairie, MN 55344

Safety Data Sheet

acc. to OSHA HCS [Compliant with REACH/GHS]

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: HWS-402As Oxidation Media

CAS No: Not Applicable

Intended Uses/Application: Used to remove contaminants for drinking water.

Company Information: Headwater Technologies
9807 Valley View Road
Eden Prairie, MN 55344

Emergency Telephone Number: 844-53WATER (92837)

Telephone for Information: 218-839-6067

2. HAZARDS IDENTIFICATION

Classification of the Substance or Mixture:

The product is not classified to the Globally Harmonized System (GHS).

Label Elements:

GHS: Not Applicable

Hazard Pictograms: Not Applicable

Signal Word: Not Applicable

Hazard Statement: Not Applicable

Classification System:

HMIS: Health = 0
Fire = 0
Reactivity = 0
Protective Equipment = X – See protective equipment, Section 8.

NFPA: Health = 0
Flammability = 0
Reactivity = 0
Symbol = Not applicable

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Characterization: Mixtures

Description: Adsorbent alumina complex with propriety reagents

Components: 1344-28-1 Activated Aluminum grade A & AA

7732-18-5 Deionized water

4. FIRST AID MEASURES

General Information: No special measures required.

Eye Contact: Rinse opened eyes with water for at least 15 minutes. Call physician.

Inhalation: Remove to fresh air. Supply fresh air if needed. Consult physician in case of complaints.

Skin Contact (First Aid): Generally, the product does not irritate the skin. Wash with soap and water.

Ingestion (First Aid): If symptoms persist consult doctor.

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Agents: CO_2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

Fire/Explosion Hazards: Not Applicable

Hazardous Combustion Products: Not Applicable

Fire Fighting Advice: Wear MSHA/NIOSH approved, pressure demand, self-contained breathing apparatus

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures: Not required

Environmental Precautions: No special measures required

Methods and Material for Containment and Cleaning Up: Pick up mechanically.

Reference to Other Sections: See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7. HANDLING AND STORAGE

Precautions for Safe Handling: Avoid generating dust during handling.

Storage: No special requirements.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Maintain general industrial hygiene practices when using this product. Avoid exposure to dust.

Personal Protective Equipment:

Eye Protection: Safety glasses

Skin Protection: Long sleeves / Lab coat

Inhalation Protection: Adequate ventilation

TLV: Not established

PEL: Not established

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: White
Physical State: Solid
Odor: Odorless
Odor Threshold: Not determined
pH: 6.5 – 8.5
Melting Point: >2000°C
Boiling Point: Undetermined
Flash Point: Not applicable
Flammability: Not determined
Ignition Temperature: Not determined
Decomposition Temperature: Not determined
Auto Igniting: Product is not self-igniting.
Danger of Explosion: Product does not present an explosion hazard.
Exposure Limits:
Lower: Not determined
Upper: Not determined
Vapor Pressure: Not applicable
Bulk Density at 20°C: 40 to 50 lbs./ft^3
Relative Density: Not determined
Vapor Density: Not applicable
Evaporation Rate: Not applicable
Solubility in / Miscibility with Water: Insoluble
Partition coefficient (n-octanol/water): Not determined
Viscosity:
Dynamic: Not applicable
Kinetic: Not applicable

Solvent Content:
Organic Solvents: 0.0%
Water: < 5.0 %
Solids Content: 100.0%
Other Information: No further relevant information available.

10. STABILITY AND REACTIVITY

Reactivity: No further relevant information available.

Chemical Stability:

Thermal Decomposition / Conditions to be Avoided: No decomposition if used according to specifications.

Possibility of Hazardous Reactions: No dangerous reactions known.

Conditions to Avoid: No further relevant information available.

Hazardous Decomposition Products: No dangerous decomposition products known.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:

Primary Irritant Effect:

On Skin: No irritant effect.

On Eyes: No irritant effect.

Sensitization: No sensitizing effects known.

Additional Toxicological Information: The product is not subject to classification according to internally approved calculation methods for preparations: When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to Headwater Technologies.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

OSHA-Ca (Occupational Safety & Health Administration): None of the ingredients are listed.

12. ECOLOGICAL INFORMATION

Aquatic Toxicity: No further relevant information available.

Persistence and Degradability: No further relevant information available.

Behavior in Environmental Systems:

Bio-accumulative Potential: No further relevant information available.

Mobility in Soil: No further relevant information available.

General Notes: Used to remove contaminants for drinking water.

Results of PBT and vPvB Assessment: Not applicable

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods:

Recommendation: Recycle if possible. This substance is inert and does not require special disposal methods. Dispose of in accordance with Federal, State, and Local Regulations.

14. TRANSPORTATION INFORMATION

UN-Number:
DOT, ADR, ADN, IMDG, IATA: Not applicable

UN Proper Shipping Name:
DOT, ADR, ADN, IMDG, IATA: Not applicable

Transport Hazard Class(es):
DOT, ADR, ADN, IMDG, IATA Class: Not applicable

Packing Group:
DOT, ADR, ADN, IMDG, IATA: Not applicable

Environmental Hazards:
Marine Pollutant: No

Transport in Bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable

UN "Model Regulation": Not applicable

15. Regulatory Information

US Federal Regulations:

OSHA: This product does not meet the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)

EPA: SARA Title III Section 311/312 Categorization (40 CFR 370): This product is not hazardous under 29 CFR.1910.1200 and therefore not covered by Title III under SARA.

SARA Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title II of SARA.

302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances

State Regulations:

California Prop. 65: No Prop. 65 listed chemicals are present in this product.
Identification of Prop. 65 Ingredient(s): None

16. OTHER INFORMATION

User Responsibility: Each user should read and understand this information and incorporate in individual site safety programs in accordance with applicable hazard communication standards and regulations.

The information is based on Headwater Technologies present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

HEADWATER TECHNOLOGIES
117 1st Street NW, Suite 3
Aitkin, MN 56431
(218) 740.5462

TECHNICAL DATA SHEET

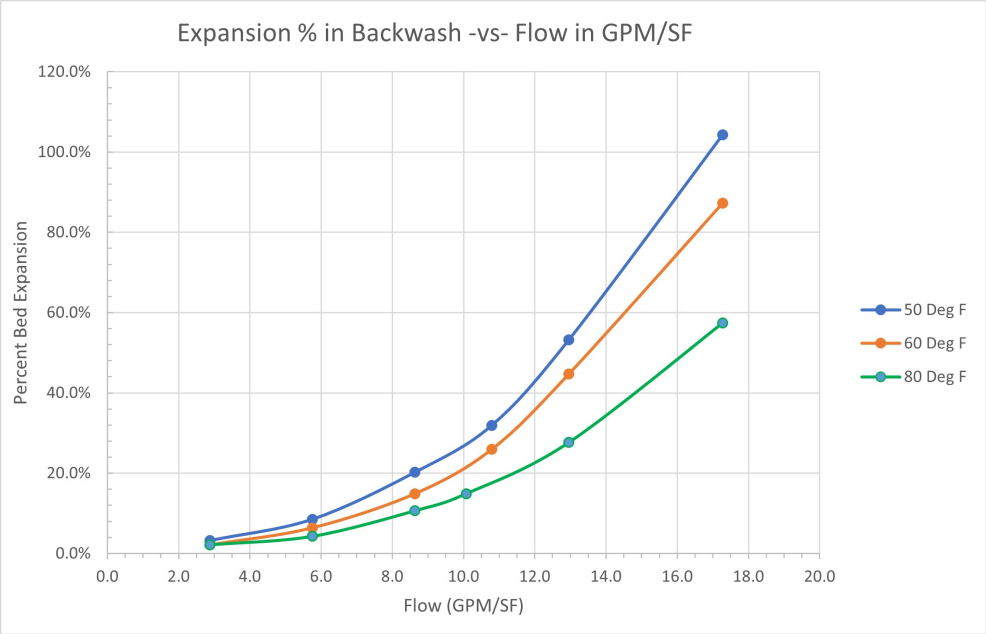
HWS-402As

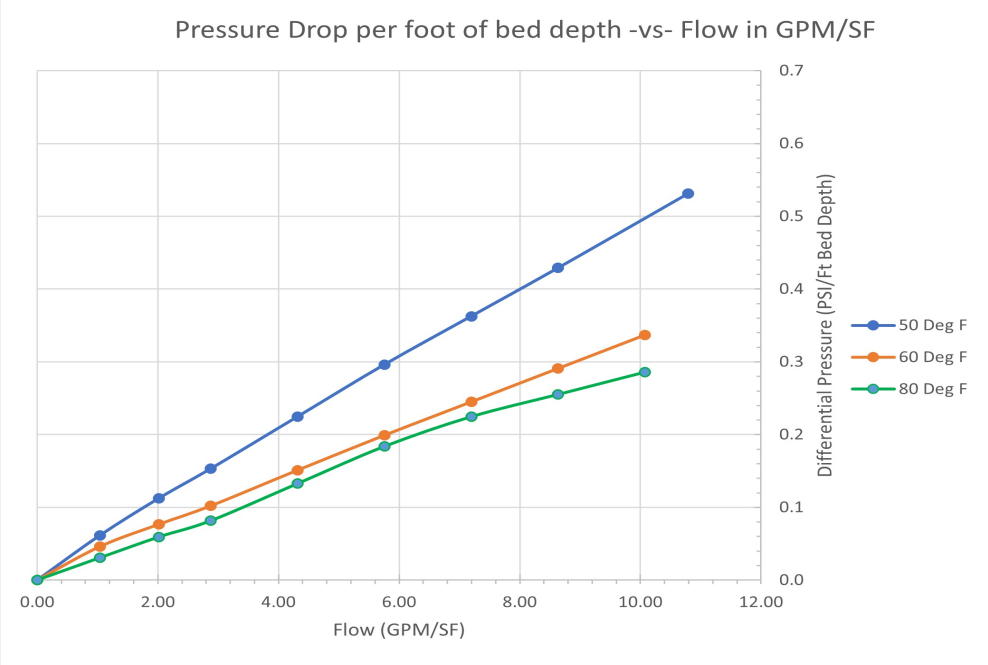
HWS-402As is a patented oxidative filtration media that can solve many water contamination problems in residential, commercial and heavy industrial processes for arsenic and multi-contaminant removal that is safe to use and disposal. This media is capable of replacing competing media in any pressurized or gravity tank system. **HWS-402As** is a water washed, enhanced alumina-based adsorbent that holds ANSI/NSF61certification for drinking water safety. Arsenic III is rapidly oxidized to Arsenic V, upon which the contaminant is adsorbed into the media. Several case histories and studies have proven that **HWS-402As** adsorption media will achieve greater than 99.5% removal of As III and As V in concentrations over 1,000 ppb. The exhausted HWS-402As non-hazardous solid waste that meets the USEPA Toxicity Characteristic Leaching Procedure (TCLP) and California Waste Extraction Test (WET) extraction tests for disposal.

BASIC FEATURES	
Appearance	Off white, odorless granular particles
Type/Form	Enhanced Oxidizing Activated Alumina adsorbent
As Shipped – Moisture Content	6 - 15%
As Shipped - Bulk Density	47 - 53 lb/ft^3
Operating Bulk Density	51 - 57 lb/ft^3
Particle Size Range	14 x 28 or 28 x 48 mesh ≥ 95 %
Uniformity Coefficient	1.6 max.
Pore Volume	45 ml/g
Surface Area	320 - 360 m2/gram
pH of media	Customizable 6.5 - 8.5 pH versions
Capacity	Depends on feed water matrix

STANDARD OPERATING CONDITIONS	
Bed Depth	30 inches minimum, up to 60 inches
Empty Bed Contact Time	1 to 10 minutes (water quality dependent)
Water Treatment - pH Operating Limits	5.5 – 8.5
Water Treatment - Temperature Limit	36 - 200 °F (2 – 93 °C)
Backwash bed expansion	50% at 13.5 GPM/SF with 60 Deg F water
Backwash on tank filling	10-minute backwash to waste required
Operating Pressure	250 psig max.
Bulk Storage - Temperature Limit	113 °F (45 °C)

HEADWATER TECHNOLOGIES
117 1st Street NW, Suite 3
Aitkin, MN 56431
(218) 740.5462





HEADWATER TECHNOLOGIES
117 1st Street NW, Suite 3
Aitkin, MN 56431
(218) 740.5462

Headwater Technologies
TurnAbout UDF - Installation and Operating Instructions

How Does It Work?

The stormwater that flows off roofs often carries a significant load of dissolved zinc and copper. The ongoing oxidation of galvanized roofing materials, roof-mounted HVAC systems and copper gutters can all contribute to elevated zinc and copper concentrations in runoff water. The Headwater Technologies (HWT) TurnAbout Upflow Downspout Filter™ (UDF) treats the water in roof runoff and removes solids, sediment, zinc, copper and most other heavy metals present in the water stream being treated. The TurnAbout is positioned under the building's gutter and downpipe system where runoff is directed to the UDF's bottom distribution manifold. From there, the water travels upwards through a bed of granular APTsorb® media that is proven to remove dissolved heavy metals such as zinc and copper with high loading rates and fast kinetics. When the water exits the TurnAbout, zinc and copper concentrations are significantly reduced or below detectable levels.

Why upflow?

The upflow design of the TurnAbout maximizes the treatment efficiency of the granular APTsorb media in two ways. First, the solids and sediment that could otherwise plug the treatment bed are dropped out of the water before encountering the media. Second, the upflow design safeguards the treatment bed and keeps it continually submerged. That means less chance for selective flow and dry pockets.

System Operating specifications:

Design treatment flow rate	Up to 50 GPM
Corresponding roof area treated	10,000 SF @ 0.5 inches / hour precipitation
Pounds of APTsorb treatment media installed	950 pounds (dry weight)
Capacity of APTsorb media with each media change out	Up to 10 pounds of zinc/copper
Volume of treatment bed	30 ft^3 (224 gal) APTsorb media
Bottom Distribution Manifold	3” Schedule 40 PVC
Outlet Collection Manifold	4” Schedule 40 PVC
Inches of gravel around bottom manifold	6”
Pounds of gravel around bottom manifold	500 pounds
Time between media maintenance cycles	6-18 months (12 months suggested)
Total System Shipping Footprint	50” x 44”
Total System Shipping Height	64”
Total System Shipping Weight	2250 pounds
UDF construction	Melt Blown HDPE with UV Stabilization
Forklift pockets	4 way – Included, molded in Bin
Main Water Inlet	4” Coupling, EPDM / Stainless Band Clamps
Main Water Outlet	4” Coupling, EPDM / Stainless Band Clamps
Media Top Drain Outlet (#3)	¾” FNPT, PVC
Bin Drain Outlet (#4)	¾” FNPT, PVC with Plug
Inlet Piping Vent (#6)	1.5” with Screen, Clear PVC, CPVC Piping
Overflow / Bypass location	External, discharges around Pre-screen

Tools and Materials needed for installation:

Description	**Purpose**
4” PVC Water inlet piping and fittings, configured to match site needs	Connection between pre-screen filter and overflow system and the 4” coupling on the main inlet fitting on UDF
4” PVC Water outlet piping and fittings, configured to match site needs	Connection between 4” coupling in the main outlet fitting on the UDF, and the 0.75” FNPT media drain fitting for treated water to desired location
Reciprocating Saw, Wall Anchors	To cut off building downspout at correct height and install the pre-screen on the building wall

System Parts and Components:

Description	#	Location on Shipment	Weight (lbs)
Treatment Bin with Lid	1	Components below installed	250
Inlet Piping Assembly	2	Installed in Bin	80
Media Top Drain with Plug	3	Installed in Bin	2
Bin Drain with Plug	4	Installed in Bin	2
Outlet Collection Manifold	5	Installed in Bin	30
Inlet Piping Vent	6	Loose, to be installed on UDF by Contractor	4
Pre-Filter Screen / Overflow	7	Loose, to be installed on building by Contractor	3
Bottom Distribution Manifold	8	Installed in Bin	25
Gravel Media, 500#	9	Installed in Bin	500
APTSorb Media, 950#	10	Installed in Bin	950

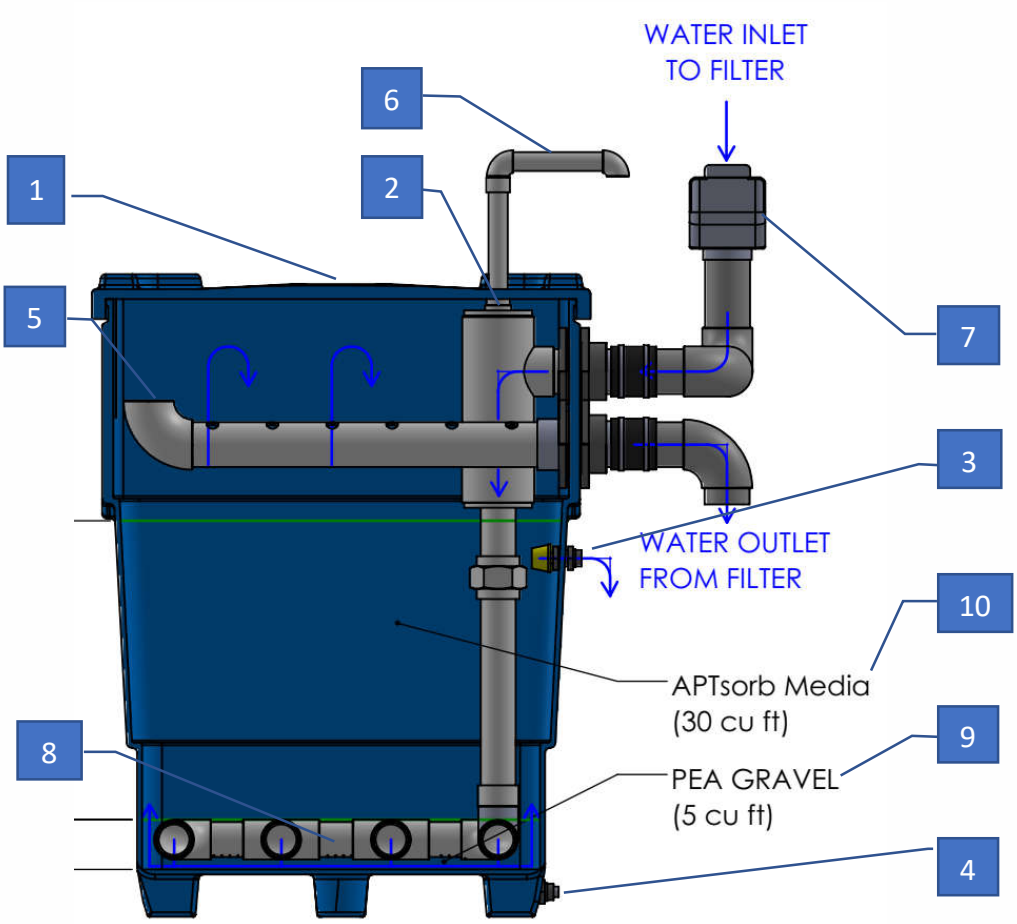


Figure 1. Configuration of UDF Components

System Final Assembly:

The Turnabout will arrive with the inlet and the outlet bulkhead connections on the left or the right-hand side of the unit when looking at the front, depending on the orientation ordered. All drawings supplied with this instruction booklet are showing the system configured in the right-hand orientation. Before ordering the system configurations should be determined for the best fit of the Bin location in relation to the building downspout to be treated.

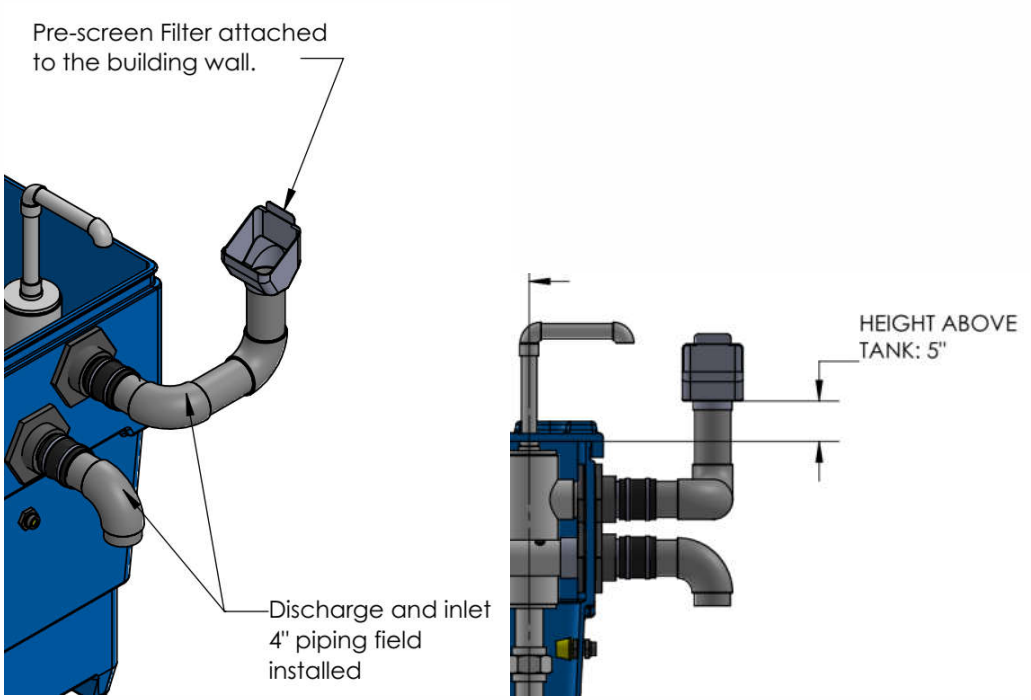


Figure 2. Making the exterior connection to the TurnAbout UDF

Place the as delivered bin in its desired final position, no less than 3” from the building exterior and near the building downspout. Cut the downspout about 12” above the height of the top of the Bin. Install the Pre-filter Screen (#7) by securing it to the building exterior, with the bottom of the Pre-filter Screen assembly 5” above the height of the top of the Bin. Be sure to position the Pre-filter Screen such that the downspout flow is directed into the center of the screen assembly.

This height prescribed for the Pre-filter Screen is critical to control flow through the unit and to allow excess flow above the design flow of the system to bypass around the Pre-filter Screen. If the flow coming from the downspout exceeds the design flow rate of the TurnAbout system, the water level in the Inlet Piping Assembly (#6) will rise until it reaches the level of the bottom of Pre-filter Screen (#7). At that point, any flow above the design capacity of the system will bypass around the Pre-filter Screen and onto the ground instead of being processed through the unit. Once the feed flow rate to the system again drops to within the systems design flow

rate parameters, the unit will accept all the water coming from the downspout for treatment through the system.

Using 4" PVC or CPVC materials (supplied by the installer), connect the bottom of the Pre-screen to the upper bulkhead on the Turnabout UDF, as shown in the above drawings. A rubber coupling is provided to allow easy connection / disconnection of the UDF from the external piping. Figure 2 shows a typical installation for the external piping, but site characteristics will determine the exact configuration, which can be substantially different from the typical installation if required.

The treated water can be discharged directly onto the ground or into an underground conveyance system. At a minimum, a 90-degree elbow on the outlet connection is recommended to direct the treated water downward. If the unit will be discharging onto the ground surface, guard that surface to prevent erosion from the falling water. If a sampling port is desired on the outlet, install the port where appropriate to get a representative sample of this treated water.

Treated water samples can also be taken from the Media Top Drain Port (#3) during system operation. This port will also be discharging a small portion of the treated water during system operation. As such it should also be routed to the same location as the main outlet piping. All of the treated water piping must be configured such that it will naturally drain by gravity from the TurnAbout UDF to the point of discharge.

System initial filling and flushing procedure:

Once the TurnAbout UDF is in place and connected to the necessary piping, install a ¾" plug into the Media Top Drain Port (#3) and fill the system through the Pre-filter Screen assembly (#7) with clean water at a flow rate of up to 20 GPM to the main water outlet. A small amount of floating media will discharge out of the unit during this initial flushing operation. The media bed will quickly become stable and only water will be discharged through the outlet after this first operation.

Continue to introduce clean water at a flow rate of up to 50 GPM into the TurnAbout UDF through the Pre-filter Screen until around five bed volumes of water discharge from the unit. This equates to around 1000 gallons of water used for this initial flush of the media.

The granular APTsorb media inside the TurnAbout is an all-natural product made from the abundant peat reserves of central Minnesota. Peat naturally leaches dissolved organic acids that show up as a tea color in water. The dissolved organic acids are environmentally benign, but they can skew effluent results if present in high enough concentrations. The above clean water flush will minimize the initial color discharged from the system.

Operating Conditions and Regular On-site Maintenance:

The Pre-Filter Screen (#7) typically captures solids and sediment that can plug the treatment system. The screen is snapped onto the housing and can be removed and cleaned as needed. In normal operation, the Pre-filter Screen will be flushed by the flow coming from the downspout, but there may be exceptions, particularly if sticky solids are a part of the water flow to be treated. To clean the screen, unsnap the screen from the housing when the system is not in use and then invert or wash it as needed.

If the unit is idle for a long period of time (i.e. during dry seasons) the water inside the unit will accumulate benign dissolved organic acids. For best results, flush the unit with up to 20 GPM of clean water following a prolonged idle period. In most cases, a prolonged idle period is described as a period of more than three months.

Periodic Comprehensive Maintenance of the System

Every 6 to 18 months, depending on the location and metals loading to the media, the TurnAbout UDF will require a change out of the media and a cleaning of the Bottom Distribution Manifold (#8) to remove solids that have accumulated in the system. Contact your TurnAbout distributor or HWT for TurnAbout UDF change out, Media replacement or additional information.

Discarding Spent Media

As with all water treatment products, disposal of spent media must comply with local laws and regulations regarding potentially hazardous materials. The APTsorb media inside the TurnAbout UDF uses adsorption to sequester heavy metals. Adsorption is the process of making physical or chemical bonds between the dissolved metal and the media surface. The bond between the media and the metal is usually quite strong, which means that the metal is not easily desorbed. Usually, the spent media does not meet the criteria for hazardous waste. Nonetheless, if disposing of the media in the TurnAbout, contact a local waste hauler or landfill to determine what testing, if any, they require on the spent media prior to accepting it at their facility. Most required testing can be performed by a local analytical laboratory.

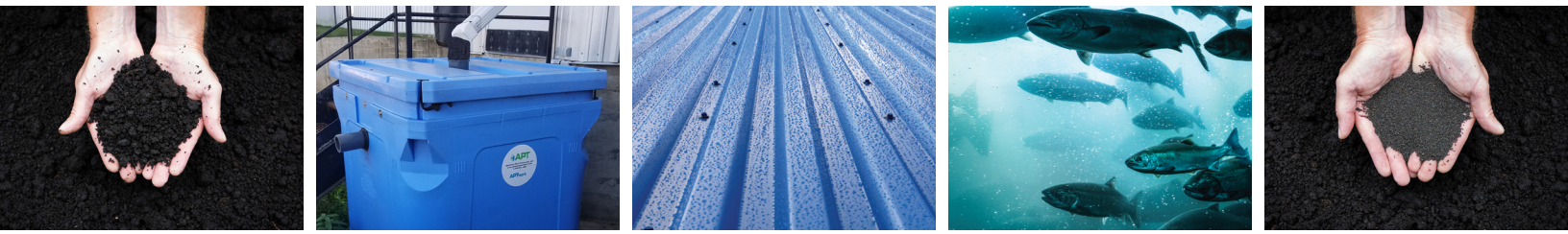
System Troubleshooting Guide

Trouble	Cause / Solution
Water is not flowing into the system at the design flowrate. Most of the flow is discharging around the Pre-Screen with very little flow leaving the water outlet piping during rain events.	The Pre-Screen may be blinded with sediment. Unsnap and clean the Pre-Screen. The Bottom Distribution Manifold may be plugged. Contact HWT or your TurnAbout distributor for onsite cleaning suggestions or requirements for Bin replacement.
The concentrations of heavy metals in the effluent water are above regulated benchmarks or is approaching benchmarks.	The APTSorb media may need replacement. Contact HWT or your TurnAbout distributor for Bin replacement. Finely divided sediment carrying heavy metals may be passing through the Pre-Screen and water treatment media to the sampling point. Contact your TurnAbout distributor or HWT for possible solutions.

HEADWATER TECHNOLOGIES

TurnAbout™
Upflow Downspout Filter

OFFICE: (218) 740-5462
TOLL FREE: (877) 257-5906



TurnAbout UDF

How Does It Work?

Simple gravity treatment of any incoming water stream is possible with the TurnAbout UDF. This system utilizes a versatile and robust HDPE bin with internal piping installed, allowing for upflow treatment of water through contact with any adsorption media at up to 50 GPM.

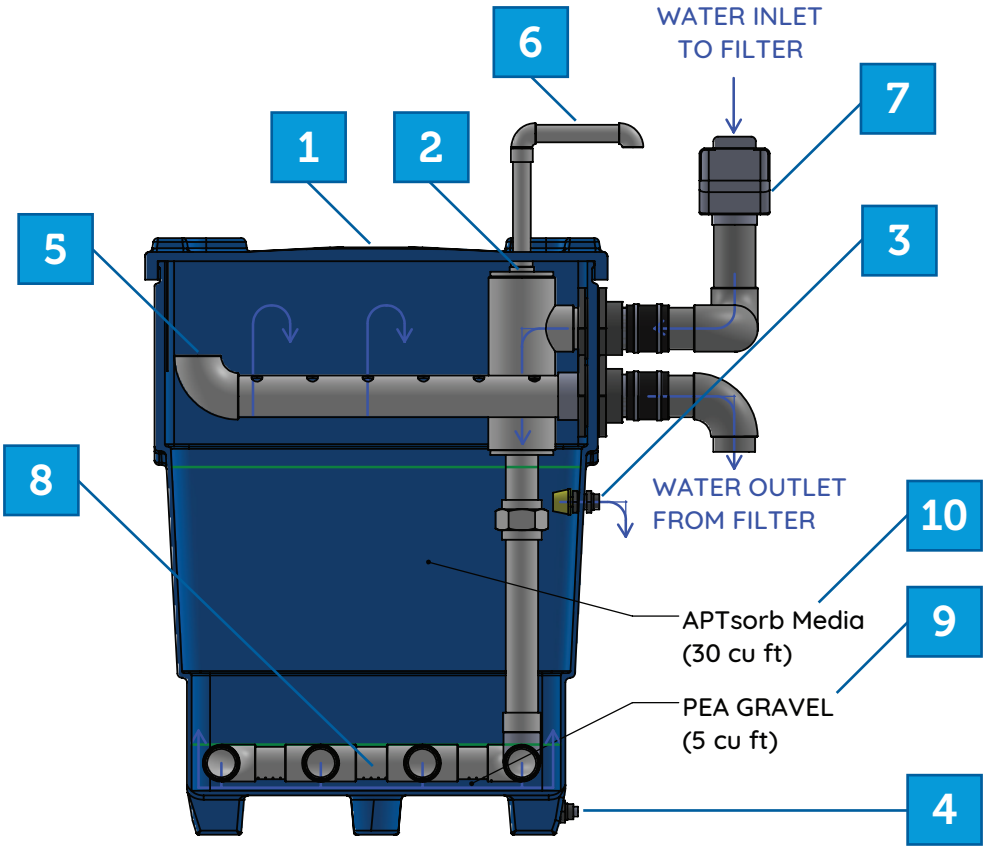
Adsorption media that can be loaded into the TurnAbout include the following:

- **APTsorb/APTIVATOR Media** - Peat-Based Granular, selectively targets heavy metals in water, including Cu, Pb, Zn, Cr, Cd. Mainly used for mining wastewater remediation, roof runoff, stormwater.
- **HWS-402 Media** – Oxidizing Activated Alumina Granular products. Disinfection / arsenic / color / taste / odor removal. Can be used for emergency drinking water use.
- **Activated Carbon Media** – Granular Products that treats many different contaminants, primarily used for VOCs or other organics adsorption. Can also target PFOS / PFOA.
- **Zeolite Media** – Granular Products that can be formulated to target cations or anions, also used for fat / oil / grease (FOG) remediation. Can also target PFOS / PFOA.

The feed water to the TurnAbout UDF needs to be filtered, in either a gravity screen supplied with the system, or directly when pumped to the bin. Screening / filtering to below 30 Micron is required for treatment.

System Operating Specifications:	
Design Treatment Flow Rate	Up to 50 GPM
Capacity for Media	Up to 30 CF
Bottom Distribution Manifold	3” Schedule 40 PVC
Outlet Collection Manifold	4” Schedule 40 PVC
Time Between Media Replacement Cycles	Depends on contaminants targeted and media
Total System Shipping Footprint	50” x 44”
Total System Shipping Height	64”
Total System Shipping Weight	Up to 2500 pounds, depending on media
Bin Construction	Melt blown HDPE with UV Stabilization
Forklift Pockets	4 way – included molded in bin
Main Water Inlet	4” coupling, EPDM / stainless band clamps
Main Water Outlet	4” coupling, EPDM / stainless band clamps
Media Top Drain Outlet	¾” FNPT, PVC
Bin Bottom Drain Outlet	¾” FNPT, PVC with plug
Overflow / Bypass location	External, ensure flow is under 50 GPM

OFFICE: (218) 740-5462
TOLL FREE: (877) 257-5906

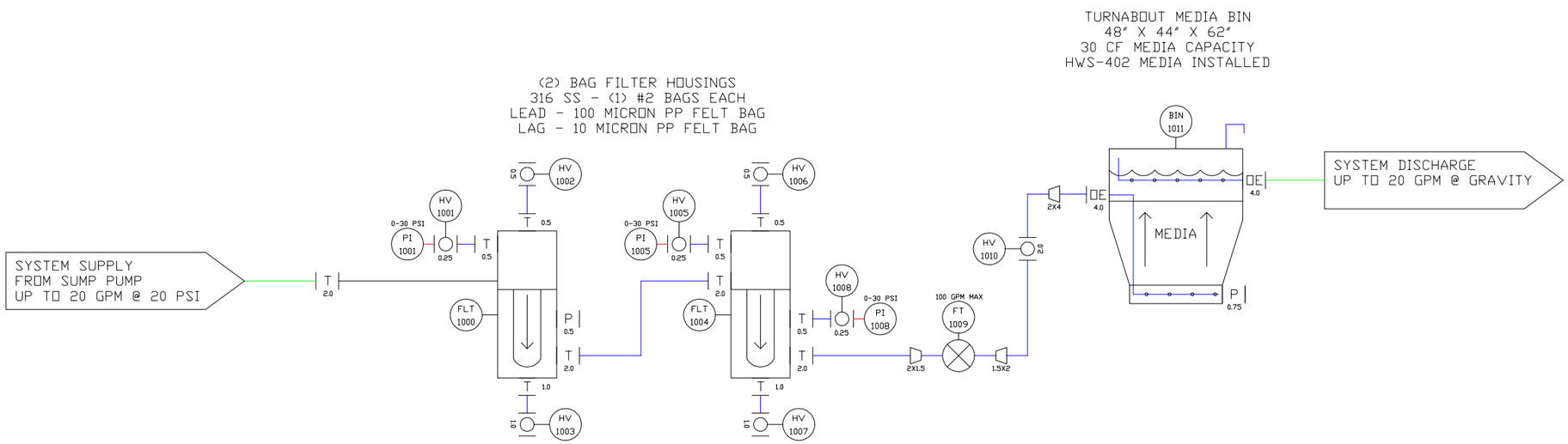


Configuration of TurnAbout UDF Components

Description	#	Location on Shipment	Weight (lbs)
Treatment Bin with Lid	1	Components below installed	250
Inlet Piping Assembly	2	Installed in Bin	80
Media Top Drain with Plug	3	Installed in Bin	2
Bin Drain with Plug	4	Installed in Bin	2
Outlet Collection Manifold	5	Installed in Bin	30
Inlet Piping Vent	6	Loose, to be installed by contractor	4
Pre-Filter Screen / Overflow	7	Loose, to be installed by contractor	3
Bottom Distribution Manifold	8	Installed in Bin	25
Gravel Support Media, 5 CF	9	Installed in Bin	500 @ 100 Lb/CF
Adsorption Media, 30 CF	10	Installed in Bin	950 @ 32 Lb/CF

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

20 GPM WASTEWATER TREATMENT SYSTEM



FILE NAME Turnabout System P & ID-Rev 1.dwg			
CONTRACT NO ####			
DRAWN 11/15/2022	TURNABOUT P & ID		
CHECK			
APPR.			
ISSUED			
	SIZE	FSCM NO	DWG NO 1.2 / REV 1
		–	
	SCALE NA	WEIGHT	SHEET 1.1