NPDES/SDS Permit Application

Volume IV – Plant Site Sewage Treatment and Stormwater

Prepared for Poly Met Mining, Inc.

July 2016 (initial submittal)

October 2017 (updated)
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October 2017 (updated)

Contents

Application Forms .................................................................................................................. 1

Permit Application Checklist for Municipal/Domestic Wastewater........................................ 1

MPCA Design Flow and Loading Determination Guidelines for Wastewater Treatment Facilities, Table 2, Worksheet ........................................................................................................ 4

Municipal Surface Water Discharge Application ..................................................................... 8

Municipal and Industrial Pond Attachment ............................................................................ 14

USEPA NPDES Form 2S: Application for a Sewage Sludge Permit ...................................... 17

Industrial Chemical Additives Attachment ........................................................................... 42

Permit Application Checklist for Water Treatment ................................................................. 44

Water Treatment Residual Wastes Application ...................................................................... 46

Water Treatment Media Filter Attachment ........................................................................... 49

Industrial Chemical Additives Attachment ........................................................................... 51

1.0 Introduction ....................................................................................................................... 52

2.0 Plant Site Water Management and Infrastructure .............................................................. 58

2.1 Existing Conditions .......................................................................................................... 58

2.1.1 Existing Sewage Treatment Infrastructure ................................................................ 58

2.1.2 Existing Stormwater Conditions ................................................................................. 59

2.2 Sewage Management and Infrastructure ......................................................................... 60

2.2.1 Sewage Collection System ......................................................................................... 60

2.2.2 Stabilization Ponds ..................................................................................................... 61

2.2.3 Potable Water Treatment Plant .................................................................................. 61

2.3 Stormwater Management and Infrastructure .................................................................... 61

2.3.1 Significant Materials .................................................................................................. 63

2.3.2 Stormwater Infrastructure .......................................................................................... 63

2.3.2.1 West Plant Site .................................................................................................... 64

2.3.2.2 East Plant Site .................................................................................................... 65
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.2.3</td>
<td>Areas 1 and 2</td>
<td>65</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Floor Drains and Foundation Drains</td>
<td>65</td>
</tr>
<tr>
<td>2.4</td>
<td>Adaptive Management</td>
<td>66</td>
</tr>
<tr>
<td>2.5</td>
<td>Chemical Additives</td>
<td>66</td>
</tr>
<tr>
<td>2.6</td>
<td>Overview of the Reclamation, Closure, and Postclosure Maintenance Phases</td>
<td>67</td>
</tr>
<tr>
<td>3.0</td>
<td>Plant Site Monitoring</td>
<td>68</td>
</tr>
<tr>
<td>3.1</td>
<td>Existing Baseline Monitoring</td>
<td>68</td>
</tr>
<tr>
<td>3.2</td>
<td>Proposed Monitoring Plan</td>
<td>68</td>
</tr>
<tr>
<td>4.0</td>
<td>References</td>
<td>69</td>
</tr>
</tbody>
</table>
List of Tables

Table 1-1  Plant Site Sewage Treatment and Stormwater Management Summary........................................ 52
Table 1-2  Project Water Definitions........................................................................................................... 54
Table 1-3  Volume IV of PolyMet’s NPDES/SDS Permit Application Cross-Reference ....................... 56

List of Large Tables

Large Table 1  Design Criteria for Plant Site Stormwater Infrastructure
Large Table 2  Plant Site Chemical Additives

List of Large Figures

Large Figure 1  Site Location
Large Figure 2  Process Plant Area and Areas 1 and 2 – Existing Conditions
Large Figure 3  Process Plant Area and Areas 1 and 2 – Mine Year 1
Large Figure 4  Process Plant Area and Areas 1 and 2 – Mine Year 20

List of Appendices

Appendix A  Waste Water Treatment System Terminology Changes
Appendix B  Permit Application Support Drawings
Appendix C  Plant Site Sewage Treatment System Permit-Level Design
Appendix D  Chemical Additives Safety Data Sheets
<table>
<thead>
<tr>
<th>Acronym or Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td>NPDES/SDS Permit Application</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practice</td>
</tr>
<tr>
<td>FTB</td>
<td>Flotation Tailings Basin</td>
</tr>
<tr>
<td>gpd</td>
<td>gallons per day</td>
</tr>
<tr>
<td>HRF</td>
<td>Hydrometallurgical Residue Facility</td>
</tr>
<tr>
<td>LTVSMC</td>
<td>LTV Steel Mining Company</td>
</tr>
<tr>
<td>MPCA</td>
<td>Minnesota Pollution Control Agency</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>PolyMet</td>
<td>Poly Met Mining, Inc.</td>
</tr>
<tr>
<td>Project</td>
<td>NorthMet Project</td>
</tr>
<tr>
<td>SDS</td>
<td>State Disposal System</td>
</tr>
<tr>
<td>STS</td>
<td>Sewage Treatment System</td>
</tr>
<tr>
<td>SWPPP</td>
<td>Stormwater Pollution Prevention Plan</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solids</td>
</tr>
<tr>
<td>WWTS</td>
<td>Waste Water Treatment System</td>
</tr>
</tbody>
</table>
Municipal/Domestic Facilities are those that process wastewater primarily from domestic sanitary sewer sources and may include contributions from commercial and industrial facilities in the service area. These facilities typically include city wastewater treatment facilities and sanitary districts, but also include non-municipal facilities, such as mobile home parks, schools, campgrounds, resorts, and industries that treat their own sanitary waste.

This checklist is intended to help permit applicants determine the correct forms to submit as part of a complete permit application package. The Minnesota Pollution Control Agency (MPCA) will review the application materials for completeness and notify the applicant within 30 business days of receipt whether the application is incomplete or complete enough for processing.

Print or type application: Before submitting an application, make a photocopy of this form and all other application materials for your records. The MPCA will review the application for completeness and provide an official response to the permittees within 30 days of receipt of all necessary application materials.

Permit application assembly: To expedite the processing and review of your application, put this form and any other applicable permit application checklists for other waste types at the beginning of your submittal package. Please place all other application forms in order as listed on the back of this form. Do not place forms and checklists in an appendix as this makes it difficult and time consuming for staff to locate them.

Completeness instructions: The MPCA will not process an application without properly completed forms. All sections of required forms must be completed. If portions do not apply to this facility, please indicate using “n/a” or explain why it doesn’t apply. For permit reissuance, all forms information must also be completed in full even if the information requested is not changing from the existing permit. This allows the MPCA to quickly verify that the existing information is correct.

Facility name: NorthMet Plant Site Sewage Treatment System and Stormwater Management Systems
Permit No.: MN TBD

Reason for Application (check all that apply): ☒ New permit ☐ Permit Modification ☐ Permit Reissuance
☐ Resubmittal of an application determined to be incomplete.
(Include copies of all returned forms with a resubmittal.)

Does this action include construction activities: ☒ Construction is proposed as part of the permit action.
☐ No construction is proposed as part of this permit action.

Form Submittal
Submit two (2) complete copies of the permit application package. At least one (1) copy must be a hard copy. The other may be an electronic copy. The completed form is to be returned to:

Attn: Fiscal Services – 6th floor
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Assistance
If you have any questions regarding the selection of the proper forms or how to complete the required information, contact the MPCA staff assigned to your facility. Staff is assigned by regions and a director of regional staff can be located at: http://www.pca.state.mn.us/index.php/about-mpca/mpca-overview/agency-structure/mpca-offices/mpca-offices.html

You may also contact the MPCA at:
• In Metro Area 651-296-6300
• Outside Metro Area: 800-657-3864
• E-mail to: askpca@state.mn.us.
### Application Forms Selection

Listed below are application forms and required submittals that may be required for a typical municipal/domestic wastewater treatment facility application. All required forms must be completed in-full and included with the submittal. The MPCA cannot process an application that does not include all of the required application forms. All forms, instructions, and additional information can be found on the MPCA website at [http://www.pca.state.mn.us/enzq915](http://www.pca.state.mn.us/enzq915).

Check all boxes that apply. Include a copy of all completed application forms with the submittal.

<table>
<thead>
<tr>
<th>Required for all water quality permits</th>
<th>For MPCA use only</th>
</tr>
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<tbody>
<tr>
<td>☒ Transmittal Form (wq-wwprm7-03)</td>
<td></td>
</tr>
<tr>
<td>☒ Application Fee as specified on the Transmittal Form</td>
<td></td>
</tr>
<tr>
<td>☒ Certification Signature as specified on Transmittal Form</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.epa.gov/npdes/pubs/final2a.pdf">For Transmittal Form: Refer to Volume I of this Permit Application.</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required for all new permits and modifications with a change in design flow</th>
<th>For MPCA use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒ MPCA Design Flow and Loading Determination Guidelines for Wastewater Treatment Facilities, Table 2, Worksheet (wq-wwtp#5.20)</td>
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<thead>
<tr>
<th>Major facilities</th>
<th>For MPCA use only</th>
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<tbody>
<tr>
<td>☒ U.S. Environmental Protection Agency (EPA) NPDES Form 2A Application form</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.epa.gov/npdes/pubs/final2a.pdf">EPA NPDES Form 2S</a></td>
<td></td>
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</tbody>
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<table>
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<tr>
<th>Stormwater management for Municipal Major wastewater treatment permit holders</th>
<th>For MPCA use only</th>
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</thead>
<tbody>
<tr>
<td>☒ Industrial Stormwater Multi-Sector NPDES/SDS Permit Application (wq-wwprm7-60a)</td>
<td></td>
</tr>
<tr>
<td>Instructions for Industrial Stormwater Permit Application Attachment to NPDES/SDS permit (wq-wwprm7-60b)</td>
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<table>
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<tr>
<th>Discharge to surface water (for major and minor facilities)</th>
<th>For MPCA use only</th>
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</thead>
<tbody>
<tr>
<td>☒ Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
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</table>

<table>
<thead>
<tr>
<th>Discharge to land (i.e. spray irrigation, rapid infiltration)</th>
<th>For MPCA use only</th>
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<tbody>
<tr>
<td>☒ Municipal Land Discharge Application (wq-wwprm7-10)</td>
<td></td>
</tr>
<tr>
<td>☒ Municipal Large Subsurface Treatment System Application (wq-wwprm7-05)</td>
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</table>

<table>
<thead>
<tr>
<th>Treatment facilities using stabilization ponds</th>
<th>For MPCA use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒ Municipal and Industrial Pond Attachment (wq-wwprm7-11)</td>
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<table>
<thead>
<tr>
<th>Treatment facilities producing biosolids</th>
<th>For MPCA use only</th>
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<tr>
<td>☒ Municipal Biosolids Attachment (wq-wwprm7-16)</td>
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<tr>
<th>Additional attachments</th>
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<tbody>
<tr>
<td>☒ Additional Station Location Attachment (wq-wwprm7-49)</td>
<td></td>
</tr>
<tr>
<td>☒ Additional Chemical Additives Attachment (wq-wwprm7-48)</td>
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</table>

<table>
<thead>
<tr>
<th>Supplemental information</th>
<th>For MPCA use only</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒ Topographic map.</td>
<td></td>
</tr>
<tr>
<td>☒ A schematic drawing or treatment process flow diagram showing all treatment components, direction of flow, compliance monitoring station locations, and discharge locations.</td>
<td></td>
</tr>
</tbody>
</table>

---

**For Transmittal Form:**

Refer to Volume I of this Permit Application.

---

**For MPCA use only**

- Received
- Incomplete
- Complete
List any additional documents, reports, plans, or attachments included as part of the application package. (Common types of supplemental information may include maps, process flow diagrams, facility plans, engineering reports, plans and specifications, technical checklists and other reports related to the facility or proposed project.)

<table>
<thead>
<tr>
<th>Other waste types</th>
<th>Some facilities may also include other waste types that are not covered by this checklist. Facilities with multiple types of wastes should review the other permit application checklists to determine if additional forms and attachments may be required.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permit Application Checklist for Industrial Process Wastewater (wq-wwprm7-04b)</td>
</tr>
<tr>
<td></td>
<td>Permit Application Checklist for Miscellaneous Waste Types (wq-wwprm7-04c)</td>
</tr>
<tr>
<td></td>
<td>Permit Application Checklist for Water Treatment (wq-wwprm7-04d)</td>
</tr>
</tbody>
</table>

Refer to Volume IV Table of Contents
Figure 1: Determination of Peak Hourly Flows Before Adjustment for Storm Event

N/A

Note: All flow measurements taken at treatment plant with adjustments for bypasses, overflows, and emergency pumping. Groundwater elevation in relation to sewers should be stated for several points in the sewer system. Dates of flow measurement should be stated.
### Table 3: Determination of Design Flows

(A) For determination of peak hourly wet weather design flows (PHWW):

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Present peak hourly dry weather flow [200 employees*35 gpcd + mine area]</td>
<td>7,202</td>
</tr>
<tr>
<td>2</td>
<td>Present peak hourly during high ground water period (no runoff)</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>Present peak hourly dry weather flow [same as (1)]</td>
<td>N/A</td>
</tr>
<tr>
<td>4</td>
<td>Present peak hourly infiltration</td>
<td>16,000</td>
</tr>
<tr>
<td>5</td>
<td>Present hourly during high ground water period and runoff at point of greatest distance between Curves Y and Z</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>Present hourly during high ground water (no runoff) at same time of day as (5) measurement</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Present peak hourly inflow</td>
<td>24,000</td>
</tr>
<tr>
<td>8</td>
<td>Present peak hourly inflow adjusted for a 5-year 1-hour rainfall event</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>Present peak hourly infiltration [same as (4)]</td>
<td>See (4)</td>
</tr>
<tr>
<td>10</td>
<td>Peak hourly infiltration cost effective to eliminate</td>
<td>-10,800</td>
</tr>
<tr>
<td>11</td>
<td>Peak hourly infiltration after rehabilitation (where rehabilitation is cost effective)</td>
<td>5,200</td>
</tr>
<tr>
<td>12</td>
<td>Present peak hourly adjusted inflow [same as (8)]</td>
<td>N/A</td>
</tr>
<tr>
<td>13</td>
<td>Peak hourly inflow cost effective to eliminate</td>
<td>-16,200</td>
</tr>
<tr>
<td>14</td>
<td>Peak hourly inflow after rehabilitation (where rehabilitation is cost effective)</td>
<td>7,800</td>
</tr>
<tr>
<td>15</td>
<td>Population increase <em>150</em> @ <em>35</em> gpcd</td>
<td>5,250</td>
</tr>
<tr>
<td>16</td>
<td>Peak hourly flow from planned industrial increase</td>
<td>N/A</td>
</tr>
<tr>
<td>17</td>
<td>Estimated peak hourly flow from future unidentified industries</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Peak hourly flow from other future increases (contractor’s employees, other)</td>
<td>1,300</td>
</tr>
<tr>
<td>19</td>
<td>Peak hourly wet weather design flow [(1)+(11)+(14)+(15)+(16)+(17)+(18)] = (PF = 4) 4x26,752</td>
<td>107,008</td>
</tr>
</tbody>
</table>

(B) For determination of peak instantaneous wet weather design flow (PIWW):

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Peak hourly wet weather design flow [same as (19)]</td>
<td>107,008</td>
</tr>
<tr>
<td>21</td>
<td>Present peak hourly inflow adjusted for a 5-year 1-hour rainfall event [same as (8)]</td>
<td>N/A</td>
</tr>
<tr>
<td>22</td>
<td>Present peak inflow adjusted for a 25-year 1-hour rainfall event</td>
<td>N/A</td>
</tr>
<tr>
<td>23</td>
<td>Peak instantaneous wet weather design flow</td>
<td>107,008</td>
</tr>
</tbody>
</table>

(C) For determination of average dry weather design flow (ADW):

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Present average dry weather flow [200 employees*35 gpcd + mine area]</td>
<td>7,202</td>
</tr>
<tr>
<td>25</td>
<td>Population increase <em>150</em> @ <em>35</em> gpcd</td>
<td>5,250</td>
</tr>
<tr>
<td>26</td>
<td>Average flow from planned industrial increase</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>Estimated average flow from other future unidentified industries</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>Average flow from other future increases (contractor’s employees, other)</td>
<td>1,300</td>
</tr>
<tr>
<td>29</td>
<td>Average dry weather design flow [(24)+(25)+(26)+(27)+(28)]</td>
<td>13,752</td>
</tr>
</tbody>
</table>
(D) For determination of average wet weather design flow (30-day average for mechanical plants and 180-day average for controlled discharge ponds) (AWW):

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Present average wet weather flow for 200 employees * 35 gpcd + mine area</td>
<td>7,202</td>
</tr>
<tr>
<td>31</td>
<td>Average infiltration after rehabilitation (where rehabilitation is cost effective)</td>
<td>5,200</td>
</tr>
<tr>
<td>32</td>
<td>Average inflow after rehabilitation (where rehabilitation is cost effective)</td>
<td>7,800</td>
</tr>
<tr>
<td>33</td>
<td>Population increase 150 employees * 35 gpcd</td>
<td>5,250</td>
</tr>
<tr>
<td>34</td>
<td>Average inflow after rehabilitation</td>
<td>0</td>
</tr>
<tr>
<td>35</td>
<td>Estimated average flow from other future unidentified industries</td>
<td>0</td>
</tr>
<tr>
<td>36</td>
<td>Average flow from other future increases (contractor’s employees, other)</td>
<td>1,300</td>
</tr>
<tr>
<td>37</td>
<td>Average wet weather design flow [(30)+(31)+(32)+(33)+(34)+(35)+(36)]</td>
<td>26,752</td>
</tr>
</tbody>
</table>

(E) Critical data (including a graphical display similar to Figure 1), methodology, and a discussion on the following items shall be included with the above calculations:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>Dates during which actual flow data was recorded and its probable degree of accuracy.</td>
<td>N/A</td>
</tr>
<tr>
<td>39</td>
<td>Ground water elevation data relative to the collection system, during the time period when flow data was recorded.</td>
<td>N/A</td>
</tr>
<tr>
<td>40</td>
<td>Rainfall data during the time period when flow data was recorded and how the amount of rainfall compares to normal seasons.</td>
<td>N/A</td>
</tr>
<tr>
<td>41</td>
<td>Probable degree of accuracy of flow reduction due to proposed or completed I/I correction or elimination of bypasses.</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 4: Essential Project Components Percentage

Definitions:

“Essential project components” means those components of a wastewater disposal system that are necessary to convey or treat a municipality’s existing wastewater flows and loadings and future flows and loadings based on the projected residential growth of the municipality for a 20-year period.

Mass Loading (lbs./day) = Flow (MGD) X Concentration (mg/l) X 8.34

<table>
<thead>
<tr>
<th>Total Existing Daily Conditions</th>
<th>Total Proposed 20-year Design Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (MGD)</td>
<td>8.5E-3</td>
</tr>
<tr>
<td>CBOD₅ (mg/l)</td>
<td>220</td>
</tr>
<tr>
<td>Mass Loading (lbs./day)</td>
<td>15.6</td>
</tr>
</tbody>
</table>

Essential Project Components Percentage = \( \frac{100 \times \text{Total Existing CBOD₅ Mass Loading}}{\text{Total 20-year Growth Mass Loading}} \)

\[
= 100 \times \left( \frac{26 \text{ lbs./day}}{36 \text{ lbs./day}} \right)
\]

= 72 %
### Table 5: Determination of Design Loadings

<table>
<thead>
<tr>
<th></th>
<th>Unit Basis</th>
<th>ADW</th>
<th>AWW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential Waste</strong></td>
<td>Population</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plant Site/Other</strong></td>
<td>Number-Workers</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>200*35gpdc</td>
<td>8,300</td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td>220 mg/l</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>220 mg/l</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td>25 mg/l</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>8 mg/l</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Mine Area-Holding</strong></td>
<td>Number-workers</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>8*20gpdc</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td>7,000 mg/l</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>15,000 mg/l</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td>150 mg/l</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>250 mg/l</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Mine Area-Portable</strong></td>
<td>Number-workers</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>120/8 portc*20</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td>7,000 mg/l</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>15,000 mg/l</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td>150 mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>250 mg/l</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Future Employees</strong></td>
<td>Flow, GPD</td>
<td>150 employees @</td>
<td>(150*35gpdc) =</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>(wet/dry)</em> _ gpdc_</td>
<td>5250</td>
</tr>
<tr>
<td></td>
<td>Rated Flow, GPD</td>
<td>Wet Weather PF = 4</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td>220 mg/l</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>220 mg/l</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td>25 mg/l</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>8 mg/l</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Infiltration</strong></td>
<td>GPD</td>
<td>0 - dry</td>
<td>7,800</td>
</tr>
<tr>
<td><strong>Inflow</strong></td>
<td>GPD</td>
<td>0 – dry</td>
<td>5,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Flow, GPD</td>
<td>13,752</td>
<td>26,752</td>
</tr>
<tr>
<td></td>
<td>Rated Flow, GPD</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>BOD₅, mg/l</td>
<td>313</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>BOD₅, #/day</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>TSS, mg/l</td>
<td>435</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, mg/l</td>
<td>28</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>NH₃-N, #/day</td>
<td>3.25</td>
<td>3.25</td>
</tr>
<tr>
<td></td>
<td>P, mg/l</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>1.4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

* It may be necessary to also test for TKN for certain industrial contributors.
The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This application applies to municipal and privately owned facilities that treat domestic wastewater for disposal to a surface water of the state.

Complete the application by typing or printing in black ink. Attach additional sheets as necessary. For more information, please contact the Minnesota Pollution Control Agency (MPCA) at: In Metro Area: 651-296-6300 or Outside Metro Area: 800-657-3864.

Permittee name: Poly Met Mining, Inc. Permit number: MN TBD

Wastewater Treatment and Discharge

1. Please complete the following table by listing all existing facility components:

<table>
<thead>
<tr>
<th>Existing component</th>
<th>Quantity</th>
<th>Date of construction/installation</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Refer to Section 2.1.1 of this volume for a description of the existing conditions and infrastructure.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. What is the classification of your facility? 
   - A
   - B
   - C
   - D
   - To be determined

3. Are there any plans to make changes to the facility within the next five years? 
   - Yes
   - No

If yes, please complete the following table by listing all of the proposed changes to the facility components:

<table>
<thead>
<tr>
<th>New and/or removed component</th>
<th>Quantity</th>
<th>Estimated date of installation/removal</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Refer to Section 2.2 of this volume and Section 3.0 of Appendix C of this volume for a description of the proposed changes to the facility components.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Design flows of the existing and/or proposed facility:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Existing</th>
<th>Proposed (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average wet weather design flow (AWW)</td>
<td>N/A mgd</td>
<td>0.0215 mgd</td>
</tr>
<tr>
<td>Average annual design flow (AAD)</td>
<td>N/A mgd</td>
<td>0.0085 mgd</td>
</tr>
<tr>
<td>Average dry weather design flow (ADW)</td>
<td>N/A mgd</td>
<td>N/A mgd</td>
</tr>
<tr>
<td>Peak hourly wet weather flow (PHWW)</td>
<td>N/A mgd</td>
<td>N/A mgd</td>
</tr>
</tbody>
</table>

If available, please provide:

5. Design influent concentration in milligrams per liter and/or the design loading in pounds per day for the following parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Existing</th>
<th>Proposed (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-day Biochemical Oxygen Demand (BOD₅)</td>
<td>N/A mg/L</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>N/A mg/L</td>
<td>42 lbs/day</td>
</tr>
<tr>
<td>Total Phosphorus</td>
<td>N/A mg/L</td>
<td></td>
</tr>
<tr>
<td>Ammonia Nitrogen</td>
<td>N/A mg/L</td>
<td>1.5 lbs/day</td>
</tr>
</tbody>
</table>

6. Type of discharge (check one):

   **Existing:**  
   - [ ] Continuous  
   - [ ] Controlled  
   - [ ] Intermittent  
   - [ ] Periodic/Seasonal

   **Proposed (if applicable):**  
   - [ ] Continuous  
   - [ ] Controlled  
   - [ ] Intermittent  
   - [x] Periodic/Seasonal

   If the discharge is intermittent or periodic/seasonal, specify below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Existing</th>
<th>Proposed (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of times per year when discharge occurs</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Average duration of each discharge</td>
<td>N/A</td>
<td>10 to 14 days per discharge</td>
</tr>
<tr>
<td>Average flow per discharge</td>
<td>N/A</td>
<td>To be determined in final design</td>
</tr>
<tr>
<td>Months in which discharge occurs</td>
<td>N/A</td>
<td>Spring, Fall</td>
</tr>
</tbody>
</table>

7. Does the facility have the ability to measure effluent flow (i.e., effluent flow meter)?  
   - [x] Yes  
   - [ ] No

8. Inflow/Infiltration

   a. Do you have any known sources of inflow and infiltration?  
      - [x] Yes  
      - [ ] No

      If yes, please describe:  
      Refer to Section 2.3 of Appendix C of this volume.

   b. Explain any work that has been completed in the last five years to minimize inflow and infiltration:  
      Not applicable; the system has not been in operation during the last five years.

   c. Explain any planned efforts to minimize inflow and infiltration:  
      Refer to Section 3.1 of Appendix C of this volume for a discussion of the proposed collection system improvements.
9. Does the facility contain any designed bypass points?  ☐ Yes  ☒ No
   If yes, how many: ________________________________
   Also, if yes, answer the following questions regarding each bypass point:
   a. Is/are the bypass structure(s) ☐ Manual or  ☐ Automatic?
   b. Is/are the bypass structure(s) ☐ Controlled and  ☐ Kept locked?
   c. Were the bypass structures(s) approved in the plans and specifications?  ☐ Yes  ☐ No

10. Releases (Provide the number of releases/bypass/overflow incidents in the last five years.)

<table>
<thead>
<tr>
<th>Date (mm/dd/yy)</th>
<th>Discharge point description</th>
<th>Location</th>
<th>Flow (total gallons)</th>
<th>Receiving water (if applicable)</th>
<th>Degree of treatment</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

11. Areas serviced by the facility:

<table>
<thead>
<tr>
<th>Name of entity</th>
<th>Population served</th>
<th>Is this portion of the collection system owned and operated by the entity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NorthMet Project Plant Site</td>
<td>200</td>
<td>☒ Yes  ☐ No</td>
</tr>
<tr>
<td>NorthMet Project Mine Site</td>
<td>120</td>
<td>☒ Yes  ☐ No</td>
</tr>
</tbody>
</table>

Pretreatment

12. Does the facility influent waste stream include wastewater/residual waste from a municipal or industrial water treatment plant?  ☐ Yes  ☒ No  If yes, provide the following:
   a. Name of water treatment facility: ________________________________
   b. Type of water treatment facility (reverse osmosis, filter, etc.): ________________________________
   c. Any potential wastes (arsenic, radium, etc.) that may impact the facility: ________________________________
   d. The flow in gallons per week or gallons per month: ________________________________

13. Does the facility have, or is it subject to, a formally delegated pretreatment program?  ☐ Yes  ☒ No

14. Provide a list of all SIUs and CIUs that discharge to the facility:

<table>
<thead>
<tr>
<th>Name</th>
<th>Total average flow (mgd)</th>
<th>Flow from process wastewater (mgd)</th>
<th>Flow from non-process wastewater (mgd)</th>
<th>Principal products or raw materials used</th>
<th>Considered a SIU?</th>
<th>Is there currently a control mechanism and/or local limits?</th>
<th>Is the IU subject to Categorical Standards?</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
<td>☐ Yes  ☐ No</td>
</tr>
</tbody>
</table>
15. Has a completed *Pretreatment Notification of a Significant Industrial User’s Form* been submitted to the Minnesota Pollution Control Agency (MPCA) for all of the above listed SIUs?  □ Yes  ☑ No  

16. Do you anticipate significant changes in volume or quality of discharge from existing industrial users to the facility?  
□ Yes  ☑ No  If yes, please describe: ____________________________

17. Do you anticipate any new industrial users to the facility in the next five years?  
□ Yes  ☑ No  If yes, please describe: ____________________________

18. Have any of the industrial users caused or contributed to any problems (e.g. upsets, interference) at the facility in the past three years?  □ Yes  ☑ No  If yes, please describe each episode, including the name of the industrial users and the events which caused the problems.

19. Is the facility subject to the Hazardous Waste Management program under the Resource Conservation and Recovery Act (RCRA), or does it accept any known hazardous waste material?  □ Yes  ☑ No  

If yes, attach a copy of your existing RCRA permit per 40 CFR 122.21 regulations, including facility maps showing the location at which hazardous waste enters the treatment facility; copies of any sampling results of hazardous waste taken at your facility, etc.

**Sampling Requirements**

*This section must be completed for municipal facilities with an average wet weather design flow equal to or greater than 0.100 mgd.*

20. A facility discharge sample needs to be analyzed for the parameters listed below. Complete the table with the sample results.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SD: Results</th>
<th>Units</th>
<th>SD: Results</th>
<th>Units</th>
<th>SD: Results</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonia (as N)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrite plus Nitrate Nitrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Attachments**

☑ **Pond Attachment:** If your facility has a pond treatment component (i.e., primary secondary, polishing, cooling, etc.), complete the *Pond Attachment.*

☐ **Biosolids Attachment:** If your facility generates biosolids (sewage sludge) or if you intend to become a preparer of biosolids within the next five years, complete the *Biosolids Attachment.*

Review the application and ensure all requested items are submitted with this application.

Please make a copy for your records.

Refer to the *Transmittal Form* for mailing instructions.
**Instructions**

**Question 1.** Complete the table with all of the existing facility components. Add in the number of components, date the components were constructed and additional information providing further clarification of the facility components. The additional information must include, if applicable, but is not limited to pond size (in acres), pond depth, type of pond liner, component size and/or detention time, type of nutrient removal and chemicals used in treatment process.

Areas of facility to include:
- Lift Stations
- Preliminary Treatment
- Primary Treatment
- Biological/Secondary Treatment
- Nutrient Removal
- Advanced Tertiary Treatment
- Disinfection
- Biosolids Treatment

**Question 2.** Refer to Minn. R. ch. 9400.0500 for information on determining facility class.

**Example:**

<table>
<thead>
<tr>
<th>Existing component</th>
<th>Number</th>
<th>Date of construction/installation</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar Screen</td>
<td>2</td>
<td>September 1984</td>
<td>1 mechanical, 1 manual</td>
</tr>
<tr>
<td>Primary Clarifier</td>
<td>2</td>
<td>September 1984</td>
<td></td>
</tr>
<tr>
<td>Activated sludge, conventional</td>
<td>3</td>
<td>September 1984</td>
<td></td>
</tr>
<tr>
<td>Secondary Clarifier</td>
<td>2</td>
<td>September 1984</td>
<td></td>
</tr>
<tr>
<td>Chemical addition P removal</td>
<td>1</td>
<td>June 2001</td>
<td>Alum addition</td>
</tr>
<tr>
<td>Chlorination</td>
<td>1</td>
<td>September 1984</td>
<td>Chlorine Gas</td>
</tr>
<tr>
<td>Dechlorination</td>
<td>1</td>
<td>April 1995</td>
<td>Sulfur dioxide gas</td>
</tr>
<tr>
<td>Sludge holding tank</td>
<td>1</td>
<td>April 1995</td>
<td></td>
</tr>
<tr>
<td>Primary anaerobic digester</td>
<td>2</td>
<td>April 1995</td>
<td></td>
</tr>
<tr>
<td>Secondary anaerobic digester</td>
<td>2</td>
<td>April 1995</td>
<td></td>
</tr>
<tr>
<td>Lift stations</td>
<td>3</td>
<td>1984, 1995, 2004</td>
<td>One main and 2 smaller</td>
</tr>
</tbody>
</table>

**Question 3.** Changes to the facility components and/or design flow may result in different/stricter limits and/or a facility classification change. Complete the table with all the proposed facility components. Refer to the instructions for Question 1.

**Question 4.** Refer to the MPCA Design Flow and Loading Determination Guidelines for a definition of each flow type. The MPCA Design Flow and Loading Determination Guidelines for Wastewater Treatment Plants can be found at: [http://www.pca.state.mn.us/publications/wq-wwtp5-20.pdf](http://www.pca.state.mn.us/publications/wq-wwtp5-20.pdf).

**Question 8.** Inflow and infiltration are major defects in collection systems that can result in failure of the system as well as hydraulic overloading. Inflow is stormwater making its way into the collection system through roof leaders, foundation drains, manhole covers, catch basins and surface runoff. Infiltration is groundwater making its way into the collection system through cracks, leaky joints, roots, etc. Efforts to minimize inflow and infiltration, for example, are televising, smoke testing, replacement, house inspections ordinance revision, etc.

**Question 10.** Any release, bypass, or overflow where untreated wastewater is discharged from the collection system or treatment facility shall be included.

**Example:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Discharge Point Description</th>
<th>Location</th>
<th>Flow (total gallons)</th>
<th>Receiving Water (if applicable)</th>
<th>Degree of Treatment</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/12/2006</td>
<td>Lift station #1</td>
<td>4th Avenue and Main Street</td>
<td>2,300</td>
<td>Storm Sewer to Little River</td>
<td>None</td>
<td>Plugged sewer line-industry disposed of towels</td>
</tr>
</tbody>
</table>

**Question 11.** Provide the name and population of the municipalities, private communities, unincorporated areas, etc. served by the facility. If the facility serves a sewer district list all the communities in the district. Indicate if the portion of the collection system is owned and operated by the entity instead of the Permittee.
**Example:**

<table>
<thead>
<tr>
<th>Name of Entity</th>
<th>Population Served</th>
<th>Is this portion of the collection system owned and operated by the entity?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakes Development</td>
<td>53</td>
<td>☐ Yes ☑ No</td>
</tr>
</tbody>
</table>

**Question 12.** If the facility receives wastewater/residual waste from water treatment facilities (ex. filter backwash, lime and ion-exchange softening wastes, and membrane treatment reject concentrate), please indicate the name of the facility and the potential pollutants present in the discharge which may affect the wastewater treatment plant.

**Question 13.** Delegated Pretreatment Program: Federal regulations and State rules require Publicly Owned Treatment Works (POTWs) with one or more significant industrial users (SIUs) and have a design flow of five million gallons per day or more to develop delegated pretreatment programs.

**Question 14.** A Significant Industrial User (SIU) is defined as any industrial user that discharges an average of 25,000 gallons per day or more of processed wastewater to the wastewater treatment facility, excluding sanitary, noncontact cooling, and boiler blowdown wastewater; process wastewater which makes up at least five percent of the facility’s design BOD loading; or has the potential, in the opinion of the Permittee or MPCA, to adversely impact the Permittee’s treatment works or the quality of the effluent.

A Categorical Industrial User (CIU) is defined as a user discharging pollutants which are regulated by pretreatment standards established by the EPA which address various processes and activities being performed within the establishment; may or may not have been assigned a standard industrial classification (SIC) number.

**Question 15.** All facilities are required to complete a “Pretreatment Notification of a SIU” form when the facility identifies a SIU. The form can be obtained online at [http://www.pca.state.mn.us/publications/wq-wwtp7-21.doc](http://www.pca.state.mn.us/publications/wq-wwtp7-21.doc).

**Question 16.** List any anticipated changes at any existing industrial users within the next five-year term of this permit. This would include plans to increase flows, changes or increases in chemical usage, etc.

**Question 18.** Provide information concerning any problems the facility has experienced that are attributable to discharges from the industrial users. Problems may include upsets or interference at the facility, corrosion in the collection system, or other similar events in the past three years.

**Question 20.** The sample type shall be consistent with the effluent sample type in the facility’s NPDES/SDS Permit. For example, if the facility is required to take 24-hour composite samples at the permitted outfall stations the parameters listed in the table should be analyzed from a 24-hour composite sample. If the facility has more than one permitted outfall a sample must be taken from each outfall. Indicate the permitted Station ID in the table. If the parameters listed in the table are required to be sampled by the facility’s current NPDES/SDS Permit, include the most recent sample result. Sample preservation and test procedures for the analysis of the parameters shall conform to 40 CFR Part 136 and Minn. R. 7041.3200.
The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This attachment applies to municipal and industrial facilities with a pond system (i.e. primary, secondary, polishing, equalization, anaerobic, contaminated runoff, etc.).

Complete the attachment by typing or printing in black ink. Attach additional sheets as necessary. For more information, please contact the Minnesota Pollution Control Agency (MPCA) at: In Metro Area: 651-296-6300 or Outside Metro Area: 800-657-3864.

Permittee name: Poly Met Mining, Inc. Permit number: MN TBD

Geology/Hydrogeology Information

1. Provide a description of the soil beneath or in the vicinity of the ponds. Use information from soil surveys or from existing soil borings or well logs if available. (Ex.: 8 feet (ft.) of fine sand underlain by 10 ft. of silty clay.)
   To be determined by geotechnical exploration and evaluation prior to final design.
   TBD by geotechnical exploration and evaluation prior to final design

2. What is the depth below ground surface of the water table at the pond site? 
   TBD by geotechnical exploration and evaluation prior to final design

   How many feet below ground surface is the bottom of the pond?
   TBD by geotechnical exploration and evaluation prior to final design

3. What is the depth to bedrock at the pond site? ☐ <10 ft. ☐ 10-20 ft. ☐ 20-50 ft. ☐ >50 ft.

4. What is the bedrock type (Ex.: limestone, sandstone, etc.)? TBD by geotechnical exploration and evaluation prior to final design

5. What is the proximity to the ponds of private water supply wells? ☐ < ¼ mile ☐ ¼ - 1 mile ☒ >1 mile

6. Describe the approximate number, type and depth of private water wells in the general vicinity of the ponds (3 mile radius). (Ex.: most (#?) wells generally drilled to greater than 50 ft., however, several shallow (20 ft.) sand point wells also present.)

   The Minnesota Well Index includes one well listed for public supply/non-community use within a 3-mile radius of the proposed sewage treatment ponds: Unique Well ID 584559. This well was drilled for LTSMC, is 406 ft deep, and is listed as sealed.

   The Minnesota Well Index includes one well listed for domestic use within a 3-mile radius of the proposed sewage treatment ponds: Unique Well ID 665923. This well was drilled for LTSMC, is 165 ft deep, and currently supplies potable water to PolyMet's administration building.

   There are no other known private water supply wells within a 3-mile radius of the proposed ponds.

7. Are the ponds located in a designated Wellhead Protection Area? ☐ Yes ☒ No

8. Are monitoring wells present at the pond site? ☒ Yes ☐ No

   If yes, please submit a topographic or equivalent map showing well locations with respect to the pond system.

   Have any wells shown adverse impacts (Ex.: high nitrate or chloride concentrations)? ☒ Yes ☐ No

   If yes, please describe the adverse impacts: Groundwater monitoring wells in the vicinity of the existing Plant Site show the following elevated parameters possibly influenced by previous industrial activity: boron, fluoride, iron, molybdenum, sulfate, TDS, and turbidity.

9. What is the proximity to the ponds of any nearby surface waters? (Ex.: Minnesota River located ¼ mile to the north.)

   Wetlands located immediately adjacent and Second Creek located approximately 3,930 feet to the southeast.
Pond Information

10. Please indicate the types of ponds that are present at the facility. (Check all that apply)
   - Primary
   - Secondary
   - Polishing
   - Equalization
   - Aerated
   - Anaerobic
   - Cooling
   - Contaminated runoff
   - Irrigation holding
   - Ash handling
   - Other: 

11. Please complete the following table for each pond at the facility.

<table>
<thead>
<tr>
<th>Pond type</th>
<th>Max operating depth (ft.)</th>
<th>Min operating depth (ft.)</th>
<th>Mean operating depth (ft.)</th>
<th>Acreage at mean operating depth</th>
<th>Days of detention time (design flow)</th>
<th>Year each pond was constructed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Stabilization Pond 1</td>
<td>TBD (pending final design)</td>
<td>TBD (pending final design)</td>
<td>4</td>
<td>1.44</td>
<td>210</td>
<td>To be determined</td>
</tr>
<tr>
<td>Primary Stabilization Pond 2</td>
<td>TBD (pending final design)</td>
<td>TBD (pending final design)</td>
<td>4</td>
<td>1.44</td>
<td>210</td>
<td>To be determined</td>
</tr>
<tr>
<td>Secondary Stabilization Pond</td>
<td>TBD (pending final design)</td>
<td>TBD (pending final design)</td>
<td>4</td>
<td>1.44</td>
<td>210</td>
<td>To be determined</td>
</tr>
</tbody>
</table>

12. What is the source of the acreage information in question 11 above? (Ex: as built plans and specs, engineering survey, etc.)
   Permit level design

13. Has the pond system ever been repaired or upgraded?  ☐ Yes  ☑ No  If yes, what year?  N/A
    If yes, please describe what the upgrade included:  N/A

14. Has the pond system ever been dredged?  ☐ Yes  ☑ No  If yes, what year?  N/A
    If yes, please describe the method of dredge material disposal:  N/A

15. What type of pond liner is present?  ☐ Clay  ☐ Synthetic/Vinyl  ☐ Bentonite  ☑ Other:  Geomembrane

16. Is the pond system ever operated at a depth so that the freeboard is less than 3 feet?  ☐ Yes  ☑ No
    If yes, please describe the situation and identify how often it occurs:  N/A

17. What is the relationship between current wastewater flows and pond designed hydraulic capacity?
    ☐ below capacity  ☐ at or near capacity  ☑ above capacity  Not applicable; no current wastewater flows

18. Are there any drain tiles (designed or pre-existing) located in the vicinity of or beneath the pond system?  ☐ Yes  ☑ No
    If yes, please submit a topographic or equivalent map showing the drain tile locations and a description of each. (The map and description should include but not be limited to: the drain tile location in relation to the pond system; the drain tile location in relation to the irrigation field if applicable; each drain tile discharge location; and, each discharge location station identification code if applicable.)

19. Please list the calendar month total influent and effluent flow in million gallons for each of the past 12 months (not applicable for municipal facilities).

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Influent</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Effluent</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
20. What is the average annual influent CBOD₅? 220 (estimated) mg/L

21. Are there known or potential sources of toxic pollutants (metals, Volatile Organic Compounds [VOCs] such as, trichloroethylene, chloroform, methyl tert-butyl ether [MTBE], benzene, etc.)? ☐ Yes ☑ No
   If yes, please describe: N/A

22. Is the pond system located in karst topography? ☑ Yes ☐ No
   If yes and if your facility is listed in the 1993 Administrative Order requiring the preparation of a contingency plan, please ensure your facility has an updated contingency plan on file.

   Review the attachment and ensure all requested items are submitted with this attachment.
   Please make a copy for your records.
   Refer to the Transmittal Form for mailing instructions.
Disclaimer

This is an updated PDF document that allows you to type your information directly into the form and to save the completed form. This form is the most updated form currently available.

Note: This form can be viewed and saved only using Adobe Acrobat Reader version 7.0 or higher, or if you have the full Adobe Professional version.

Instructions:
1. Type in your information
2. Save file (if desired)
3. Print the completed form
4. Sign and date the printed copy
5. Mail it to the directed contact.
NPDES FORM 2S APPLICATION OVERVIEW

PRELIMINARY INFORMATION

This page is designed to indicate whether the applicant is to complete Part 1 or Part 2. Review each category, and then complete Part 1 or Part 2, as indicated. For purposes of this form, the term “you” refers to the applicant. “This facility” and “your facility” refer to the facility for which application information is submitted.

FACILITIES INCLUDED IN ANY OF THE FOLLOWING CATEGORIES MUST COMPLETE PART 2 (PERMIT APPLICATION INFORMATION).

1. Facilities with a currently effective NPDES permit.

2. Facilities which have been directed by the permitting authority to submit a full permit application at this time.

ALL OTHER FACILITIES MUST COMPLETE PART 1 (LIMITED BACKGROUND INFORMATION).
### PART 1: LIMITED BACKGROUND INFORMATION

This part should be completed only by “sludge-only” facilities - that is, facilities that do not currently have, and are not applying for, an NPDES permit for a direct discharge to a surface body of water.

For purposes of this form, the term “you” refers to the applicant. “This facility” and “your facility” refer to the facility for which application information is submitted.

1. **Facility Information.**
   - a. Facility name
   - b. Mailing Address
   - c. Contact person
     - Title
     - Telephone number
   - d. Facility Address (not P.O. Box)
   - e. Indicate the type of facility
     - Publicly owned treatment works (POTW)
     - Privately owned treatment works
     - Federally owned treatment works
     - Blending or treatment operation
     - Surface disposal site
     - Sewage sludge incinerator
     - Other (describe)

2. **Applicant Information.**
   - a. Applicant name
   - b. Mailing Address
   - c. Contact person
     - Title
     - Telephone number
   - d. Is the applicant the owner or operator (or both) of this facility?
     - owner
     - operator
   - e. Should correspondence regarding this permit be directed to the facility or the applicant?
     - facility
     - applicant

---

Poly Met Mining, Inc.
3. Sewage Sludge Amount. Provide the total dry metric tons per latest 365 day period of sewage sludge handled under the following practices:

- a. Amount generated at the facility
- b. Amount received from off site
- c. Amount treated or blended on site
- d. Amount sold or given away in a bag or other container for application to the land
- e. Amount of bulk sewage sludge shipped off site for treatment or blending
- f. Amount applied to the land in bulk form
- g. Amount placed on a surface disposal site
- h. Amount fired in a sewage sludge incinerator
- i. Amount sent to a municipal solid waste landfill
- j. Amount used or disposed by another practice

Describe

4. Pollutant Concentrations. Using the table below or a separate attachment, provide existing sewage sludge monitoring data for the pollutants for which limits in sewage sludge have been established in 40 CFR part 503 for this facility’s expected use or disposal practices. If available, base data on three or more samples taken at least one month apart and no more than four and one-half years old.

<table>
<thead>
<tr>
<th>POLLUTANT</th>
<th>CONCENTRATION (mg/kg dry weight)</th>
<th>ANALYTICAL METHOD</th>
<th>DETECTION LEVEL FOR ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARSENIC</td>
<td></td>
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<tr>
<td>CADMIUM</td>
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<tr>
<td>CHROMIUM</td>
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<tr>
<td>COPPER</td>
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<td>LEAD</td>
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<td>MERCURY</td>
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<td>MOLYBDENUM</td>
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<td>NICKEL</td>
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<tr>
<td>SELENIUM</td>
<td></td>
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<td></td>
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<tr>
<td>ZINC</td>
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</tr>
</tbody>
</table>

5. Treatment Provided At Your Facility.

- a. Which class of pathogen reduction does the sewage sludge meet at your facility?
  - ______ Class A  ______ Class B  ______ Neither or unknown

- b. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce pathogens in sewage sludge:
  
  __________________________________________________________
  __________________________________________________________
  __________________________________________________________
  __________________________________________________________
  __________________________________________________________
  __________________________________________________________
  __________________________________________________________
c. Which vector attraction reduction option is met for the sewage sludge at your facility?

- Option 1 (Minimum 38 percent reduction in volatile solids)
- Option 2 (Anaerobic process, with bench-scale demonstration)
- Option 3 (Aerobic process, with bench-scale demonstration)
- Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
- Option 5 (Aerobic processes plus raised temperature)
- Option 6 (Raise pH to 12 and retain at 11.5)
- Option 7 (75 percent solids with no unstabilized solids)
- Option 8 (90 percent solids with unstabilized solids)
- Option 9 (Injection below land surface)
- Option 10 (Incorporation into soil within 6 hours)
- Option 11 (Covering active sewage sludge unit daily)
- None or unknown

d. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce vector attraction properties of sewage sludge:

_______________________________________________________________________________________________
_______________________________________________________________________________________________

6. Sewage Sludge Sent to Other Facilities. Does the sewage sludge from your facility meet the Table 1 ceiling concentrations, the Table 3 pollutant concentrations, Class A pathogen requirements, and one of the vector attraction options 1-8?

- Yes
- No

If yes, go to question 8 (Certification).

If no, is sewage sludge from your facility provided to another facility for treatment, distribution, use, or disposal?

- Yes
- No

If no, go to question 7 (Use and Disposal Sites).

If yes, provide the following information for the facility receiving the sewage sludge:

a. Facility name

b. Mailing address

_______________________________________________________________________________________________
_______________________________________________________________________________________________

C. Contact person

Title

Telephone number

_______________________________________________________________________________________________
_______________________________________________________________________________________________

- Treatment or blending
- Sale or give-away in bag or other container
- Land application
- Surface disposal
- Incineration
- Other (describe):

_______________________________________________________________________________________________
_______________________________________________________________________________________________

Not Applicable

Poly Met Mining, Inc.
### 7. Use and Disposal Sites.
Provide the following information for each site on which sewage sludge from this facility is used or disposed:

<table>
<thead>
<tr>
<th>a. Site name or number</th>
<th></th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>b. Contact person</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. Site location (Complete 1 or 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Street or Route #</td>
</tr>
<tr>
<td>County</td>
</tr>
<tr>
<td>City or Town</td>
</tr>
<tr>
<td>_______________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Latitude</th>
<th>Longitude</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>d. Site type (Check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
</tr>
<tr>
<td>Surface disposal</td>
</tr>
<tr>
<td>Reclamation</td>
</tr>
</tbody>
</table>

### 8. Certification.
Sign the certification statement below. (Refer to instructions to determine who is an officer for purposes of this certification.)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

<table>
<thead>
<tr>
<th>Name and official title</th>
<th></th>
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<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Signature</th>
<th></th>
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<table>
<thead>
<tr>
<th>Telephone number</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Date signed</th>
<th></th>
</tr>
</thead>
</table>

**SEND COMPLETED FORMS TO:**
PART 2: PERMIT APPLICATION INFORMATION

Complete this part if you have an effective NPDES permit or have been directed by the permitting authority to submit a full permit application at this time. In other words, complete this part if your facility has, or is applying for, an NPDES permit.

For purposes of this form, the term “you” refers to the applicant. “This facility” and “your facility” refer to the facility for which application information is submitted.

APPLICATION OVERVIEW — SEWAGE SLUDGE USE OR DISPOSAL INFORMATION

Part 2 is divided into five sections (A-E). Section A pertains to all applicants. The applicability of Sections B, C, D, and E depends on your facility's sewage sludge use or disposal practices. The information provided on this page indicates which sections of Part 2 to fill out.

1. SECTION A: GENERAL INFORMATION.
   
   Section A must be completed by all applicants.

2. SECTION B: GENERATION OF SEWAGE SLUDGE OR PREPARATION OF A MATERIAL DERIVED FROM SEWAGE SLUDGE.
   
   Section B must be completed by applicants who either:
   
   1) Generate sewage sludge, or
   2) Derive a material from sewage sludge.

3. SECTION C: LAND APPLICATION OF BULK SEWAGE SLUDGE.
   
   Section C must be completed by applicants who either:
   
   1) Apply sewage to the land, or
   2) Generate sewage sludge which is applied to the land by others.

   NOTE: Applicants who meet either or both of the two above criteria are exempted from this requirement if all sewage sludge from their facility falls into one of the following three categories:
   
   1) The sewage sludge from this facility meets the ceiling and pollutant concentrations, Class A pathogen reduction requirements, and one of vector attraction reduction options 1-8, as identified in the instructions, or
   2) The sewage sludge from this facility is placed in a bag or other container for sale or give-away for application to the land, or
   3) The sewage sludge from this facility is sent to another facility for treatment or blending.

4. SECTION D: SURFACE DISPOSAL
   
   Section D must be completed by applicants who own or operate a surface disposal site.

5. SECTION E: INCINERATION
   
   Section E must be completed by applicants who own or operate a sewage sludge incinerator.
### A. GENERAL INFORMATION

All applicants must complete this section.

#### A.1. Facility Information.

<table>
<thead>
<tr>
<th>a. Facility name</th>
<th>Poly Met Mining, Inc.</th>
</tr>
</thead>
</table>
| b. Mailing Address | PO Box 475
Hoyt Lakes, MN 55750 |
| c. Contact person | Christie Kearney |
| | Title |
| | Environmental Site Director |
| | Telephone number |
| | (218) 461-7746 |
| d. Facility Address (not P.O. Box) | 6500 County Road 666
Hoyt Lakes, MN 55750 |
| e. Is this facility a Class I sludge management facility? | Yes ✔ No ✔ |
| f. Facility design flow rate: | 0.014 mgd |
| g. Total population served: | 470 |
| h. Indicate the type of facility: | |
| | ✔ Publicly owned treatment works (POTW) |
| | ✔ Privately owned treatment works |
| | ✔ Federally owned treatment works |
| | ✔ Blending or treatment operation |
| | ✔ Surface disposal site |
| | ✔ Sewage sludge incinerator |
| | ✔ Other (describe) |

#### A.2. Applicant Information. If the applicant is different from the above, provide the following:

<table>
<thead>
<tr>
<th>a. Applicant name</th>
<th>Poly Met Mining, Inc.</th>
</tr>
</thead>
</table>
| b. Mailing Address | PO Box 475
Hoyt Lakes, MN 55750 |
| c. Contact person | Brad Moore |
| | Title |
| | Executive VP Environmental and Governmental Affairs |
| | Telephone number |
| | (651) 389-4100 |
| d. Is the applicant the owner or operator (or both) of this facility? | ✔ owner ✔ operator |
| e. Should correspondence regarding this permit should be directed to the facility or the applicant. | ✔ facility ☐ applicant |
A.3. Permit Information.

a. Facility's NPDES permit number (if applicable): N/A

b. List, on this form or an attachment, all other Federal, State, and local permits or construction approvals received or applied for that regulate this facility's sewage sludge management practices:

<table>
<thead>
<tr>
<th>Permit Number</th>
<th>Type of Permit</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td></td>
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<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

A.4. Indian Country. Does any generation, treatment, storage, application to land, or disposal of sewage sludge from this facility occur in Indian Country?

Yes [✔] No

If yes, describe: ________________________________________________________________
________________________________________________________________________________
________________________________________________________________________________

A.5. Topographic Map. Provide a topographic map or maps (or other appropriate map(s) if a topographic map is unavailable) that show the following information. Map(s) should include the area one mile beyond all property boundaries of the facility:

a. Location of all sewage sludge management facilities, including locations where sewage sludge is stored, treated, or disposed.

b. Location of all wells, springs, and other surface water bodies, listed in public records or otherwise known to the applicant within 1/4 mile of the facility property boundaries.

A.6. Line Drawing. Provide a line drawing and/or a narrative description that identifies all sewage sludge processes that will be employed during the term of the permit, including all processes used for collecting, dewatering, storing, or treating sewage sludge, the destination(s) of all liquids and solids leaving each unit, and all methods used for pathogen reduction and vector attraction reduction.

A.7. Contractor Information.

Are any operational or maintenance aspects of this facility related to sewage sludge generation, treatment, use or disposal the responsibility of a contractor? [✔] Yes [ ] No

If yes, provide the following for each contractor (attach additional pages if necessary):

a. Name

b. Mailing Address

c. Telephone Number

d. Responsibilities of contractor

Refer to Appendix C of this volume
A.8. Pollution Concentrations: Using the table below or a separate attachment, provide sewage sludge monitoring data for the pollutants for which limits in sewage sludge have been established in 40 CFR Part 503 for this facility’s expected use or disposal practices. All data must be based on three or more samples taken at least one month apart and must be no more than four and one-half years old.

<table>
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<tr>
<th>POLLUTANT</th>
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<th>ANALYTICAL METHOD</th>
<th>DETECTION LEVEL FOR ANALYSIS</th>
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</thead>
<tbody>
<tr>
<td>ARSENIC</td>
<td>N/A</td>
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</tr>
<tr>
<td>CADMIUM</td>
<td>N/A</td>
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<tr>
<td>CHROMIUM</td>
<td>N/A</td>
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<tr>
<td>COPPER</td>
<td>N/A</td>
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<tr>
<td>LEAD</td>
<td>N/A</td>
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<tr>
<td>MERCURY</td>
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<tr>
<td>MOLYBDENUM</td>
<td>N/A</td>
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<tr>
<td>NICKEL</td>
<td>N/A</td>
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<tr>
<td>SELENIUM</td>
<td>N/A</td>
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<tr>
<td>ZINC</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A.9. Certification. Read and submit the following certification statement with this application. Refer to the instructions to determine who is an officer for purposes of this certification. Indicate which parts of Form 2S you have completed and are submitting:

- [ ] Part 1 Limited Background Information packet
- [ ] Part 2 Permit Application Information packet:
  - [ ] Section A (General Information)
  - [ ] Section B (Generation of Sewage Sludge or Preparation of a Material Derived from Sewage Sludge)
  - [ ] Section C (Land Application of Bulk Sewage Sludge)
  - [ ] Section D (Surface Disposal)
  - [ ] Section E (Incineration)

Part 1 and Part 2 Sections C, D, and E are not applicable.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with the system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and official title: Brad Moore, Executive VP Environmental and Governmental Affairs

Signature: [Signature] Date signed: 7/11/16

Telephone number: (651) 389-4100

Upon request of the permitting authority, you must submit any other information necessary to assess sewage sludge use or disposal practices at your facility or identify appropriate permitting requirements.

SEND COMPLETED FORMS TO:
B. GENERATION OF SEWAGE SLUDGE OR PREPARATION OF A MATERIAL DERIVED FROM SEWAGE SLUDGE

Complete this section if your facility generates sewage sludge or derives a material from sewage sludge.

B.1. Amount Generated On Site.
Total dry metric tons per 365-day period generated at your facility: ______________________ dry metric tons

B.2. Amount Received from Off Site. If your facility receives sewage sludge from another facility for treatment, use, or disposal, provide the following information for each facility from which sewage sludge is received. If you receive sewage sludge from more than one facility, attach additional pages as necessary.

a. Facility name
   _____________________________________________________________
   Not applicable

b. Mailing Address
   _____________________________________________________________
   _____________________________________________________________
c. Contact person
   _____________________________________________________________
   _____________________________________________________________
   Title
   _____________________________________________________________
   Telephone number
   _____________________________________________________________
d. Facility Address (not P.O. Box)
   _____________________________________________________________
   _____________________________________________________________
e. Total dry metric tons per 365-day period received from this facility: ______________________ dry metric tons
   N/A
f. Describe, on this form or on another sheet of paper, any treatment processes known to occur at the off-site facility, including blending activities and treatment to reduce pathogens or vector attraction characteristics.
   N/A

B.3. Treatment Provided At Your Facility.

a. Which class of pathogen reduction is achieved for the sewage sludge at your facility?
   ______ Class A  ______ Class B  ✔ Neither or unknown

b. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce pathogens in sewage sludge:
   N/A

   _____________________________________________________________

   _____________________________________________________________

c. Which vector attraction reduction option is met for the sewage sludge at your facility?
   ______ Option 1 (Minimum 38 percent reduction in volatile solids)
   ______ Option 2 (Anaerobic process, with bench-scale demonstration)
   ______ Option 3 (Aerobic process, with bench-scale demonstration)
   ______ Option 4 (Specific oxygen uptake rate for aerobically digested sludge)
   ______ Option 5 (Aerobic processes plus raised temperature)
   ______ Option 6 (Raise pH to 12 and retain at 11.5)
   ______ Option 7 (75 percent solids with no unstabilized solids)
   ______ Option 8 (90 percent solids with unstabilized solids)
   ✔ None or unknown
B.3. Treatment Provided At Your Facility. (con't)

d. Describe, on this form or another sheet of paper, any treatment processes used at your facility to reduce vector attraction properties of sewage sludge:

N/A

---

e. Describe, on this form or another sheet of paper, any other sewage sludge treatment or blending activities not identified in (a) - (d) above:

N/A

---

Complete Section B.4 if sewage sludge from your facility meets the ceiling concentrations in Table 1 of 40 CFR 503.13, the pollutant concentrations in Table 3 of §503.13, the Class A pathogen reduction requirements in §503.32(a), and one of the vector attraction reduction requirements in §503.33(b)(1)-(8) and is land applied. Skip this section if sewage sludge from your facility does not meet all of these criteria.

B.4. Preparation of Sewage Sludge Meeting Ceiling and Pollutant Concentrations, Class A Pathogen Requirements, and One of Vector Attraction Reduction Options 1-8.

a. Total dry metric tons per 365-day period of sewage sludge subject to this section that is applied to the land: ___________ dry metric tons

---

b. Is sewage sludge subject to this section placed in bags or other containers for sale or give-away for application to the land?

_______Yes _______No

---

Complete Section B.5. if you place sewage sludge in a bag or other container for sale or give-away for land application. Skip this section if the sewage sludge is covered in Section B.4.

B.5. Sale or Give-Away in a Bag or Other Container for Application to the Land.

a. Total dry metric tons per 365-day period of sewage sludge placed in a bag or other container at your facility for sale or give-away for application to the land: ______________________ dry metric tons

---

b. Attach, with this application, a copy of all labels or notices that accompany the sewage sludge being sold or given away in a bag or other container for application to the land.

---

Complete Section B.6 if sewage sludge from your facility is provided to another facility that provides treatment or blending. This section does not apply to sewage sludge sent directly to a land application or surface disposal site. Skip this section if the sewage sludge is covered in Sections B.4 or B.5. If you provide sewage sludge to more than one facility, attach additional pages as necessary.

B.6. Shipment Off Site for Treatment or Blending.

a. Receiving facility name

____________________________

---

b. Mailing address

____________________________

---

c. Contact person

____________________________

Title

____________________________

Telephone number

____________________________

---

d. Total dry metric tons per 365-day period of sewage sludge provided to receiving facility: N/A

---
### B.6. Shipment Off Site for Treatment or Blending (con’t)

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. Does the receiving facility provide additional treatment to reduce pathogens in sewage sludge from your facility?</td>
<td>Yes</td>
</tr>
<tr>
<td>Which class of pathogen reduction is achieved for the sewage sludge at the receiving facility?</td>
<td>Class A</td>
</tr>
<tr>
<td>Describe, on this form or another sheet of paper, any treatment processes used at the receiving facility to reduce pathogens in sewage sludge:</td>
<td></td>
</tr>
</tbody>
</table>

f. Does the receiving facility provide additional treatment to reduce vector attraction characteristics of the sewage sludge? | Yes    |
| Which vector attraction reduction option is met for the sewage sludge at the receiving facility? | Option 2 |
| Describe, on this form or another sheet of paper, any treatment processes used at the receiving facility to reduce vector attraction properties of sewage sludge: |          |

g. Does the receiving facility provide any additional treatment or blending activities not identified in (c) or (d) above? | Yes    |
| If yes, describe, on this form or another sheet of paper, the treatment or blending activities not identified in (c) or (d) above: |          |

h. If you answered yes to (e), (f), or (g), attach a copy of any information you provide the receiving facility to comply with the “notice and necessary information” requirement of 40 CFR 503.12(g).

i. Does the receiving facility place sewage sludge from your facility in a bag or other container for sale or give-away for application to the land? | Yes    |
| If yes, provide a copy of all labels or notices that accompany the product being sold or given away. |          |

### B.7. Land Application of Bulk Sewage Sludge

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total dry metric tons per 365-day period of sewage sludge applied to all land application sites:</td>
<td></td>
</tr>
</tbody>
</table>

Complete Section B.7 if sewage sludge from your facility is applied to the land, unless the sewage sludge is covered in:
- Section B.4 (it meets Table 1 ceiling concentrations, Table 3 pollutant concentrations, Class A pathogen requirements, and one of vector attraction reduction options 1-8); or
- Section B.5 (you place it in a bag or other container for sale or give-away for application to the land); or
- Section B.6 (you send it to another facility for treatment or blending).
B.7. Land Application of Bulk Sewage Sludge. (cont) Not Applicable

b. Do you identify all land application sites in Section C of this application? ______ Yes ______ No

If no, submit a copy of the land application plan with application (see instructions).

c. Are any land application sites located in States other than the State where you generate sewage sludge or derive a material from sewage sludge? ______ Yes ______ No

If yes, describe, on this form or another sheet of paper, how you notify the permitting authority for the States where the land application sites are located. Provide a copy of the notification.

Complete Section B.8 if sewage sludge from your facility is placed on a surface disposal site. Not Applicable

B.8. Surface Disposal.

a. Total dry metric tons of sewage sludge from your facility placed on all surface disposal sites per 365-day period: ________ dry metric tons

b. Do you own or operate all surface disposal sites to which you send sewage sludge for disposal? ______ Yes ______ No

If no, answer B.8.c through B.8.f for each surface disposal site that you do not own or operate. If you send sewage sludge to more than one such surface disposal site, attach additional pages as necessary.

c. Site name or number

d. Contact person

Title

Telephone number

Contact is: ______ Site owner ______ Site operator

e. Mailing address

f. Total dry metric tons of sewage sludge from your facility placed on this surface disposal site per 365-day period: ________ dry metric tons

Complete Section B.9 if sewage sludge from your facility is fired in a sewage sludge Incinerator. Not Applicable


a. Total dry metric tons of sewage sludge from your facility fired in all sewage sludge incinerators per 365-day period: ________ dry metric tons

b. Do you own or operate all sewage sludge incinerators in which sewage sludge from your facility is fired? ______ Yes ______ No

If no, complete B.9.c through B.9.f for each sewage sludge incinerator that you do not own or operate. If you send sewage sludge to more than one such sewage sludge incinerator, attach additional pages as necessary.

c. Incinerator name or number:

d. Contact person:

Title:

Telephone number:

Contact is: ______ Incinerator owner ______ Incinerator operator
### B.9. Incineration. (con't)

- **e.** Mailing address: ____________________________________________________________

- **f.** Total dry metric tons of sewage sludge from your facility fired in this sewage sludge incinerator per 365-day period: _____ dry metric tons

---

**Complete Section B.10 if sewage sludge from this facility is placed on a municipal solid waste landfill.**

### B.10. Disposal in a Municipal Solid Waste Landfill.

Provide the following information for each municipal solid waste landfill on which sewage sludge from your facility is placed. If sewage sludge is placed on more than one municipal solid waste landfill, attach additional pages as necessary.

- **a.** Name of landfill: __________________________________________________________

- **b.** Contact person: ____________________________________________________________
  - Title: ____________________________
  - Telephone number: ____________________________
  - Contact is: _______ Landfill owner _______ Landfill operator

- **c.** Mailing address: __________________________________________________________

- **d.** Location of municipal solid waste landfill:
  - Street or Route #: ____________________________
  - County: ____________________________
  - City or Town: ____________________________ State _________ Zip ___________

- **e.** Total dry metric tons of sewage sludge from your facility placed in this municipal solid waste landfill per 365-day period: __________________ dry metric tons

- **f.** List, on this form or an attachment, the numbers of all other Federal, State, and local permits that regulate the operation of this municipal solid waste landfill.

<table>
<thead>
<tr>
<th>Permit Number</th>
<th>Type of Permit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

- **g.** Submit, with this application, information to determine whether the sewage sludge meets applicable requirements for disposal of sewage sludge in a municipal solid waste landfill (e.g., results of paint filter liquids test and TCLP test)

- **h.** Does the municipal solid waste landfill comply with applicable criteria set forth in 40 CFR Part 258?
  - Yes _____ No _____
Complete Section C for every site on which the sewage sludge that you reported in Section B.7 is applied. **Not Applicable**

### C.1. Identification of Land Application Site.

**a. Site name or number**

**b. Site location** (Complete 1 and 2).

1. **Street or Route #**
2. **City or Town**
   - **State**
   - **Zip**

2. **Latitude**
   - **Longitude**

**Method of latitude/longitude determination**

- **USGS map**
- **Field survey**
- **Other**

**c. Topographic map. Provide a topographic map (or other appropriate map if a topographic map is unavailable) that shows the site location.**

### C.2. Owner Information.

**a. Are you the owner of this land application site?**

- **Yes**
- **No**

**b. If no, provide the following information about the owner:**

- **Name**
- **Telephone number**
- **Mailing Address**

### C.3. Applier Information.

**a. Are you the person who applies, or who is responsible for application of, sewage sludge to this land application site?**

- **Yes**
- **No**

**b. If no, provide the following information for the person who applies:**

- **Name**
- **Telephone number**
- **Mailing Address**

### C.4. Site Type: Identify the type of land application site from among the following.

- **Agricultural land**
- **Forest**
- **Public contact site**
- **Reclamation site**
- **Other. Describe:**
C.5. Crop or Other Vegetation Grown on Site.
   a. What type of crop or other vegetation is grown on this site?
      _________________________________________________________________________________________________
   b. What is the nitrogen requirement for this crop or vegetation?
      _________________________________________________________________________________________________

   Are any vector attraction reduction requirements met when sewage sludge is applied to the land application site?
   ____ Yes   ____ No

   If yes, answer C.6.a and C.6.b;
   a. Indicate which vector attraction reduction option is met:
      ____ Option 9 (Injection below land surface)
      ____ Option 10 (Incorporation into soil within 6 hours)
   b. Describe, on this form or another sheet of paper, any treatment processes used at the land application site to reduce vector attraction properties of sewage sludge:
      _______________________________________________________________________________________________
      _______________________________________________________________________________________________

C.7. Cumulative Loadings and Remaining Allotments.
   a. Have you contacted the permitting authority in the State where the bulk sewage sludge subject to CPLRs will be applied, to ascertain whether bulk sewage sludge subject to CPLRs has been applied to this site on or since July 20, 1993?  ____ Yes  ____ No

      If no, sewage sludge subject to CPLRs may not be applied to this site.

      If yes, provide the following information:
      Permitting authority
      _______________________________________________________________________________________________
      Contact Person
      _______________________________________________________________________________________________
      Telephone number
      _______________________________________________________________________________________________

   b. Based upon this inquiry, has bulk sewage sludge subject to CPLRs been applied to this site since July 20, 1993?
      ____ Yes   ____ No

      If no, skip C.7.c.
c. Provide the following information for every facility other than yours that is sending, or has sent, bulk sewage sludge to CPLRs to this site since July 20, 1993. If more than one such facility sends sewage sludge to this site, attach additional pages as necessary.

<table>
<thead>
<tr>
<th>Facility name</th>
<th>____________________________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Contact person</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Title</td>
<td>____________________________________________</td>
</tr>
<tr>
<td>Telephone number</td>
<td>____________________________________________</td>
</tr>
</tbody>
</table>

Poly Met Mining, Inc.
D. SURFACE DISPOSAL

Complete this section if you own or operate a surface disposal site.
Complete Sections D.1 - D.5 for each active sewage sludge unit.

**Not Applicable**

D.1. Information on Active Sewage Sludge Units.

a. Unit name or number: ________________________________

b. Unit location (Complete 1 and 2).
   1. Street or Route #: ________________________________
      County: ________________________________
      City or Town: __________________________ State: ____________ Zip: ______________
   2. Latitude: _____________ Longitude: _____________
      Method of latitude/longitude determination: ______ USGS map ______ Field survey ______ Other

c. Topographic map. Provide a topographic map (or other appropriate map if a topographic map is unavailable) that shows the site location.

d. Total dry metric tons of sewage sludge placed on the active sewage sludge unit per 365-day period: ______________ dry metric tons

e. Total dry metric tons of sewage sludge placed on the active sewage sludge unit over the life of the unit: ______________ dry metric tons

f. Does the active sewage sludge unit have a liner with a maximum hydraulic conductivity of $1 \times 10^{-7}$ cm/sec? ______ Yes ______ No

   If yes, describe the liner (or attach a description):
   ____________________________________________________________________________________________
   ____________________________________________________________________________________________

   If you answered no to either D.1.f. or D.1.g., answer the following question:

   Is the boundary of the active sewage sludge unit less than 150 meters from the property line of the surface disposal site?
   ______ Yes ______ No

   If yes, provide the actual distance in meters: ___________________________

   Provide the following information:

   Remaining capacity of active sewage sludge unit, in dry metric tons: ________________ dry metric tons

   Anticipated closure date for active sewage sludge unit, if known: ________________ (MM/DD/YYYY)

   Provide, with this application, a copy of any closure plan that has been developed for this active sewage sludge unit.
D.2. Sewage Sludge from Other Facilities. Is sewage sent to this active sewage sludge unit from any facilities other than your facility?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

If yes, provide the following information for each such facility. If sewage sludge is sent to this active sewage sludge unit from more than one such facility, attach additional pages as necessary.

<table>
<thead>
<tr>
<th>a. Facility name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. Mailing Address</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. Contact person</th>
<th>Title</th>
<th>Telephone number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>d. Which class of pathogen reduction is achieved before sewage sludge leaves the other facility?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>Class B</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e. Describe, on this form or another sheet of paper, any treatment processes used at the other facility to reduce pathogens in sewage sludge:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>f. Which vector attraction reduction option is met for the sewage sludge at the receiving facility?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1 (Minimum 38 percent reduction in volatile solids)</td>
<td></td>
</tr>
<tr>
<td>Option 2 (Anaerobic process, with bench-scale demonstration)</td>
<td></td>
</tr>
<tr>
<td>Option 3 (Aerobic process, with bench-scale demonstration)</td>
<td></td>
</tr>
<tr>
<td>Option 4 (Specific oxygen uptake rate for aerobically digested sludge)</td>
<td></td>
</tr>
<tr>
<td>Option 5 (Aerobic processes plus raised temperature)</td>
<td></td>
</tr>
<tr>
<td>Option 6 (Raise pH to 12 and retain at 11.5)</td>
<td></td>
</tr>
<tr>
<td>Option 7 (75 percent solids with no unstabilized solids)</td>
<td></td>
</tr>
<tr>
<td>Option 8 (90 percent solids with unstabilized solids)</td>
<td></td>
</tr>
<tr>
<td>None or unknown</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>g. Describe, on this form or another sheet of paper, any treatment processes used at the other facility to reduce vector attraction properties of sewage sludge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>h. Describe, on this form or another sheet of paper, any other sewage sludge treatment activities performed by the other facility that are not identified in (d) - (g) above:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

D.3. Vector Attraction Reduction

<table>
<thead>
<tr>
<th>a. Which vector attraction option, if any, is met when sewage sludge is placed on this active sewage sludge unit?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 9 (Injection below and surface)</td>
<td></td>
</tr>
<tr>
<td>Option 10 (Incorporation into soil within 6 hours)</td>
<td></td>
</tr>
<tr>
<td>Option 11 (Covering active sewage sludge unit daily)</td>
<td></td>
</tr>
</tbody>
</table>
D.3. Vector Attraction Reduction. (con’t)
   b. Describe, on this form or another sheet of paper, any treatment processes used at the active sewage sludge unit to reduce vector attraction properties of sewage sludge:

_____________________________________________________________________________________________
_____________________________________________________________________________________________

   a. Is ground-water monitoring currently conducted at this active sewage sludge unit, or are ground-water monitoring data otherwise available for this active sewage sludge unit?  
      _____ Yes  _____ No

      If yes, provide a copy of available ground-water monitoring data. Also, provide a written description of the well locations, the approximate depth to ground-water, and the ground-water monitoring procedures used to obtain these data.

_____________________________________________________________________________________________
_____________________________________________________________________________________________

   b. Has a ground-water monitoring program been prepared for this active sewage sludge unit?  _____ Yes  _____ No

      If yes, submit a copy of the ground-water monitoring program with this permit application.

   c. Have you obtained a certification from a qualified ground-water scientist that the aquifer below the active sewage sludge unit has not been contaminated?  _____ Yes  _____ No

      If yes, submit a copy of the certification with this permit application.

D.5. Site-Specific Limits.  Are you seeking site-specific pollutant limits for the sewage sludge placed on the active sewage sludge unit?
   _____ Yes  _____ No

      If yes, submit information to support the request for site-specific pollutant limits with this application.
E. INCINERATION

Complete this section if you fire sewage sludge in a sewage sludge incinerator.

Complete this section once for each incinerator in which you fire sewage sludge. If you fire sewage sludge in more than one sewage sludge incinerator, attach additional copies of this section as necessary.

E.1. Incinerator Information.
   a. Incinerator name or number: __________________________
   b. Incinerator location (Complete 1 and 2).
      1. Street or Route #: __________________________
      County: __________________________
      City or Town: __________________________ State: ______________ Zip: ______________
      2. Latitude: __________________________ Longitude: __________________________
         Method of latitude/longitude determination: _____ USGS map _____ Field survey _____ Other

E.2. Amount Fired. Dry metric tons per 365-day period of sewage sludge fired in the sewage sludge incinerator: ____________ dry metric tons

E.3. Beryllium NESHAP.
   a. Is the sewage sludge fired in this incinerator “beryllium-containing waste,” as defined in 40 CFR Part 61.31? _____ Yes _____ No
      Submit, with this application, information, test data, and description of measures taken that demonstrate whether the sewage sludge incinerated is beryllium-containing waste, and will continue to remain as such.
   b. If the answer to (a) is yes, submit with this application a complete report of the latest beryllium emission rate testing and documentation of ongoing incinerator operating parameters indicating that the NESHAP emission rate limit for beryllium has been and will continue to be met.

E.4. Mercury NESHAP.
   a. How is compliance with the mercury NESHAP being demonstrated?
      _____ Stack testing (if checked, complete E.4.b)
      _____ Sewage sludge sampling (if checked, complete E.4.c)
   b. If stack testing is conducted, submit the following information with this application:
      A complete report of stack testing and documentation of ongoing incinerator operating parameters indicating that the incinerator has met, and will continue to meet, the mercury NESHAP emission rate limit.
      Copies of mercury emission rate tests for the two most recent years in which testing was conducted.
   c. If sewage sludge sampling is used to demonstrate compliance, submit a complete report of sewage sludge sampling and documentation of ongoing incinerator operating parameters indicating that the incinerator has met, and will continue to meet the mercury NESHAP emission rate limit.

E.5. Dispersion Factor.
   a. Dispersion factor, in micrograms/cubic meter per gram/second: __________________________
   b. Name and type of dispersion model: __________________________
   c. Submit a copy of the modeling results and supporting documentation with this application.
   a. Control efficiency, in hundredths, for the following pollutants:
      Arsenic: _______  Chromium: _______  Nickel: _______
      Cadmium: _______  Lead: _______
   b. Submit a copy of the results or performance testing and supporting documentation (including testing dates) with this application.

E.7. Risk Specific Concentration for Chromium.
   a. Risk specific concentration (RSC) used for chromium, in micrograms per cubic meter: ______________
   b. Which basis was used to determine the RSC?
      ___Table 2 in 40 CFR 503.43
      ___Equation 6 in 40 CFR 503.43 (site-specific determination)
   c. If Table 2 was used, identify the type of incinerator used as the basis:
      ___Fluidized bed with wet scrubber
      ___Fluidized bed with wet scrubber and wet electrostatic precipitator
      ___Other types with wet scrubber
      ___Other types with wet scrubber and wet electrostatic precipitator
   d. If Equation 6 was used, provide the following:
      Decimal fraction of hexavalent chromium concentration to total chromium concentration in stack exit gas: __________
      Submit results of incinerator stack tests for hexavalent and total chromium concentrations, including date(s) of test, with this application.

E.8. Incinerator Parameters
   a. Do you monitor Total Hydrocarbons (THC) in the sewage sludge incinerator's exit gas?  _______ Yes  _______ No
      Do you monitor Carbon Monoxide (CO) in the sewage sludge incinerator's exit gas?  _______ Yes  _______ No
   b. Incinerator type: _______________________
   c. Incinerator stack height, in meters: ______________________
      Indicate whether value submitted is:  ______ Actual stack height  ______ Creditable stack height

E.9. Performance Test Operating Parameters
   a. Maximum Performance Test Combustion Temperature: _______________________________
   b. Performance test sewage sludge feed rate, in dry metric tons/day: ______________________
      indicate whether value submitted is:
      _____ Average use  _____ Maximum design
      Submit, with this application, supporting documents describing how the feed rate was calculated.
   c. Submit, with this application, information documenting the performance test operating parameters for the air pollution control device(s) used for this sewage sludge incinerator.
### E.10. Monitoring Equipment

List the equipment in place to monitor the following parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total hydrocarbons or carbon monoxide</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>b. Percent oxygen</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>c. Moisture content</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>d. Combustion temperature</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>e. Other</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

### E.11. Air Pollution Control Equipment

Submit, with this application, a list of all air pollution control equipment used with this sewage sludge incinerator.

<table>
<thead>
<tr>
<th>Equipment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
Additional Information, if provided, will appear on the following pages.
# Industrial Chemical Additives

## Attachment

NPDES/SDS Permit Program

**Doc Type:** Permit Application

The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This is an attachment to the Industrial Applications for facilities with multiple chemical additives.

Complete the attachment by typing or printing in black ink. Attach additional sheets as necessary. For more information, please contact the Minnesota Pollution Control Agency (MPCA) at: In Metro Area: 651-296-6300 or Outside Metro Area: 800-657-3864.

### Permittee name: Poly Met Mining, Inc.  
### Permit number: MN TBD

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Purpose</th>
<th>Location of chemical addition in process (e.g., to raw water supply, at greensand filter, before RO unit #2, etc.)</th>
<th>Amount/duration/frequency of addition (i.e., continuous or slug dosing. If slug dosing give amount/duration and frequency of addition; e.g., slug dosing 13.5 gal/3hours, once every two weeks)</th>
<th>Average rate of use (weight or volume per day)</th>
<th>Maximum rate of use (weight or volume per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT-205W</td>
<td>Anionic / Nonionic Surfactant Blend (Primary) Dust suppressant</td>
<td>Conveyor transfer points</td>
<td>No average use planned. For maximum use: spray on conveyor transfer points 1 time per year, as needed (if needed, this will be a winter application)</td>
<td>N/A</td>
<td>1 time per year, applied by vendor/manufacturer</td>
</tr>
<tr>
<td>Polysaccharide Surfactant Blend (Potential Substitute) Dust suppressant</td>
<td>Conveyor transfer points</td>
<td>No average use planned. For maximum use: spray on conveyor transfer points 1 time per year, as needed (if needed, this will be a winter application)</td>
<td>N/A</td>
<td>1 time per year, applied by vendor/manufacturer</td>
<td></td>
</tr>
<tr>
<td>Magnesium Chloride Aqueous Solution (Dustgard) (Primary) Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 gallons/day (128,691 gallons/year)</td>
<td>98,823 gallons/day (296,469 gallons/year)</td>
<td></td>
</tr>
<tr>
<td>Roadsaver®-C (Potential Substitute) Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>89,839 gallons/day (116,992 gallons/year)</td>
<td>89,839 gallons/day (269,518 gallons/year)</td>
<td></td>
</tr>
<tr>
<td>Roadsaver® (Potential Substitute) Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 gallons/day (128,691 gallons/year)</td>
<td>98,823 gallons/day (296,469 gallons/year)</td>
<td></td>
</tr>
<tr>
<td>Durasoil (Potential Substitute) Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 gallons/day (128,691 gallons/year)</td>
<td>98,823 gallons/day (296,469 gallons/year)</td>
<td></td>
</tr>
<tr>
<td>Gorilla-Snot (Potential Substitute) Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 gallons/day (128,691 gallons/year)</td>
<td>98,823 gallons/day (296,469 gallons/year)</td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>Type</td>
<td>Use</td>
<td>Application Rate (gallons/day)</td>
<td>Application Rate (gallons/year)</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-----</td>
<td>------------------------------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td>Soiltac (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>49,412 (64,345)</td>
<td></td>
</tr>
<tr>
<td>Coherex (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 (128,691)</td>
<td></td>
</tr>
<tr>
<td>BT-468 Aqueous Amorphous Polymer Solution (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year</td>
<td>98,823 (128,691)</td>
<td></td>
</tr>
<tr>
<td>Calcium Chloride (Primary)</td>
<td>De-icer</td>
<td>Walkways, haul roads</td>
<td>No average use planned. For maximum use: use, as needed, based on recommended application rates (if needed, this will be a winter application)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Liquid Alum (Primary)</td>
<td>Coagulant</td>
<td>Sewage Treatment System Stabilization Ponds</td>
<td>Slug addition three times per year. Usage rates are based on assumed coagulant dosage. Exact needs will be determined through sampling.</td>
<td>90 ( \text{gallons/year} )</td>
<td></td>
</tr>
</tbody>
</table>

*Remember to attach the Material Safety Data Sheets, complete product labels and any other information on chemical composition, aquatic toxicity, human health, and environmental fate for each chemical additive. Please make a copy for your records. Refer to the Transmittal Form for mailing instructions.

Chemicals listed as potential substitutes are not intended to be used at the average and maximum rates of use unless the primary chemical additive is unavailable.
Permit Application Checklist for Water Treatment

NPDES/SDS Permit Program
National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS)

Doc Type: Permit Application

Water Treatment waste types are discharges of residuals, such as solids and filter backwash, from the treatment of water for potable, non-potable, industrial, or other uses.

This checklist is intended to help permit applicants determine the correct forms to submit as part of a complete permit application package. The Minnesota Pollution Control Agency (MPCA) will review the application materials for completeness and notify the applicant within 30 business days of receipt whether the application is incomplete or complete enough for processing.

Print or type application: Before submitting an application, make a photocopy of this form and all other application materials for your records. The MPCA will review the application for completeness and provide an official response to the permittees within 30 days of receipt of all necessary application materials.

Permit application assembly: To expedite the processing and review of your application, put this form and any other applicable permit application checklists for other waste types at the beginning of your submittal package. Please place all other application forms in order as listed on the back of this form. Do not place forms and checklists in an appendix as this makes it difficult and time consuming for staff to locate them.

Completeness instructions: The MPCA will not process an application without properly completed forms. All sections of required forms must be completed. If portions do not apply to this facility, please indicate using “n/a” or explain why it doesn’t apply. For permit reissuance, all forms information must also be completed in full even if the information requested is not changing from the existing permit. This allows the MPCA to quickly verify that the existing information is correct.

Facility name: NorthMet Plant Site Potable Water Treatment Plant Permit No.: MN TBD

Reason for Application (check all that apply): ☑ New permit ☐ Permit Modification ☐ Permit Reissuance ☐ Resubmittal of an application determined to be incomplete. (Include copies of all returned forms with a resubmittal.)

Does this action include construction activities: ☑ Construction is proposed as part of the permit action. ☐ No construction is proposed as part of this permit action.

Form Submittal
Submit two (2) complete copies of the permit application package. At least one (1) copy must be a hard copy. The other may be an electronic copy. The completed form is to be returned to:

Attn: Fiscal Services – 6th floor
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN  55155-4194

Assistance
If you have any questions regarding the selection of the proper forms or how to complete the required information, contact the MPCA staff assigned to your facility. Staff is assigned by regions and a director of regional staff can be located at:
http://www.pca.state.mn.us/index.php/about-m pca/mpca-overview/agency-structure/mpca-offices/mpca-offices.html

You may also contact the MPCA at:
• In Metro Area 651-296-6300
• Outside Metro Area:  800-657-3864
• E-mail to: askpca@state.mn.us.
**Application Forms Selection** (Check all boxes that apply and include the completed form with the submittal.)

Listed below are application forms and required submittals that may be required for a typical potable water treatment facility application. All required forms must be completed in-full and included with the submittal. The MPCA cannot process an application that does not include all of the required application forms. All forms, instructions, and additional information can be found on the MPCA website at [http://www.pca.state.mn.us/enzq915](http://www.pca.state.mn.us/enzq915).

Check all boxes that apply. Include a copy of all completed application forms with the submittal.

<table>
<thead>
<tr>
<th>Required for all water quality permits</th>
<th>For Transmittal Form: Refer to Volume I of this Permit Application.</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Application Fee as specified on the Transmittal Form</td>
<td></td>
</tr>
<tr>
<td>☑ Certification Signature as specified on Transmittal Form</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water treatment residual wastes disposal</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Type of water treatment facility</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Additional attachments</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Supplemental information</th>
<th>(This information may be information required on one, or more of the forms listed above, such as a map. A single map that provides all the information required from multiple forms may be acceptable. A separate copy of each form is not required.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Topographic map.</td>
<td></td>
</tr>
<tr>
<td>☑ A schematic drawing or treatment process flow diagram showing all treatment components, direction of flow, compliance monitoring station locations, and discharge locations.</td>
<td></td>
</tr>
<tr>
<td>☑ List any additional documents, reports, plans, or attachments included as part of the application package. (Common types of supplemental information may include maps, process flow diagrams, facility plans, engineering reports, plans and specifications, technical checklists and other reports related to the facility or proposed project.)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other waste types</th>
<th>Some facilities may also include other waste types that are not covered by this checklist. Facilities with multiple types of wastes should review the other permit application checklists to determine if additional forms and attachments may be required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>☑ Permit Application Checklist for Municipal/Domestic Wastewater (wq-wwprm7-04a)</td>
<td></td>
</tr>
<tr>
<td>☑ Permit Application Checklist for Industrial Process Wastewater (wq-wwprm7-04b)</td>
<td></td>
</tr>
<tr>
<td>☑ Permit Application Checklist for Miscellaneous Waste Types (wq-wwprm7-04c)</td>
<td></td>
</tr>
</tbody>
</table>
The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This application applies to municipal and industrial water treatment facilities.

Complete the application by typing or printing in black ink. Attach additional sheets as necessary. For more information, please contact the Minnesota Pollution Control Agency (MPCA) at: In Metro Area: 651-296-6300 or Outside Metro Area: 800-657-3864.

- Review the application to ensure all requested items are submitted with this application.
- Please make a copy for your records.
- Refer to the Transmittal Form for mailing instructions.

### Facility information

1. **Permittee name:** Poly Met Mining, Inc.  
   **Permit number:** MN TBD

2. **Water treatment operator:** To be determined  
   **Mailing address:** PO Box 475  
   **City:** Hoyt Lakes  
   **State:** MN  
   **Zip code:** 55750  
   **Office phone:** (218) 471-2150  
   **Cell phone:** TBD  
   **Email:** TBD  
   **Minnesota Department of Health (MDH) certification number (water supply system):** TBD

3. **Is any of the treated water used to supply a public water system?** ☑ Yes ☐ No

### Treated water use

4. **Indicate the treated water distribution type:**  
   - ☐ Public water supply drinking water  
   - ☑ Non-public water supply water  
   - ☐ Both

If both distribution types are used include use percentages for each type of distribution:

- **Public water supply:** N/A
- **Non-public water supply:** 100%

### Facility type

5. **What is/are the Standard Industrial Classification (SIC) code(s) which best reflect the principal products or services provided by the facility?**  
   1021 (Active Metal Mining Facilities - Copper Ores), 1099 (Miscellaneous Metal Ores, Not Elsewhere Classified), 1041 (Active Metal Mining Facilities - Gold Ores)

   Municipal service districts and public utility facilities primarily engaged in distributing water for sale for residential, commercial, and industrial uses fall under SIC code 4941. **If that is the applicable SIC code, skip Questions 6 and 7.**

6. **What is/are the average production/consumption rates at which this/these activities occur?**  
   113,000 tons/year copper concentrate, 18,000 tons/year mixed nickel-copper hydroxide, and 500 tons/year of gold and PGE precipitate

7. **What is/are the maximum production/consumption rates at which this/these activities occur?**  
   32,000 tons of ore per day (after ramp-up)

The information for questions 1-3 must be projected for the next five years, since the Minnesota Pollution Control Agency (MPCA) permit will likely cover this period. The SIC code classification was developed by the U.S. Department of Commerce to classify facilities by their economic activities. SIC codes are commonly used on federal tax forms and unemployment insurance information provided to the Minnesota Department of Jobs and Training. If you do not know the four-digit SIC code number for

Production/consumption rates should be expressed as, for example, “100,000 lbs/day of milk”, “600 wafers/month of integrated circuits”, “5100 bbls/day of fuel oil”, “23,000 cans/week of canned poultry.”

Summary information

8. Please give a brief description of your water treatment facility:

The Plant Site Potable Water Treatment (PWT) will be equipped with the appropriate components for treating surface water from Colby Lake. The PWT stages will include clarification, flocculation, sedimentation, filtration, and disinfection, with chemical addition designed where chemicals are to be added.

9. List all individual groundwater, surface water and interconnection sources that supply raw water to the treatment system. For each individual source identify use status. Indicate well/source water locations on topographic map.

| Raw water source (ex. well numbers – MDH and/or facility reference, surface water body) | Use status (ex. active use, emergency use, standby, seasonal use or peak use) |
| Colby Lake | Primary, active use |

10. Have you obtained a Minnesota Department of Natural Resources (DNR) water appropriations permit(s) for this/these water supply/supplies? □ Yes ☒ No If yes, complete a. – d. below:

a. If yes, what is/are the DNR permit number(s)? While not yet obtained, the permit application is in process for Colby Lake water appropriations.

   Water Appropriations Permit #2017-0260

b. DNR permit expiration date(s)? N/A

c. What are the DNR authorized annual appropriation limits (in million gallons per year)? Colby Lake: 1,800 million gallons/year

d. Are you proposing, or have you proposed within the past five years, to increase the DNR-authorized annual appropriation limits? □ Yes ☒ No If yes, please explain:

11. What is the total annual average design finished water production of the water treatment facility in gallons per day? This is a total of all components of the treatment system (ex. RO, media filters, etc). 16,450 gallons per day

12. What is the total peak/maximum daily design finished production capacity of the water treatment facility in gallons per day? This is a total of all components of the treatment system (ex. RO, media filters, etc). 49,350 gallons per day

13. Are there any known raw water (groundwater, surface water, interconnection source) contaminants (ex: radium, arsenic, etc.)? □ Yes ☒ No If yes, please explain:

14. Name of laboratory that analyzes your discharge samples: TBD

   MDH certification number: TBD

15. If the facility is currently covered under an NPDES/SDS permit, has the facility been in compliance with the permit limits during the past five years? □ Yes ☒ No If no, please explain:

   Not applicable; the Plant Site Potable Water Treatment Plant has not been operational since the closure of LTVSMC taconite processing facility in 2001.
Facility type

16. List below all chemical additives that are used or proposed to be used at the facility. This must include all process reagents, flocculants, biocides, water treatment chemical additives (for example, chlorine, chloramines, potassium permanganate, softener salts, alum), polymers, pH adjustment chemicals, antiscalants, brine solutions, etc. MPCA approval is required for any additives that are new, increasing in usage, or not previously approved. Go to the MPCA chemical additive webpage at: [http://www.pca.state.mn.us/a6krka9](http://www.pca.state.mn.us/a6krka9) to find the documents necessary to complete the approval process. Your additives will not be approved for use until you complete this process.

<table>
<thead>
<tr>
<th>Product name</th>
<th>Purpose</th>
<th>Location in process of chemical addition</th>
<th>Frequency of addition</th>
<th>Type of application (slug dosing or continuous feed)</th>
<th>Average rate of use (weight or volume per day)</th>
<th>Maximum rate of use (weight or volume per day)</th>
<th>Previously approved? Yes or no</th>
<th>Date of approval (mm/dd/yyyy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes/No</td>
<td></td>
</tr>
</tbody>
</table>

At the direction of MPCA, the chemical additives approval process for this project would be completed via the attached Industrial Chemical Additives Attachment (wq-wwprm7-48).

An Additional Chemical Additives attachment is available on the MPCA website at [http://www.pca.state.mn.us/water/permits/index.html](http://www.pca.state.mn.us/water/permits/index.html) if more space is needed.

General permit application information

All permit applications are reviewed for general permit qualification when the water treatment general permits are up for reissuance. Those who qualify will be notified of acceptance. Only domestic water treatment facilities qualify for inclusion in the general permits.

Attachments

- **Media Filter Attachment**: If a media filter is used for water treatment (ex. sand filter) complete the Media Filter Attachment.
- **Softening Treatment**: if softening treatment is used for water treatment (ex. lime or ion-exchange) complete the Softening Treatment Attachment.
- **Membrane Filtration**: If membrane filtration is used for water treatment (ex. reverse osmosis or ultra filtration) complete the Membrane Filtration Attachment.
Water Treatment
Media Filter Attachment
NPDES/SDS Permit Program
Doc Type: Permit Application

The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This attachment applies to municipal and industrial water treatment facilities that utilize media filtration (i.e., anthracite or any other filter which is backwashed, rinsed, or flushed).

Complete the attachment by typing or printing in black ink. Attach additional sheets as necessary. For more information, please contact the Minnesota Pollution Control Agency (MPCA) at: In Metro Area: 651-296-6300 or Outside Metro Area: 800-657-3864.

Facility Information

1. **Permittee name:** Poly Met Mining, Inc.  
   **Permit number:** MN TBD

2. Describe the media filters. Include number of filters, cells, media type (e.g., activated alumina, anthracite, zeolite, garnet, activated carbon, silica sand, greensand, multimedia), etc.
   
   The Potable Water Treatment System will use two gravity-type, rapid sand filters.
   
   Refer to Section 2.2.3 of this volume for further information on the Potable Water Treatment System.

3. Has the media been replaced in the past? If so indicate the date and method of disposal.
   
   Not applicable; this is a new treatment system.

4. What is the average production capacity of the treatment component in gallons per day? (The treatment component means all filters combined.)
   
   16,450 gallons/day

5. What is the maximum production capacity of the treatment component in gallons per day?
   
   49,350 gallons/day

Backwash Wastewater

6. Backwash wastewater from the facility is discharged to (check all that apply):
   
   - [ ] Surface water – Name: ____________________________
   - [ ] Municipal storm sewer (identify where this discharges): ____________________________
   - [x] Sanitary sewer (discharges to sanitary sewer do not require an NPDES/SDS Permit)
   - [ ] Seepage basin or rapid infiltration basin

7. Describe the backwash process. (Include seasonal variations):

   The backwash process occurs when the filter head loss reaches approximately 7 feet. Normal flow of water in the Potable Water Treatment System is stopped, and treated water is backflowed through the filter media from the bottom and out the overflow trough to the backwash reclaim. Wastewater from the backwash reclaim will be transferred to the sludge storage tank for disposal at the Sewage Treatment System.

   **Backwash frequency:** Variable (when filter head loss reaches 7 feet)
   **Backwash duration:** 15 minutes
   **Backwash volume:** 1,498 gallons
   **Rinsate volume:** 170 gallons

8. Is treated/finished water from the final distribution system used to backwash the filters?  
   - [x] Yes  
   - [ ] No

   If no, describe the backwash source and indicate it on the water treatment process flow diagram or water balance diagram.
9. How is the backwash water treated to remove suspended solids and other related pollutants prior to discharge to the environment (ex. holding tank, holding pond, etc.)?

The backwash water is sent to the backwash reclaim tank to gravity settle solids. Settled solids will be transferred to the sludge storage tank. Sludge storage tank contents will be disposed in the Sewage Treatment System.

Refer to Section 2.2 of this volume for further information on the Sewage Treatment System.

10. If there is backwash detention, what is the length of settling time? Minimum of 8 hours

Discharge Information

11. How often is there a discharge to the environment (either from holding tanks/ponds, or straight from the facility)?

The Potable Water Treatment System does not discharge to the environment; rather, the system wastewater discharges to the Plant Site sewage collection system and Sewage Treatment System.

12. What is the average daily design discharge rate for the treatment component in gallons per day? 13,752 gallons/day

13. What is the maximum daily design discharge rate for the treatment component in gallons per day? 26,752 gallons/day

Review the application to ensure all requested items are submitted with this attachment.

Please make a copy for your records

Refer to the Transmittal Form for mailing instructions.
The National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Permit Program regulates wastewater discharges to land and surface waters. This is an attachment to the Industrial Applications for facilities with multiple chemical additives.

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<table>
<thead>
<tr>
<th>Chemical</th>
<th>Purpose</th>
<th>Location of chemical addition in process (e.g., to raw water supply, at greensand filter, before RO unit #2, etc.)</th>
<th>Amount/duration/frequency of addition (i.e., continuous or slug dosing. If slug dosing give amount/duration and frequency of addition; e.g., slug dosing 13.5 gal/3hours, once every two weeks)</th>
<th>Average rate of use (weight or volume per day)</th>
<th>Maximum rate of use (weight or volume per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (Primary)</td>
<td>Disinfectant</td>
<td>Filter and Clearwell</td>
<td>Continuous</td>
<td>0.8 pounds/day (292 pounds/year)</td>
<td>2.5 pounds/day (912.5 pounds/year)</td>
</tr>
<tr>
<td>Aluminum Sulfate, 50% Solution (Primary)</td>
<td>Coagulant</td>
<td>Flocculator</td>
<td>Continuous</td>
<td>47 pounds/day (17,155 pounds/year)</td>
<td>190 pounds/day (69,350 pounds/year)</td>
</tr>
<tr>
<td>Potassium Permanganate (Primary)</td>
<td>Oxidant</td>
<td>Flocculator</td>
<td>Continuous</td>
<td>12 pounds/day (4,380 pounds/year)</td>
<td>74 pounds/day (27,010 pounds/year)</td>
</tr>
<tr>
<td>Ammonia (Primary)</td>
<td>Disinfectant (Chloramines)</td>
<td>Clearwell</td>
<td>Continuous (as needed)</td>
<td>0.07 pounds/day (25.55 pounds/year)</td>
<td>0.2 pounds/day (73 pounds/year)</td>
</tr>
</tbody>
</table>

*Remember to attach the Material Safety Data Sheets, complete product labels and any other information on chemical composition, aquatic toxicity, human health, and environmental fate for each chemical additive. Please make a copy for your records. Refer to the Transmittal Form for mailing instructions.*
1.0 Introduction

This volume, Volume IV of the National Pollutant Discharge Elimination System (NPDES) / State Disposal System (SDS) Permit Application (Application) for Poly Met Mining, Inc.’s (PolyMet) NorthMet Project (Project), focuses on the Plant Site, which will be redeveloped from the existing plant site that was previously owned and operated by LTV Steel Mining Company (LTVSMC). Specifically, this volume focuses on the management of sewage and stormwater associated with the Process Plant Area, Area 1 Shops, Area 1 Locomotive Fueling Facility, Area 2 Shops, and ancillary facilities, shown on Large Figure 1. Water management associated with the Tailings Basin and the Beneficiation Plant, and the Hydrometallurgical Residue Facility (HRF) and the Hydrometallurgical Plant, which are also located at the Plant Site, are described in Volumes V and VI, respectively. Refer to Section 2.0 of Volume I for discussion of the permitting approach for this Application as it applies to the Plant Site.

Table 1-1 provides a high-level overview of the Plant Site sewage treatment and stormwater management.

| Purpose | Plant Site Sewage Treatment System (STS): To collect sewage generated at the Plant Site and to treat sewage generated at both the Plant Site and Mine Site prior to routing to the Flotation Tailings Basin (FTB). Plant Site stormwater management systems: To manage and treat stormwater associated with the Plant Site in compliance with applicable stormwater requirements. |
| Location | The Process Plant Area at the existing former LTV Steel Mining Company (LTVSMC) plant site, south of the Tailings Basin, as well as the Area 1 Shops, Area 1 Locomotive Fueling Facility, Area 2 Shops, Administration Building, Guard Shack, and other associated ancillary facilities (Large Figure 1). |
| Facility description | The Project’s Process Plant and other support facilities are located at the Plant Site. The Plant Site STS will consist of a collection system and stabilization ponds. The Plant Site stormwater management systems will include manholes, catch basins, culverts, ditches, and stormwater ponds. |
| Sewage management and discharge | No direct discharge to the environment. Treated effluent from the Plant Site STS stabilization ponds will be routed to the FTB. (Refer to Volume V for discussion of FTB water management.) |
| Stormwater management and discharge | Plant Site stormwater will discharge off-site either directly or through stormwater ponds. |
| Estimated commission | Infrastructure is existing or will be upgraded or constructed during an estimated 18-24 month pre-operation construction phase prior to Mine Year 1\(^{(1)}\). |

Italicized terms are defined in Table 1-2.

\(^{(1)}\) Mine Year 1 will begin on the first day of production blasting within the open pit at the Mine Site.
This volume is organized in three sections:

Section 1.0 Provides an overview of sewage treatment and stormwater management at the Plant Site and provides the water definitions specific to the volume.

Section 2.0 Describes water management and infrastructure at the Plant Site, including existing conditions, sewage and stormwater management and infrastructure, adaptive management, chemical additives, and an overview of the reclamation, closure, and postclosure maintenance phases.

Section 3.0 Summarizes the proposed monitoring plan for the Plant Site.

In accordance with Minnesota Rules, part 6132.0200, the Plant Site has been designed “to control possible adverse environmental effects of nonferrous metallic mineral mining, to preserve natural resources, and to encourage planning of future land utilization.” The design of the Plant Site includes systems for managing water in a manner that results in compliance with applicable water quality standards at appropriate compliance points (Section 1.1 of Reference (1)). The water management systems have been designed to achieve compliance based on modeling of expected water quantity and quality; additionally, plans have been developed for adaptive management (Section 4.0 of Reference (2) and Section 6.4 of Reference (1)) and contingency mitigation (Section 6.5 of Reference (1)) as deemed necessary to maintain compliance (refer to Section 2.4 of this volume for further discussion).

Water management includes collection and management of sewage and stormwater at the Plant Site. The flow of water associated with the Plant Site is included on Large Figure 4 in Volume I, which depicts the general flow of water throughout the Project. Refer to Sections 2.2 and 2.3 of this volume for further details on the management of sewage and stormwater, respectively.

Table 1-2 provides definitions for the terms process water, sewage, plant reservoir water, industrial stormwater, construction stormwater, and non-contact stormwater, as well as notes regarding the definitions’ application to specific facets of sewage treatment and stormwater management at the Plant Site.

Separate applications will be submitted requesting:

- authorization to discharge stormwater associated with construction activities at the Plant Site under the Minnesota NPDES/SDS Construction Stormwater General Permit (Construction Stormwater General Permit)
- authorization to discharge stormwater associated with industrial activities at the Plant Site under the Minnesota NPDES/SDS Industrial Stormwater General Permit (Industrial Stormwater General Permit)

Refer to Section 2.3 of this volume for further details on the management of stormwater during operations.
<table>
<thead>
<tr>
<th>Project-Specific Term</th>
<th>Project-Wide Definition(^{(1)})</th>
<th>Plant Site Specifics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Water</td>
<td>Water that has been used in the beneficiation process or hydrometallurgical process</td>
<td>(no additions to Project-Wide Definition)</td>
</tr>
<tr>
<td>Sewage</td>
<td>Water collected from sanitary facilities and sedimentation tank and filter backwash waste collected from the Plant Site Potable Water Treatment Plant</td>
<td>Water collected from the Plant Site and Mine Site sanitary facilities and sedimentation tank and filter backwash waste collected from the Plant Site Potable Water Treatment Plant(^{(2)}) for treatment by the Sewage Treatment System (STS). Also, water collected by the Area 1 and Area 2 septic systems.</td>
</tr>
</tbody>
</table>
| Plant Reservoir Water | Water collected and stored within the Plant Reservoir, which includes the following:  
  - water pumped from Colby Lake  
  - precipitation that falls on the Plant Reservoir | (no additions to Project-Wide Definition) |
| Industrial Stormwater | Stormwater associated with industrial activities\(^{(3)}\) | Includes precipitation and runoff from the industrial areas at the Plant Site and, after construction of the Hydrometallurgical Residue Facility (HRF), runoff from portions of the southern exterior of the Tailings Basin dams (Cells 1E and 2W) and the eastern exterior of the HRF dams (if constructed of tailings) which will sheet flow onto the Plant Site. |
| Construction Stormwater | Stormwater associated with construction activities\(^{(4)}\) | (no additions to Project-Wide Definition) |
| Non-Contact Stormwater | Precipitation and runoff that contacts natural, stabilized, or reclaimed surfaces and has not been exposed to mining activities, construction activities\(^{(4)}\), or industrial activities\(^{(3)}\) | (no additions to Project-Wide Definition) |

\(^{(1)}\) If two types of waters mix, the mixture is handled as the more actively managed type of water (e.g., a mixture of non-contact stormwater and industrial stormwater is managed as industrial stormwater). Management of water mixtures will be governed by regulatory requirements.

\(^{(2)}\) The Potable Water Treatment Plant will be covered under a permit from the Minnesota Department of Health; only the waste from the Potable Water Treatment Plant is discussed in this Application.

\(^{(3)}\) As defined in Minnesota Rules, part 7090.0080, subpart 6

\(^{(4)}\) As defined in Minnesota Rules, part 7090.0080, subpart 4

During environmental review, PolyMet developed numerous Management Plans to provide details of the design, construction, operations, reclamation, closure, and postclosure maintenance phases of the Project. The Management Plans rely on and incorporate the results of Data Packages, which are compilations of technical data and related supporting information.
Information from the above-referenced documents, as well as from this and other permit applications and issued permits, will be incorporated into an operations plan for use during the operations, reclamation, closure, and postclosure maintenance phases of the Project. Refer to Section 1.7 of Volume I for a description of the Project phases.

To help the reviewer navigate the supporting material for Volume IV of this Application, Table 1-3 cross references key Plant Site sewage treatment and stormwater-related topics, PolyMet Management Plans and Data Packages, sections of this narrative, and permit application requirements.

Note that some terminology associated with the Waste Water Treatment System (WWTS) has changed since the environmental review process was completed and the NPDES/SDS Permit Application was submitted in July 2016. Changes are associated with the relocation of the mine water treatment trains that were previously planned for the Mine Site Waste Water Treatment Facility, which will now be in the Plant Site WWTS, and the relocation of the Mine Site equalization basins, Central Pumping Station, and Construction Mine Water Basin south of Dunka Road. There is no change to the level of treatment planned for the Project as a result of these relocations. To facilitate the review of documents prepared for the NorthMet Mining Project and Land Exchange Final Environmental Impact Statement (Reference (3)) which are also referenced in this Application, Appendix A explains the WWTS terminology changes.
<table>
<thead>
<tr>
<th>Facility Topic</th>
<th>Location of Relevant Details:</th>
<th>NPDES/SDS Volume IV</th>
<th>Permit Application Form</th>
<th>Application Question(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable Standard Industrial Classification (SIC) Code(s) and/or Narrative Activities</td>
<td></td>
<td></td>
<td>Water Treatment Residual Wastes Application (wq-wwprm7-17)</td>
<td>5</td>
</tr>
<tr>
<td>Existing Conditions</td>
<td></td>
<td></td>
<td>Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
<td>1</td>
</tr>
<tr>
<td>Overall</td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 1.3</td>
<td>Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
<td>1</td>
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<td>Existing Sewage Treatment Infrastructure</td>
<td></td>
<td></td>
<td>MPCA Design Flow and Loading Determination Guidelines for Wastewater Treatment Facilities</td>
<td>Table 3, Table 4, and Table 5</td>
</tr>
<tr>
<td>Existing Stormwater Conditions</td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 2.4</td>
<td>USEPA Form 2S: Application for a Sewage Sludge Permit</td>
<td>Part 2</td>
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<td>Sewage Management and Infrastructure</td>
<td>Overall</td>
<td>Section 2.2</td>
<td>USEPA Form 2S: Application for a Sewage Sludge Permit</td>
<td>Part 2</td>
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<tr>
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<td>NorthMet Project Water Management Plan – Plant (Reference (2))</td>
<td>Section 2.4</td>
<td>Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
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<td></td>
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<td>Section 2.2.1</td>
<td>Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
<td>6, 7, 10</td>
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<td></td>
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<td>Section 2.2.2</td>
<td>Municipal Surface Water Discharge Application (wq-wwprm7-09)</td>
<td>1 through 22</td>
</tr>
<tr>
<td></td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 2.2.3</td>
<td>Water Treatment Residual Wastes Application (wq-wwprm7-17)</td>
<td>1 through 15</td>
</tr>
<tr>
<td></td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 2.5</td>
<td>Water Treatment Media Filter Attachment (wq-wwprm7-45)</td>
<td>1 through 13</td>
</tr>
<tr>
<td>Stormwater Management and Infrastructure</td>
<td>Overall</td>
<td>Sections 2.6 and 4.2</td>
<td>Industrial Chemical Additives Attachment (wq-wwprm7-48)</td>
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<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 2.3</td>
<td>Water Treatment Residual Wastes Application (wq-wwprm7-17)</td>
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<td>Section 1.4.1</td>
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<td>Section 2.3.2</td>
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<td></td>
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<tr>
<td></td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 2.4</td>
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<td></td>
<td>NorthMet Project Water Management Plan (Reference (2))</td>
<td>Section 4.0</td>
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Table 1-3 Volume IV of PolyMet’s NPDES/SDS Permit Application Cross-Reference
<table>
<thead>
<tr>
<th>Facility Topic</th>
<th>Location of Relevant Details: Management Plan / Data Package</th>
<th>NPDES/SDS Volume IV</th>
<th>Permit Application Form</th>
<th>Application Question(1)</th>
</tr>
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<tr>
<td>Overview of the Reclamation, Closure, and Postclosure Maintenance Phases</td>
<td>NorthMet Project Water Modeling Data Package Volume 2 – Plant Site (Reference (4))</td>
<td>Section 2.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring</td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 4.5</td>
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<td></td>
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<td>Baseline Surface Water Monitoring</td>
<td>NorthMet Project Water Modeling Data Package Volume 2 – Plant Site (Reference (4))</td>
<td>Section 1.4.1</td>
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<tr>
<td>Baseline Groundwater Monitoring</td>
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<td>Section 4.3.4.1</td>
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<tr>
<td>Proposed Monitoring Plan</td>
<td>NorthMet Project Water Management Plan – Plant (Reference (1))</td>
<td>Section 1.4.2</td>
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<td></td>
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<td>Section 3.2 Water Treatment Residual Wastes Application (wq-wwprm7-17)</td>
<td></td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Gray shading indicates no corresponding reference material

(1) Municipal Surface Water Discharge Application (wq-wwprm7-09) questions 12 through 20 address pretreatment and sampling requirements; these requirements are not applicable to the facility, therefore these questions are not listed here.
2.0 Plant Site Water Management and Infrastructure

This section focuses on water management associated with sewage treatment and stormwater at the Plant Site during operations, specifically during the period covered by this Application (approximately Mine Years 1 through 5). The following sub-sections describe:

- the existing site conditions (Section 2.1)
- the water management systems related to sewage (Section 2.2)
- the stormwater management systems (Section 2.3)
- the adaptive management approach that can be used to modify Plant Site water management systems in response to site-specific conditions encountered during operations (Section 2.4)
- chemical additives proposed for use at the Plant Site (Section 2.5)
- an overview of plans for the reclamation, closure, and postclosure maintenance phases (Section 2.6)

Permit application support drawings for Plant Site water management systems are included in Appendix B.

2.1 Existing Conditions

The Plant Site will be located at the existing plant site previously owned and operated by LTVSMC. The Plant Site was previously used for processing of taconite iron ore; much of the existing facility infrastructure will be refurbished for the Project operations. Section 2.1.1 describes existing sewage management infrastructure, and Section 2.1.2 describes existing stormwater conditions. Other existing Plant Site infrastructure relevant to management of sewage and stormwater that will be reused includes the following:

- existing buildings for crushing and concentration operations
- Area 1 Shops and Locomotive Fueling Facility and Area 2 Shops
- Administration Building and Guard Shack
- supporting infrastructure (such as roads, electrical supply, and rail connections)
- potable water treatment plant near the Plant Reservoir and potable water distribution system which extends to Area 1 Shops and Locomotive Fueling Facility and Area 2 Shops

2.1.1 Existing Sewage Treatment Infrastructure

Prior to the closure of the LTVSMC taconite processing facility in 2001, a sewage treatment system was used to treat domestic wastes generated from restrooms, shower facilities, and a lunchroom area, as well
as waste water from the Heating Plant and the potable water treatment plant. The LTVSMC sewage treatment system consisted of two parts: a collection system and a mechanical sewage treatment plant. Originally, this system was designed to discharge treated effluent from the treatment plant into a ditch that flowed to Second Creek. A pump station was later added to re-route the treated effluent to the northeast into the Emergency Basin.

After the LTVSMC facility ceased taconite operations, the mechanical sewage treatment plant was decommissioned. Its former location is shown on Large Figure 2. Sewage generated by the few employees at the Administration Building is currently routed to a septic system that was added in 2001.

The existing sewage collection system is primarily original (1955) construction consisting of sanitary sewer piping and manholes extending throughout the Process Plant.

### 2.1.2 Existing Stormwater Conditions

The watershed divide between the Embarrass River watershed and the Partridge River watershed cuts across the northern portion of the Process Plant Area, as shown on Large Figure 2. Stormwater falling in the Embarrass River watershed generally drains to the north, and stormwater falling in the Partridge River watershed generally drains to the south. The existing LTVSMC tailings basin is located north of the Process Plant Area and mostly within the Embarrass River watershed; for additional information on existing stormwater conditions at the Tailings Basin, refer to Section 2.1.2 of Volume V.

The Process Plant Area is divided into two subwatershed areas within the Partridge River watershed: the West Plant subwatershed and the East Plant subwatershed. The West Plant and East Plant subwatershed areas (as shown on Large Figure 2) drain south toward Second Creek. Area 1 and Area 2 are also located within the Second Creek subwatershed. Drainage patterns in these areas are dominated by railroad embankments of the extensive track system serving the Process Plant.

Stormwater from the Process Plant Area is currently covered under Cliffs Erie NPDES/SDS Permits MN0054089 and MN0042536. No stormwater outfalls or monitoring requirements are specified under the terms of these permits. Locations of existing stormwater outfalls are shown on Large Figure 2. Most of the existing stormwater infrastructure at the Plant Site has been filled or partially filled with sediment.

The West Plant subwatershed includes the majority of the existing buildings and other infrastructure at the Process Plant, as shown on Large Figure 2. Water from many original building floor drains was either discharged to the stormwater system or combined with roof drainage and collected for use in taconite processing. Since LTVSMC processing ceased, water from building floor drains and roof drains has been routed to the Emergency Basin (which is in the Embarrass River watershed). Stormwater from the West Plant is routed through a series of ditches, culverts, manholes, catch basins, ponds, and pipes to a large stormwater ditch in the southwest corner of the Plant Site before being discharged off-site to a system of ditches tributary to Second Creek.
The East Plant subwatershed includes some existing buildings, but is more vegetated than the West Plant subwatershed, as shown on Large Figure 2. *Stormwater* from the East Plant is routed through a series of ditches and culverts before being discharged off-site to a system of ditches tributary to Second Creek.

Area 1 includes the Area 1 Shops and Locomotive Fueling Facility, as well as a number of rail lines. Area 2 includes the Area 2 Shops, Area 2 Water Tower, a number of rail lines, and a portion of Dunka Road. *Stormwater* generally flows from these areas as dispersed sheetflow or is routed through a series of ditches and culverts to tributaries of Second Creek.

Refer to Section 3.1 of this volume for discussion of baseline surface water quality.

### 2.2 Sewage Management and Infrastructure

This section summarizes the design and operation of the infrastructure that will be used to manage *sewage* at the Plant Site in accordance with applicable regulations. This infrastructure will be constructed or upgraded from existing conditions prior to commencement of Project operations. Details regarding the design of the Sewage Treatment System (STS) are provided in Appendix C and the Plant Site Sewage Treatment Permit Application Support Drawings are included in Appendix B. *Sewage* will be generated at various buildings in the Process Plant, Administration Building, Area 1 Shops and Locomotive Fueling Facility, and Area 2 Shops. Additionally, the *sewage* generated at the Mine Site will be handled in holding tanks and transported to the Plant Site for treatment and disposal.

At the Process Plant, PolyMet will operate a STS: the existing sewage collection system will be refurbished and new stabilization ponds will be constructed. Initially, the system will be designed for average daily flow of approximately 8,500 gallons per day (gpd) and average wet weather flow of approximately 21,500 gpd. The system may be expanded in the future if the workforce expands, as described in Appendix C. *Sewage* from the Administration Building will be routed to the STS. At the Area 1 and Area 2 Shops, PolyMet will operate septic systems. Permit application support drawings for the STS are included in Appendix B.

The following subsections describe the design and operation of the major components of the STS, which include the sewage collection system (Section 2.2.1) and the stabilization ponds (Section 2.2.2). Septic systems at the Area 1 and Area 2 Shops will be covered under a St. Louis County Subsurface Sewage Treatment System Permit, and thus are not discussed further in this Application.

#### 2.2.1 Sewage Collection System

The existing sewage collection system will be refurbished to meet current regulatory standards to properly transport *sewage* to the stabilization ponds. Existing piping will be refurbished to minimize infiltration and inflow to the collection system. New piping and associated infrastructure will also be added to connect new Plant Site facilities to the collection system and the stabilization ponds.
In addition to sewage, sedimentation tank and filter backwash waste from the Plant Site Potable Water Treatment Plant (as described in Section 2.2.3 of this volume) will be routed to the sewage collection system.

### 2.2.2 Stabilization Ponds

Stabilization ponds will be constructed to treat Project sewage. Approximate locations of the stabilization ponds, which will be located northwest of the Southwest Pond, are shown in Large Figure 3 and Large Figure 4.

The stabilization ponds will be designed in accordance with the Minnesota Pollution Control Agency (MPCA) Recommended Pond Design Criteria (Reference (5)) and will include lined ponds and a controlled discharge. The proposed stabilization ponds will consist of two primary ponds and one secondary pond with operating depths of approximately four feet. The secondary pond will discharge to the Flotation Tailings Basin (FTB) Pond via a pump station. The controlled discharge will occur in the spring and fall of each year. Each controlled discharge will typically last 10 to 14 days, depending on weather conditions. STS treated water will represent around 0.1% of the inflow to the FTB Pond (Section 6.1 of Reference (4)). FTB water management is described in Volume V. Seepage from the FTB will be collected and returned to the pond or treated at the WWTS, which is described in Volume III.

### 2.2.3 Potable Water Treatment Plant

The Plant Site Potable Water Treatment Plant will route sedimentation tank and filter backwash waste to the STS. This waste stream is expected to consist of settled solids, iron and manganese precipitates sludge, and backwash sludge. These constituents will be effectively removed by treatment in the stabilization ponds. The volume of this waste stream is estimated to be 100 gpd. The STS has been sized to accommodate waste streams from the Potable Water Treatment Plant. There is an existing Plant Site Potable Water Treatment Plant and the location (shown on Large Figure 2) will not change. Only the waste from the Plant Site Potable Water Treatment Plant is within the scope of this permit; PolyMet will apply for a Minnesota Department of Health permit for the operation of the Plant Site Potable Water Treatment System.

### 2.3 Stormwater Management and Infrastructure

This section describes the management of stormwater at the Plant Site, including best management practices (BMPs) and the design and operation of the infrastructure that will be used to manage stormwater in accordance with applicable regulations.

Consistent with the overall Project approach (Table 1-2 of this volume), stormwater at the Plant Site is defined in three categories:

- *construction stormwater*, which consists of stormwater associated with construction activities
- *industrial stormwater*, which consists of stormwater associated with industrial activities
• non-contact stormwater, which consists of precipitation and runoff that contacts natural, stabilized, or reclaimed surfaces and has not been exposed to mining activities, construction activities, or industrial activities.

Stormwater infrastructure will be constructed or upgraded from existing conditions as necessary prior to commencement of Project operations. As discussed in Section 1.0 of this volume, a separate application is being submitted requesting authorization to discharge stormwater associated with construction activities at the Plant Site under the Construction Stormwater General Permit. While these activities will be associated with the separate Construction Stormwater General Permit program, an overview of PolyMet’s plan for management of construction stormwater is included here as additional background. Stormwater associated with construction activities will be managed with controls and BMPs, including erosion and sediment control measures, construction water management control measures, dust control measures, and construction site restoration practices. Prior to the start of each phase of construction activities, these management measures will be incorporated into a Construction Stormwater Pollution Prevention Plan (SWPPP) based on detailed construction plans and in accordance with Construction Stormwater General Permit requirements. In order to meet the permanent stormwater management requirements of the Construction Stormwater General Permit, additional stormwater features beyond those discussed herein may be included in final engineering designs and subsequently added to the Construction SWPPP.

Also, as discussed in Section 1.0 of this volume, a separate application is being submitted requesting authorization to discharge stormwater associated with industrial activities at the Plant Site under the Industrial Stormwater General Permit. While these activities will be associated with the separate Industrial Stormwater General Permit program, an overview of PolyMet’s plan for management of industrial stormwater is included here as additional background. PolyMet will develop and implement an Industrial SWPPP in accordance with Industrial Stormwater General Permit requirements, which will incorporate and expand upon the discussions in this section.

During initial operations, subwatershed divides in the Process Plant Area will remain unchanged from existing conditions, as shown on Large Figure 3. However, over the course of operations, construction of the FTB and the HRF, and changes in stormwater management for Process Plant buildings will modify the Process Plant Area subwatershed divides. Some of these changes will take place beyond the time period covered by this Application; however, for context, the end-of-operations subwatershed configuration, when the HRF and the FTB are both fully constructed, is shown in Large Figure 4.

Stormwater management during operations for Plant Site subwatersheds in the Embarrass River watershed is covered in Volume V (Tailings Basin) and Volume VI (HRF). Stormwater management during operations for Plant Site subwatersheds in the Partridge River watershed is described in this section. Stormwater conditions during operations will be changed from existing conditions as follows:

• Construction of the HRF will prevent some stormwater from following the existing drainage pattern to the northwest, toward the Embarrass River. This stormwater will be rerouted to flow
south into the West Plant subwatershed. West Plant stormwater infrastructure will be designed to handle the additional flow for eventual discharge to tributaries of Second Creek.

- Roof drainage from Plant Site buildings will no longer be discharged to the Emergency Basin. As part of the Plant Site renovations and design of new buildings, roof drainage will be rerouted and managed as stormwater within the West Plant and East Plant subwatersheds. Downstream Plant Site stormwater infrastructure will be designed to handle this additional flow.

- Water collected in building floor drains will no longer be discharged with stormwater. Instead, water from floor drains will be routed to the overflow collection system (the re-purposed existing process water collection system) to be reused in the process or pumped to the FTB. (Refer to Section 2.3.3 of this volume for further discussion.)

Plant Site stormwater infrastructure (described in Section 2.3.2) will take into account these changes to existing stormwater drainage patterns, stormwater handling, and the potential for stormwater to contact significant materials (Section 2.3.1).

### 2.3.1 Significant Materials

Significant materials are defined by 40 CFR § 122.26(b)(12) as including, but not limited to:

“raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); any chemical the facility is required to report pursuant to Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA); fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.”

Stormwater may come into contact with significant materials at the Plant Site and will be managed throughout the life of the Project using appropriate BMPs, including engineered controls and spill prevention and response procedures, to reduce or eliminate contact or exposure of pollutants to stormwater or remove pollutants from stormwater.

### 2.3.2 Stormwater Infrastructure

To manage stormwater in the West Plant, East Plant, Area 1, and Area 2 subwatersheds, existing stormwater infrastructure will be repaired and upgraded, and new infrastructure will be added where necessary. Most of the existing stormwater infrastructure at the Plant Site is in poor condition, and with the proposed changes to Project drainage patterns much of it is undersized to handle the additional stormwater flow expected during operations.

Plant Site stormwater infrastructure is designed to handle storm events in excess of those required under the Industrial Stormwater General Permit, which requires stormwater ponds be designed to store and treat a 5-year storm event and eliminate scour and resuspension for up to the 10-year storm event. In
general, the Plant Site stormwater system is designed to routinely handle flows associated with the 10-year, 24-hour storm event with some features upsized to avoid impacts up to the 100-year, 24-hour storm.

The design storm events were chosen using best engineering judgment, in consultation with the regulatory agencies, based on the level of risk associated with an overflow and the capital costs and environmental impacts associated with larger facilities (e.g., larger or deeper ponds) that could handle additional capacity. Risk was evaluated qualitatively based on the likelihood of flows larger than the design storm event over the life of the infrastructure and the level of hazard represented by the potential quantity and water quality of the runoff associated with a storm larger than the design storm event.

Large Table 1 summarizes the objectives, design criteria, and rationale used to design the Plant Site stormwater infrastructure. Plant Site Stormwater Permit Application Support Drawings are included in Appendix B. Detailed design of Plant Site stormwater infrastructure will be developed for approval with the Industrial SWPPP.

Infrastructure that will be reused will be cleaned out and inspected for damage that may impact the capacity or necessary life of the structure. The majority of the infrastructure will likely be removed and replaced. Many of the ditches need to be excavated deeper and/or wider than they currently are to restore or increase capacity.

2.3.2.1 West Plant Site

Stormwater improvements in the West Plant subwatershed will include repairing and/or replacing existing drainage features, re-sizing stormwater infrastructure where necessary, and constructing new stormwater ditches, pipes, and ponds (Section 2.6.3.3 of Reference (1)). Three stormwater ponds are planned: the North Stormwater Pond, the Central Stormwater Pond, and the Southwest Stormwater Pond. The approximate locations of the Plant Site stormwater ponds are shown on Large Figure 3 and Large Figure 4 for the Process Plant Area layout in Mine Year 1 and Mine Year 20, respectively.

Stormwater from the West Plant subwatershed will be routed to the stormwater ponds through a series of ditches, culverts, manholes, catch basins, and pipes and then will be generally routed from north to south through ponds, ditches, and pipes (Section 2.6.3.3 of Reference (1)). The North Stormwater Pond will be constructed west of the Concentrator, and the Central Stormwater Pond will be constructed west of the future Oxygen Plant. Currently, there is a small depression that holds water in the future location of the Central Stormwater Pond. Stormwater from the North Stormwater Pond and Central Stormwater Pond will be routed to the Southwest Stormwater Pond, the largest and the last pond that stormwater from the West Plant will flow through before discharging off-site. The Southwest Stormwater Pond will be located in the southwest corner of the Plant Site where there currently is a long, wide ditch. A series of weirs or ditch blocks will be used to create a pond in this location, and this ditch may be widened to the west if additional capacity is necessary. Water from the Southwest Stormwater Pond will flow off-site to the south through a culvert under the railroad grade as shown on Large Figure 3 and Large Figure 4. This culvert discharges to a system of ditches tributary to Second Creek.
As the HRF is constructed, additional stormwater ditches and culverts will be constructed to route stormwater from the areas south and east of the HRF into the West Plant stormwater system. The new stormwater infrastructure will be in place before the HRF foundation blocks any stormwater flow that could result in changed drainage patterns.

### 2.3.2.2 East Plant Site

Stormwater improvements in the East Plant subwatershed will consist primarily of repairing and/or replacing existing site drainage features and re-sizing stormwater infrastructure where required (Section 2.6.3.4 of Reference (1)). Existing infrastructure will be cleaned out and reused, or removed and replaced, as necessary. Stormwater ditches will be reestablished to provide the full drainage capacity as originally designed or up-sized as necessary. There are no existing stormwater ponds associated with the East Plant, and no future need is anticipated for stormwater ponds to manage stormwater from the East Plant due to the existing vegetated swales which will naturally treat for total suspended solids (TSS).

Stormwater from the East Plant subwatershed will be routed through ditches and culverts before being discharged off-site. There are currently two locations where stormwater leaves the East Plant via culverts; both of these locations will be maintained as stormwater outfalls as shown on Large Figure 3 and Large Figure 4. These culverts discharge to a system of ditches tributary to Second Creek.

### 2.3.2.3 Areas 1 and 2

In Area 1, existing stormwater ditches and culverts will generally be adequate to manage stormwater during operations. These systems will be cleaned out and reused, or removed and replaced, as necessary, to maintain the existing drainage patterns to the extent practical (Section 2.6.3.5 of Reference (1)). PolyMet will maintain these systems throughout operations.

In Area 2, in the vicinity of the Area 2 shops and along Dunka Road and the railroad corridor, existing stormwater ditches and culverts will generally be adequate to manage stormwater during operations. These systems will be cleaned out and reused, or removed and replaced, as necessary, to maintain the existing drainage patterns to the extent practical (Section 2.6.3.5 of Reference (1)). PolyMet will maintain these systems throughout operations.

### 2.3.3 Floor Drains and Foundation Drains

Some of the existing building floor drains currently discharge to the stormwater system. Because the Industrial Stormwater General Permit does not allow floor drains from process areas to be discharged as stormwater, any existing floor drains that are currently routed to the stormwater system will be permanently blocked, and this water will be re-routed to the existing overflow collection system within the buildings to be reused in the beneficitation process.

Currently, water from concentrator foundation drains and French drains along the tunnel system are collected in a large sump west of the Concentrator. Water collected in this sump discharges through the Emergency Drainage Tunnel to the Emergency Basin. The Emergency Drainage Tunnel will be blocked at a manhole west of the large sump as part of the Project development, and this foundation drain water will
be re-directed to the overflow collection system to be reused in the process or pumped to the FTB. This sump also currently collects water from the thickeners, the roof, and floor drains in this area. As part of Project development, the thickeners will be decommissioned and cleaned out, and runoff from the roofs and remaining decommissioned thickeners will be re-directed to surface stormwater.

### 2.4 Adaptive Management

The Plant Site water management systems have been designed to achieve compliance based on modeling of expected water quantity and quality. As described in Section 1.6 of Volume I, if water quality objectives are not met by these engineering controls, PolyMet will use an adaptive management approach, as necessary, to improve performance. As part of the adaptive management approach at the Plant Site, studies will first be undertaken to determine the root cause of the problem. Second, the design or operation of existing (or planned) Project engineering controls will be modified to remedy the root cause. Third, if modifying the design or operation of Project engineering controls is not sufficient, then contingency mitigation actions will be taken. Fourth, outcomes will be monitored and may be evaluated with water modeling. This process is meant to be iterative and will be repeated as necessary. The process for implementing adaptive management at the Plant Site is described in Section 6.4 of Reference (1) and Section 4.0 of Reference (2). Potential contingency mitigation actions are described in Section 6.5 of Reference (1).

### 2.5 Chemical Additives

Chemical additives, specifically chemical dust suppressants, will be used to control fugitive dust emissions from unpaved roads within the Plant Site and to prevent sedimentation and entrainment of dust in stormwater and nearby water bodies. Chemical dust suppression will be used to bind the dust to the unpaved roads. Dust suppressants are typically applied approximately one time per year and watered as necessary to reactivate the binding agents in the dust suppressant chemicals.

In order to mitigate potential environmental transport of the applied suppressants, BMPs will be implemented when calculating usage rates and applying products. The U.S. Environmental Protection Agency (Reference (6)) and MPCA (Reference (7)) provide guidance on the BMPs associated with the usage of chemical dust suppressants. Adherence to usage BMPs will limit the off-site transport of chemical additives. For example, information from vendors and/or field trials and usage will allow for optimization of application rates, application frequency, and the water dilution to product ratio, so that only the minimum amount of treatment needed to achieve successful dust suppression will be applied to surfaces. Optimizing treatment will result in minimization of pooling, runoff, and costs. Chemical dust suppressants will not be applied immediately adjacent to water bodies or when it is raining or when rain is imminent. Other BMPs for application and usage of chemical dust suppressants will be used when applicable.

Refer to Volumes V and VI for a detailed discussion of the chemical additives that will be used in the Beneficiation Plant and Hydrometallurgical Plant at the Plant Site. Several chemical additives will also be used in the water treatment process at the Plant Site Potable Water Treatment Plant. Specifically, these water treatment chemicals will be used to facilitate flocculation, filtration, sedimentation, and disinfection.
processes; these chemicals will remain in potable water until consumed or will be routed to the stabilization ponds (described in Section 2.2.2 of this volume) for removal. Chemical doses and usage rates will be optimized during startup and operation.

Additional information regarding each proposed chemical additive is included in Large Table 2. Additionally, Safety Data Sheets and product information labels for each proposed chemical additive are included in Appendix D. Based on project economics and the availability of specific products, chemical additives may be acquired from multiple manufacturers provided that the chemical additive is commensurate with the use proposed within this application. Several different dust suppressant products are listed, and the decision on which product to use will be determined and reevaluated throughout the Project.

2.6 Overview of the Reclamation, Closure, and Postclosure Maintenance Phases

While the activities described in this section are beyond the scope of the first NPDES/SDS permit term, an overview of the activities associated with the reclamation, closure, and postclosure maintenance phases, which are estimated to begin in Mine Years 21, 25, and 55, respectively, are provided here as additional background.

Reclamation activities in the Process Plant Area, Area 1, and Area 2 will begin after mining ceases in Mine Year 20. Plant Site buildings not needed to support Project activities in the reclamation, closure, and postclosure maintenance phases will be demolished, and two feet of overburden material suitable for vegetation will be placed upon the facility's former footprint. Plant area roads that are deemed not necessary for access by the Minnesota Department of Natural Resources Commissioner will be scarified and vegetated. Building areas, roads, and parking lots will be reclaimed and vegetated according to Minnesota Rules, part 6132.2700. Rail line reclamation will be as described in Section 2.5 of Volume VII.

Where roads and railroads will be abandoned, culverts will be removed to prevent potential flow obstruction due to clogged or dammed culverts and to minimize impediments to access and movement in the stream by aquatic life. Any culverts requiring removal will be replaced with channels; culvert locations will be graded and vegetated to provide a stable stream bank approximating a natural channel and floodplain configuration.
3.0 Plant Site Monitoring

Monitoring of baseline water quality and quantity has been ongoing in the vicinity of the Plant Site. As the Project commences, monitoring will continue at specific locations for a variety of purposes, including compliance with this permit.

3.1 Existing Baseline Monitoring

The Plant Site is primarily located in the Second Creek watershed, a subwatershed of the Partridge River watershed. Section 3.1 of Volume V discusses existing baseline monitoring of surface water and groundwater in the vicinity of the Tailings Basin, which also includes surface water monitoring of Second Creek. Monitoring has been conducted at the existing surface water locations shown on Large Figure 2.

3.2 Proposed Monitoring Plan

Monitoring proposed as part of permit requirements for the Plant Site is included in the integrated Plant Site monitoring plan presented in Section 3.0 of Volume I. Additionally, stormwater inspections and monitoring will occur in accordance with the Construction Stormwater General Permit and the Industrial Stormwater General Permit; the details associated with stormwater inspection and monitoring will be specified in the respective SWPPPs.
4.0 References


Large Tables
<table>
<thead>
<tr>
<th>Structure</th>
<th>Objectives</th>
<th>Design Criteria and Assumptions</th>
<th>Design Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ditches, Pipes, Manholes, and Other Infrastructure</td>
<td>Convey runoff from industrial areas and natural areas within Plant Site to stormwater ponds</td>
<td>Contain and convey peak flows associated with 10-year, 24-hour storm event</td>
<td>Manage stormwater runoff</td>
</tr>
<tr>
<td></td>
<td>Intercept stormwater prior to reaching other water management areas (Hydrometallurgical Residue Facility (HRF), Flotation Tailings Basin (FTB), Sewage Treatment System (STS)) and flooding Plant Site buildings</td>
<td>Manage stormwater runoff with ditches, dikes, and other infrastructure up to the 100-year, 24-hour storm event</td>
<td>Avoid stormwater mixing with other water types to minimize the need for treatment other than for total suspended solids (TSS)</td>
</tr>
<tr>
<td></td>
<td>Limit erosion</td>
<td>Install riprap, drop structures, or other best management practices (BMPs) in ditch sections where flow velocities are greater than 4 feet per second during the 10-year, 24-hour storm</td>
<td>Protect infrastructure and reduce TSS in runoff</td>
</tr>
<tr>
<td>Ponds</td>
<td>Control the conveyance of stormwater off-site to avoid significant localized increases in peak flows to Second Creek and its tributaries</td>
<td>Provide storage and conveyance of peak flows and volumes associated with 10-year, 24-hour storm event through the primary pond outlet</td>
<td>Manage stormwater runoff</td>
</tr>
<tr>
<td></td>
<td>Reduce TSS concentration in stormwater discharged from the Plant Site</td>
<td>Size ponds to provide residence time needed to meet 100 mg/L TSS storm event benchmark limit for up to the 100-year, 24-hour storm event</td>
<td>Comply with expected individual permit requirements; 100 mg/L TSS benchmark limit is defined by the Minnesota NPDES/SDS Industrial Stormwater General Permit</td>
</tr>
<tr>
<td></td>
<td>Manage stormwater runoff to avoid overflows into other water management areas (HRF, FTB, STS)</td>
<td>Size ponds to manage, control, and convey stormwater runoff up to the 100-year, 24-hour storm event</td>
<td>Avoid stormwater mixing with other water types</td>
</tr>
<tr>
<td>Chemical</td>
<td>Purpose</td>
<td>Location of chemical addition in process</td>
<td>Amount/duration/ frequency of addition</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>----------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>BT-205W Anionic / Nonionic Surfactant Blend (Primary)</td>
<td>Dust suppressant</td>
<td>Conveyor transfer points</td>
<td>No average use planned. For maximum use: spray on conveyor transfer points 1 time per year, as needed (if needed, this will be a winter application)</td>
</tr>
<tr>
<td>BT-668 Polysaccharide Surfactant Blend (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Conveyor transfer points</td>
<td>No average use planned. For maximum use: spray on conveyor transfer points 1 time per year, as needed (if needed, this will be a winter application)</td>
</tr>
<tr>
<td>Magnesium Chloride Aqueous Solution (Dustgard) (Primary)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td>Roadsave®-C (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td>Roadsave® (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td>Chemical</td>
<td>Purpose</td>
<td>Location of chemical addition in process</td>
<td>Amount/duration/frequency of addition</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td><strong>Durasoil</strong> (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td><strong>Gorilla-Snot</strong> (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td><strong>Soiltac</strong> (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td><strong>Coherex</strong> (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td><strong>BT-468 Aqueous Amorphous Polymer Solution</strong> (Potential Substitute)</td>
<td>Dust suppressant</td>
<td>Haul roads</td>
<td>For average use: main roads will be sprayed twice per year and minor roads once per year For maximum use: roads will be sprayed 3 times per year</td>
</tr>
<tr>
<td>Chemical</td>
<td>Purpose</td>
<td>Location of chemical addition in process</td>
<td>Amount/duration/ frequency of addition</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Calcium Chloride (Primary)</td>
<td>De-icer</td>
<td>Walkways, haul roads</td>
<td>No average use planned</td>
</tr>
<tr>
<td>Liquid Alum (Primary)</td>
<td>Coagulant</td>
<td>Sewage Treatment System Stabilization Ponds</td>
<td>Slug addition three times per year. Usage rates are based on assumed coagulant dosage. Exact needs will be determined through sampling</td>
</tr>
<tr>
<td>Chlorine (Primary)</td>
<td>Disinfectant</td>
<td>Filter and Clearwell</td>
<td>Continuous</td>
</tr>
<tr>
<td>Aluminum Sulfate, 50% Solution (Primary)</td>
<td>Coagulant</td>
<td>Flocculator</td>
<td>Continuous</td>
</tr>
<tr>
<td>Potassium Permanganate (Primary)</td>
<td>Oxidant</td>
<td>Flocculator</td>
<td>Continuous</td>
</tr>
<tr>
<td>Ammonia (Primary)</td>
<td>Disinfectant (Chloramines)</td>
<td>Clearwell</td>
<td>Continuous (as needed)</td>
</tr>
</tbody>
</table>
Large Figures
SITE LOCATION
NorthMet Project
Poly Met Mining, Inc.

NPDES/SDS Permit Application Volume IV:
Plant Site Sewage Treatment and Stormwater Permit Application Update – October 2017

Legend:
- EIS Project Areas
- Existing Tailings Basin
- Proposed Railroad
- Existing Private Railroad
- Public Waters Inventory (PWI) Watercourses
- National Hydrography Dataset (NHD) Rivers & Streams

Note: Due to previous disturbance, both data sources may show watercourses that no longer exist.

1 These are provisional representations of PWI watercourses found on the current paper regulatory maps.
2 The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from LiDAR 24K Streams and 1:24,000 USGS quadrangle maps.
These are provisional representations of PWI watercourses found on the current paper regulatory maps. The NHD is a feature-based database that interconnects and uniquely identifies the stream segments or reaches that make up the nation's surface water drainage system. NHD features are created from MNR's 24K Streams and 1:24,000 USGS quad maps. Note: Due to previous development, both data sources may show watercourses that no longer exist. Imagery Source: 2018 St. Louis County Pictometry.

PROCCESS PLANT AREA
AND AREAS 1 AND 2 - MINE YEAR 20
NorthMet Project
Poly Met Mining, Inc.

Large Figure 4
NPDES/SDS Permit Application Volume IV:
Plant Site Sewage Treatment and Stormwater Permit Application Update – October 2017
Appendices
Appendix A

Waste Water Treatment System Terminology Changes
Appendix A  Waste Water Treatment System Terminology Changes

Some terminology associated with the Waste Water Treatment System (WWTS) has changed since the environmental review process was completed and the NPDES/SDS Permit Application was submitted in July 2016. Changes are associated with the relocation of the mine water treatment trains that were previously planned for the Mine Site Waste Water Treatment Facility (WWTF), which will now be in the Plant Site WWTS, and the relocation of the Mine Site equalization basins, Central Pumping Station (CPS), and Construction Mine Water Basin south of Dunka Road. There is no change to the level of treatment planned for the Project as a result of these relocations.

To facilitate the review of documents prepared for the NorthMet Mining Project and Land Exchange Final Environmental Impact Statement (FEIS) which are also referenced in this NPDES/SDS Permit Application, the following table explains WWTS terminology changes.

<table>
<thead>
<tr>
<th>Former Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Water Treatment Plant (WWTP) and Waste Water Treatment Facility (WWTF)</td>
<td>Waste Water Treatment System (WWTS) (1)</td>
</tr>
<tr>
<td>Treated Water Pipeline</td>
<td>As a whole:</td>
</tr>
<tr>
<td></td>
<td>• Mine to Plant Pipelines (MPP)</td>
</tr>
<tr>
<td></td>
<td>Three individual pipes:</td>
</tr>
<tr>
<td></td>
<td>• Construction Mine Water Pipeline</td>
</tr>
<tr>
<td></td>
<td>• Low Concentration Mine Water Pipeline</td>
</tr>
<tr>
<td></td>
<td>• High Concentration Mine Water Pipeline</td>
</tr>
<tr>
<td>Construction Mine Water Basin</td>
<td>Construction Mine Water Basin</td>
</tr>
<tr>
<td>West Equalization Basin</td>
<td>High Concentration Equalization Basin (HCEQ Basin)</td>
</tr>
<tr>
<td>East Equalization Basin 1</td>
<td>Low Concentration Equalization Basin 1 (LCEQ Basin 1)</td>
</tr>
<tr>
<td>East Equalization Basin 2</td>
<td>Low Concentration Equalization Basin 2 (LCEQ Basin 2)</td>
</tr>
<tr>
<td>WWTP effluent (discharged to receiving waters)</td>
<td>WWTS discharge</td>
</tr>
<tr>
<td>WWTF effluent (sent to the FTB via the Central Pumping Station)</td>
<td>Treated mine water (3) (WWTS stream pumped to the FTB)</td>
</tr>
<tr>
<td>Treated mine water (2)</td>
<td>Treated mine water (3)</td>
</tr>
<tr>
<td>Central Pumping Station</td>
<td>Central Pumping Station</td>
</tr>
<tr>
<td>--</td>
<td>Equalization Basin Area (4)</td>
</tr>
<tr>
<td>Splitter Structure</td>
<td>This structure will be integrated into the Central Pumping Station.</td>
</tr>
<tr>
<td>Central Pumping Station (CPS) Pond</td>
<td>This pond no longer exists.</td>
</tr>
</tbody>
</table>

(1) The two sets of treatment trains that were previously at two locations will now be housed under one roof at the Plant Site.
(2) “Treated mine water” formerly included WWTF effluent, OSLA runoff, and construction mine water and was all sent to the FTB.
(3) “Treated mine water” now consists of effluent from the chemical precipitation and membrane filtration portion of the WWTS that are sent to the FTB.
(4) New term describing pond area south of Dunka Road.
Appendix B

Permit Application Support Drawings

Plant Site Stormwater
Plant Site Sewage Treatment
Plant Site Stormwater Permit Application Support Drawings
Plant Site Sewage Treatment Permit Application Support Drawings
POLY MET MINING, INC. NORTHMET PROJECT
PERMIT APPLICATION SUPPORT DRAWINGS
SEWAGE TREATMENT SYSTEM
HOYT LAKES, MINNESOTA
Appendix C

Plant Site Sewage Treatment System Permit-Level Design
Design Basis Memorandum

To: Christie Kearney, Poly Met Mining, Inc.
From: Jon Minne
Subject: Plant Site Sewage Treatment System Permit-Level Design
Date: July 11, 2016

1.0 Introduction

Poly Met Mining, Inc. (PolyMet) plans to update the sanitary sewage treatment system at the former LTV Steel Mining Company (LTVSMC) process plant as part of re-opening the facilities as the NorthMet Project (Project) Plant Site. When LTVSMC ceased taconite operations in 2001, the mechanical sanitary sewage treatment facility at the site was retired. Currently, only a small number of administrative employees work at the site, and domestic sewage from the administration building is routed to a septic tank and drain field.

The decommissioned mechanical sanitary sewage treatment facility remains on-site, but PolyMet has determined that, due to the age and condition of the system, the existing collection system will require thorough review and refurbishment and the existing treatment facility is inoperable and will need to be replaced. After assessing various alternatives, PolyMet plans to replace the mechanical treatment plant with a stabilization pond system. This design basis memorandum provides a description of the plan for the NorthMet Plant Site Sewage Treatment System (STS) (Section 2.0) and an overview of STS design (Section 3.0).

2.0 Design Basis

The sewage flows and loadings for the STS have been estimated based on typical design values for industrial facilities, predictive future flows based on employee increases, and historical flow and loading data based on the existing Cliffs Erie, LLC (Cliffs Erie) NPDES/SDS Permit (MN0054089), which includes the Plant Site. The computations were completed using the Minnesota Pollution Control Agency (MPCA) Design Flow and Loading Determination Guidelines for Wastewater Treatment Plants (Attachment A). The planning period for wastewater treatment facilities recommended by Board of State and Provincial Public Health and Environment Managers, Recommended Standards for Wastewater Facilities (Ten States Standards Reference (1)), is 20 years. The current mine life is expected to be 20 years. Based on this, the planning period of 20 years is appropriate.

2.1 Employment

The STS will be sized based on expected permanent employment at the Plant Site and the Mine Site. PolyMet plans to manage Mine Site sewage with holding tanks or portable restrooms, then transport it to the STS for treatment. The sewage from the Area 1 shops, which will be treated by the existing individual sewage treatment system, and from the Area 2 shops, which will be treated by a septic system, is not included in the flows and loads to the STS. Temporary portable facilities will be provided to serve the construction workforce on-site during the pre-operation construction phase. Table 1 shows workforce estimates used to design the STS.
Table 1  Workforce Estimates for Sewage Treatment System Design

<table>
<thead>
<tr>
<th>Employees</th>
<th>Plant Site</th>
<th>Mine Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial workforce (per day)</td>
<td>200</td>
<td>120</td>
</tr>
<tr>
<td>Future estimated workforce (per day)</td>
<td>350</td>
<td>120</td>
</tr>
</tbody>
</table>

2.2 Historical Flows

The Cliffs Erie NPDES/SDS Permit (MN0054089) states the existing (inoperable) sewage treatment plant was designed to treat an average wet weather flow of 0.105 MGD. The peak employment at the LTVSMC facility has been reported to be approximately 3,000 employees. Dividing the wet weather design flow by the peak employees gives 35 gallons per day (gpd)/employee. Historical data from the mid-1990s at the sewage facility shows that the sewage treatment plant influent flows ranged from 40,000 to 80,000 gpd. According to a news release (Reference (2)), 1,400 workers were employed at its closure in 2001, which included miners not located at the Plant Site. In addition to domestic sewage generated by employees, the sewage treatment plant treated backwashed solid wastes and wastewater generated by the facility potable water treatment plant, annual blow down flow from the Heating Plant compressor boiler cooling water system, and the Heating Plant cooling water and floor drains. The fluctuation of 40,000 gpd in the influent flow is likely associated with inflow and infiltration (I/I) into the collection system. This value is reflected in the design flow and loading worksheet (Attachment A). Anticipated reductions in I/I shown in the worksheet are based on allowable I/I for newer collection systems and corresponds well with published anticipated reductions when refurbishing existing collection systems (Reference (3)).

2.3 Proposed Design Values

Improvements to the collection system are expected to achieve a reduction of 60–70% of the combined inflow and infiltration (Reference (4)). The design flows and loads for the system were calculated with the assumption that all collection system refurbishments have been completed. Proposed design values for the STS are shown in Table 2.

Table 2  Proposed Design Values for Sanitary Treatment System

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Plant Site</th>
<th>Mine Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>35 gal/capita-d (dry weather)</td>
<td>Holding Tank Flow = 20 gal/capita-d Porta-ble Restrooms Flow = 1 portable/8 capita @ 20 gal/week/portable</td>
</tr>
<tr>
<td>Biological Oxygen Demand (BOD₅)</td>
<td>220 mg/L</td>
<td>7,000 mg/L</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>220 mg/L</td>
<td>15,000 mg/L</td>
</tr>
<tr>
<td>Ammonia Nitrogen (NH₃-N)</td>
<td>25 mg/L</td>
<td>150 mg/L</td>
</tr>
<tr>
<td>Phosphorus (P)</td>
<td>8 mg/L</td>
<td>250 mg/L</td>
</tr>
</tbody>
</table>

The Plant Site dry and wet weather flows were based on limited available historical flow data from previous records and have been verified by text book values (Reference (5), Reference (1)) for similar
facilities. The Mine Site holding tank flows were based on textbook values for similar facilities (Reference (1), Reference (6)). The Mine Site portable restroom flows were based on data provided by a portable restroom supplier with mining facility experience in northern Minnesota. The loads were based on textbook values for average strength sewage from the Plant Site and septic strength sewage from the Mine Site (Reference (1), Reference (6)).

Design flow computations were completed in accordance with the MPCA Design Flow and Loading Determination Guidelines for Wastewater Treatment Plants. Table 3 (Attachment A) summarizes the design flows and loading calculated using the MPCA design calculations worksheets.

Table 3 Design Flows and Loading Summary

<table>
<thead>
<tr>
<th></th>
<th>ADF (gpd)</th>
<th>AWWF (gpd)</th>
<th>BOD5 (lb/day)</th>
<th>TSS (lb/day)</th>
<th>NH3-N (lb/day)</th>
<th>P (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADF</td>
<td>AWWF</td>
<td>ADF</td>
<td>AWWF</td>
<td>ADF</td>
<td>AWWF</td>
</tr>
<tr>
<td>Initial</td>
<td>8,502</td>
<td>21,502</td>
<td>22</td>
<td>42</td>
<td>30</td>
<td>54</td>
</tr>
<tr>
<td>Future</td>
<td>13,752</td>
<td>26,752</td>
<td>36</td>
<td>36</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

ADF = Average Daily Flow
AWWF = Average Wet Weather Flow

2.4 Treatment Targets

Treatment targets for the design of Sewage Treatment System are based on the existing Cliffs Erie NPDES/SDS Permit (MN0054089), despite the lower flows projected for the new system. The permitted effluent limits applied to the facility’s sanitary sewage treatment system as it was operating at the time of permit issuance on May 4, 2001 are summarized in Table 4. These treatment targets are in accordance with the minimum secondary treatment standards for sewage as outlined in Minnesota Rules, part 7053.0215, subpart 1.
Table 4  Existing Cliffs Erie NPDES/SDS Permit (MN0054089) Effluent Limits

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit</th>
<th>Limit Type</th>
<th>Effective Period</th>
<th>Sampling Type</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBOD₅</td>
<td>9.9 kg/day, 25 mg/L, 16 kg/day, 40 mg/L</td>
<td>Calendar month average, Calendar month average, Maximum calendar week average, Maximum calendar week average</td>
<td>Jan. – Dec., Jan. – Dec., Jan. – Dec., Jan. – Dec.</td>
<td>8-Hour Flow Composite</td>
<td>2 x Month</td>
</tr>
<tr>
<td>Chlorine, total residual</td>
<td>Monitor only (mg/L)</td>
<td>Daily maximum</td>
<td>Jan. – Dec.</td>
<td>Grab</td>
<td>1 x Day</td>
</tr>
<tr>
<td>Fecal coliform, MPN or Membrane Filter 44.5°C</td>
<td>200 #/100 mL Monitor only</td>
<td>Calendar month geometric mean, Maximum calendar week average</td>
<td>May – Oct.</td>
<td>Grab</td>
<td>2 x Month</td>
</tr>
<tr>
<td>Flow</td>
<td>Monitor Only</td>
<td>Calendar Month Average, Calendar Month Maximum, Calendar Month Total</td>
<td>Jan. – Dec.</td>
<td>Measurement, Continuous</td>
<td>1 x Day</td>
</tr>
<tr>
<td>Solids, Total Suspended</td>
<td>12 kg/day, 30 mg/L, 18 kg/day, 45 mg/L</td>
<td>Calendar month average, Calendar month average, Maximum calendar week average, Maximum calendar week average</td>
<td>Jan. – Dec., Jan. – Dec., Jan. – Dec., Jan. – Dec.</td>
<td>8-Hour Flow Composite</td>
<td>2 x Month</td>
</tr>
</tbody>
</table>

3.0  Sewage Treatment System Design

3.1  Sewage Collection System Improvements

The existing collection system is primarily original construction. Based on available drawings, the collection system consists of various sizes of sanitary sewer piping (4-inch to 10-inch diameter) and manholes originally constructed in 1955. The type of pipe within the existing tunnels under the plant is cast iron. The type of pipe in the yard areas and near the coarse crusher is not disclosed on the available historical drawings. The manholes are reinforced concrete sections with cast iron castings, based on the historical drawings provided. The collection system is described in the sections below, which correspond to the site plan of the existing facilities shown on the attached SWGT-001, Sewage Treatment Plant - Overall Site Plan (Attachment B).

3.1.1  Segment A:

This segment encompasses existing collection systems in the southern part of Plant Site. The administration building has an existing septic tank and a submersible pump lift station located on the south side of the building. The forcemain carries the wastewater around the east side of the building and then follows the road north to an existing drain field. An abandoned forcemain continues from this point northeast to the sewage treatment plant.
3.1.2 Segment B:

This segment encompasses existing collection systems in the northern part of Plant Site. The booster pump house at the north end of the Plant Site has a gravity line leading to an existing drain field on the northwest side of the building.

3.1.3 Segment C:

This segment encompasses existing collection systems in the central part of Plant Site. The Plant Site collection system begins on the north end at Sanitary Manhole #12 located just outside the southeast corner of the Coarse Crusher Building. From here, the sanitary sewer follows the road to the south between the Concentrator and the Drive House. Just north of the Fine Crusher, the sanitary sewer collects the flow from the Fine Crusher and turns west to collect the flow from the Concentrator. Sewage piping from the Garage General Shop areas connects in between the Fine Crusher and the Concentrator. The piping then continues to the southwest until it reaches Sanitary Manhole #1.

Sewage piping from the demolished pellet plant location area serving the Concentrate Loadout area runs northwesterly until connecting to Sanitary Manhole #1. From Sanitary Manhole #1, the sanitary sewage is combined and conveyed south to the location of the existing (inoperable) sewage treatment plant.

The existing sewage collection system will be refurbished to meet current design standards. Existing piping will be refurbished to minimize I/I entering the treatment system. New piping and associated infrastructure will also be added to connect new Plant Site facilities and the administration building to the system.

The proposed sewage collection system refurbishments include:

- administration building lift station renovation
- force main relocation to the west side of the administration building
- force main installation from the existing drain field north of the administration building to the sewage treatment facility
- air relief manhole installation at high point along force main
- sanitary sewer replacement from Manhole #12 to a point 382 feet south of Manhole #11
- force main installation from Manhole #12 northeast to the Waste Water Treatment Plant (WWTP)
- grinder pump installation at the WWTP
- force main installation from the tailings booster pump house to the concentrator
- grinder pump installation at the tailings booster pump house
- sanitary sewer service installation for the new Flotation Building
- sanitary sewer service installation for the new Concentrate Loadout Building addition
- replacement of the concrete filled Manhole #2
• complete cleaning and televising of buried pipes
• replacement of 30% of piping and in-situ lining of 70% of piping

3.2 Stabilization Ponds

PolyMet will construct a new stabilization pond facility with lined ponds and a controlled discharge. Twice a year (once in the spring and once in the fall), discharge will be routed to the Flotation Tailings Basin (FTB) Pond. Operation and maintenance will consist of regular grass mowing in the summer, occasional transfer/control of wastewater flows, and discharge sampling and monitoring in the spring and fall. Permit level drawings for the stabilization ponds are provided in Attachment B.

The stabilization pond facility will include two primary ponds and one secondary pond. Preliminary pond sizes were calculated following MPCA guidelines for pond systems north of Brainerd, MN to store the future AWWF for 210 days. Based on the future AWWF of 26,752 gpd and 210 days of storage, 17.24 acre feet of storage will be required for the entire pond system or 2.41 acres of primary pond(s) to meet the required pond BOD₅ loading of 22 lbs/acre/day. Three 1.44 acre ponds will provide the required detention time and meet the BOD₅ loading design for the future AWWF. Alternatively, two 1.91 acre ponds (one primary and a secondary) could be constructed to treat the initial AWWF of 21,502 gpd and BOD₅ load of 42 lb/day, with another primary pond added when needed to treat the future flows.

The pond design will be completed following the MPCA Recommended Pond Design Criteria (Reference (6)). Key design factors are summarized in Table 5.

Table 5 Design Criteria for Stabilization Ponds

<table>
<thead>
<tr>
<th>Pond Feature</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pond Shape and Depth</td>
<td>Length to width ratio</td>
<td>4:1 or less</td>
</tr>
<tr>
<td></td>
<td>Corner angles</td>
<td>45° or greater</td>
</tr>
<tr>
<td></td>
<td>High water depth</td>
<td>6 feet</td>
</tr>
<tr>
<td>Dike</td>
<td>Dike top elevation</td>
<td>3 feet above high water depth</td>
</tr>
<tr>
<td></td>
<td>Dike top width</td>
<td>12 feet</td>
</tr>
<tr>
<td></td>
<td>Dike material</td>
<td>Class IV material</td>
</tr>
<tr>
<td></td>
<td>Dike inner slopes</td>
<td>Between 3:1 and 4:1 (run to rise)</td>
</tr>
<tr>
<td></td>
<td>Dike outer slopes</td>
<td>3:1 (run to rise)</td>
</tr>
<tr>
<td>Erosion Control</td>
<td>Interior dike riprap</td>
<td>from pond bottom to one foot above high water</td>
</tr>
<tr>
<td></td>
<td>Interior dike cover</td>
<td>at least 4 inches fertile topsoil with seed</td>
</tr>
<tr>
<td></td>
<td>Exterior dike cover</td>
<td>at least 4 inches fertile topsoil with seed</td>
</tr>
<tr>
<td>Liner</td>
<td>Liner type</td>
<td>low-permeability geomembrane</td>
</tr>
<tr>
<td></td>
<td>Maximum leakage loss</td>
<td>500 gallons/acre/day</td>
</tr>
</tbody>
</table>
The ponds will be designed with a geomembrane liner and will maintain the required separation distances from bedrock and groundwater. The required separation distances from bedrock and groundwater will be met by completing a geotechnical exploration, geotechnical evaluation, and groundwater monitoring program prior to final design. The pond liner will be a geomembrane liner. The ponds will be designed with a 2-foot deep sludge volume allowance in the pond bottom. When the sludge level reaches 2 feet, sludge will be removed and properly disposed off-site. Annual removal and disposal of sludge is not required for a typical stabilization pond system. Sludge accumulation rate depends on many factors, and sludge removal may not be necessary during the 20-year life of the Project.

Pond control manholes and piping will be provided to operate the ponds in parallel or series and to transfer sewage between ponds prior to discharge. An influent pump station will likely be required to pump into the ponds. The influent pump station will be a duplex submersible pump station, with pumps sized to handle the peak wet weather design flow. Each pump discharge pipe will include a check valve and isolation valve housed in a separate valve structure. Pump discharge piping will be a minimum of 4 inches in diameter. The pump and pipe will be sized to have a minimum flow velocity of 2 feet per second. A controlled discharge will be completed from the ponds in the spring and fall of each year, typically lasting 10 to 14 days depending on weather conditions. The ponds will discharge to an effluent pump station similar to the influent pump station, sized appropriately for the discharge flow quantity of 6 inches of pond volume per day. From the effluent pump station, effluent will be routed to the FTB Pond for final disposal.

4.0 References


Attachment A

Design Flow and Loading Calculations
The determination of design flows and pollutant loadings is one of the most important items in the planning of a new or expanded wastewater treatment facility. A detailed analysis of existing flow conditions and the use of adequate flow estimates will determine the hydraulic and pollutant removal capacity needed to properly treat the wastewater and comply with permit conditions. It is necessary to include all contributing flow streams and pollutant loading sources in this analysis, including all residential, seasonal, institutional, commercial, industrial, inflow, infiltration, return and recycle streams and any other unique aspect of flow and pollutant contributions.

These guidelines are the recommended procedures for estimating the design flow and pollutant loading conditions, and are considered to be the minimum values necessary to assure adequate treatment facility capacity. It is expected that sound engineering judgment will be used to determine the appropriate design conditions for each individual treatment facility and that consideration will be given to impacts of decisions on upstream and downstream unit processes.

Introduction

The flow monitoring period for any particular project must record flow data during critical peak wet weather flow events which have occurred during a sustained wet weather flow period. Data collected during this flow period are used to estimate the four flow conditions that are critical to the design and operation of wastewater treatment plants (see Table 1): average dry weather (ADW), average wet weather (AWW), peak hourly wet weather (PHWW), and peak instantaneous wet weather (PIWW).

The average dry weather flow is the daily average flow when the ground water is at or near normal and a runoff condition is not occurring.

**Average wet weather** flow is the daily average flow for the wettest 30 consecutive days for mechanical plants or for the wettest 180 consecutive days for controlled discharge pond systems. The 180 consecutive days for pond systems should be based on either the storage period from approximately November 15 through May 15 or the storage period from approximately May 15 through November 15.

The **peak hourly wet weather** flow is the peak flow during the peak hour of the day at a time when the ground water is high and a five-year one-hour storm event is occurring. To determine this five-year one-hour storm event for the specific project, please refer to the attached Map Number 1.

The **peak instantaneous wet weather** flow is the peak instantaneous flow during the day at a time when the ground water is high and a twenty-five year one-hour storm event is occurring. To determine the appropriate twenty-five year one-hour storm event, please refer to Map Number 2.
### Table 1: Design Flow Condition Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADW</td>
<td>Average Dry Weather Flow. Assumes normal ground water with no runoff.</td>
<td>Facility designed to meet the calendar month average permit limitations and to determine if flow equalization should be evaluated.</td>
</tr>
<tr>
<td>AWW</td>
<td>Average Wet Weather Flow (the wettest 30-day average for mechanical plants and wettest 180-day average of controlled discharge pond systems). Assumes high ground water with inflow.</td>
<td>Facility designed to meet the calendar month average permit limitations and to determine if flow equalization should be evaluated.</td>
</tr>
<tr>
<td>PHWW</td>
<td>Peak Hourly Wet Weather Flow. Assumes high ground water with inflow due to a five-year one-hour storm event.</td>
<td>Clarifier and disinfection sizing and to determine if flow equalization should be evaluated.</td>
</tr>
<tr>
<td>PIWW</td>
<td>Peak Instantaneous Wet Weather Flow. Assumes high ground water with inflow due to a twenty-five year one-hour storm event.</td>
<td>Hydraulic design sizing for preliminary units, screens, filters, piping, and pumping at the treatment facility.</td>
</tr>
</tbody>
</table>

Where the Minnesota Pollution Control Agency (MPCA) determines that the above design flow considerations will not provide adequate protection to the receiving waters, facility capacity in excess of peak instantaneous wet weather flow may be required.

In cases where flow studies are over five years old, or where the consultant designing the treatment or transmission facility did not perform the flow study, a verification of the acceptability of the flow data should be performed.

Table 2 contains a summary of the minimum recommended flow and loading conditions for only a select group of processes. Specific design parameter details for individual treatment process units shall be in accordance with Ten States Standards.

### Table 2: Design Flow and Loading Condition Summary

<table>
<thead>
<tr>
<th>Treatment Unit</th>
<th>Hydraulic Design Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection System</td>
<td>Must be capable of transporting all flow to the treatment facility without bypassing.</td>
</tr>
<tr>
<td>Lift Station</td>
<td>Must be capable of transporting all flow to the treatment facility without bypassing.</td>
</tr>
<tr>
<td>Sanitary Sewers</td>
<td>100 gpcd (Other flows may be approved provided adequate justification is provided. In no case will a flow of less than 75 gpcd be approved.) + 80 gpcd for seasonal visitors + 20 gpcd for out-of-town student + commercial, industrial, and other non-residential flow</td>
</tr>
<tr>
<td></td>
<td>Minimum BOD of 0.17 #pcd plus commercial, industrial, and other non-residential flow</td>
</tr>
<tr>
<td></td>
<td>Minimum TSS of 0.20 #pcd plus commercial, industrial, and other non-residential flow</td>
</tr>
</tbody>
</table>

Continued on next page.
Continued from previous page.

### Table 2: Design Flow and Loading Condition Summary Continued

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Hourly Wet Weather</td>
<td>Ten States Standards Figure 1, Chapter 10; or 2.5 times AWW for residential, commercial + peak hourly industrial flow</td>
</tr>
<tr>
<td>Peak Instantaneous Wet Weather</td>
<td>Actual flow data; or 2.5 times AWW for residential, commercial + peak hourly industrial flow</td>
</tr>
<tr>
<td>Flow Equalization Basin</td>
<td>If PHWW/ADW ≥ 3, flow equalization must be considered. If PHWW/AWW ≥ 3, flow equalization must be considered. If equalization is not provided, a discussion of how the facility will handle the transition in flow must be included.</td>
</tr>
<tr>
<td>Facility Piping and Pumping</td>
<td>PIWW</td>
</tr>
<tr>
<td>Preliminary Treatment Unit</td>
<td>PIWW</td>
</tr>
<tr>
<td>Biological Treatment Units</td>
<td>PHWW + recirculation flow</td>
</tr>
<tr>
<td>Clarifiers (surface settling rate and weir loading rate)</td>
<td>PHWW + recirculation flow</td>
</tr>
<tr>
<td>Disinfection (detention time)</td>
<td>PHWW</td>
</tr>
</tbody>
</table>

#### Bypass/Overflow

All bypass/overflow structures shall be manually controlled and kept locked at all times. All bypassing is regulated by permit and is prohibited. An upset defense may be available if: 1) bypass was unavoidable to prevent loss of life, personal injury or severe property damage; 2) there was no feasible alternative to the bypass; or 3) the permittee gives previous notice of an anticipated bypass.

Any bypassing must be reported to the MPCA in a report consistent with permit requirements. This report shall include, but not be limited to, the bypass duration, estimated volume and associated meteorological conditions. Refer to the facility permit for specific bypass requirements. All bypasses and overflows must be immediately reported to the MN Duty Officer at 1-800-422-0798 (outstate) or 651-649-5451 (Twin Cities Metro Area).

The MPCA may require a corrective action plan to mitigate frequent and/or unjustified bypass events. Failure to follow the proper bypass notification procedures or resolve problems in a timely manner may subject the permittee to enforcement actions, including monetary penalties.

#### Treatment Systems with New Sanitary Sewer Collection Systems

For mechanical plants, if the industrial flow varies during the day or week, the design flow should be based on the average flow on the peak day during the period when the industry or industries are operating. This condition is called “rated flow.” For example, if the industry discharges 10,000 gallons over eight of the twenty-four hours, the rated flow is 30,000 gallons per day. For controlled discharge pond systems, if the industrial flow varies during the day or week, the average design flow may be based on a weekly average.

The peak hourly wet weather design flow are the sum of the average wet weather design flow for residential (full-time and seasonal), commercial and out-of-town students multiplied by a peaking factor, plus the peak hourly industrial flow. The peaking factor shall be determined in accordance with Figure 1, in Chapter 10 of Ten States Standards.

The MPCA may approve of an alternative flow design with appropriate justification. For determining the design of the collection system (including design flow), refer to Chapter 20 Design of Sewers from “Recommended
Standards for Sewage Works” (Ten States Standards).

Some form of permit “control language” may be included if the per capita design flow is less than what is recommended in this document. For example it may be a permit violation with "no more connections" when the permitted design flow is reached. Violation of the permitted flow could result in the requirement for submittal of a report that examines the flow in comparison to the number of connections and the number of people using the system. The permittee could also be required to plan, design, and build additional treatment units upon reaching the design capacity.

Mechanical Treatment Plants with Existing Sanitary Sewer Systems

For a mechanical plant, if a separate sanitary sewer system exists, the attached Table 3 should be used to determine the peak hourly wet weather flow, the peak instantaneous wet weather flow, the average dry weather flow, and the average wet weather flow.

Part A of Table 3 and Figure 1 are used to determine the peak hourly wet weather flow. The measured flow should be plotted for a twenty-four hour period when ground water is at or near normal and a runoff condition is not occurring (Curve X on Figure 1). The ground water elevation in relation to the sewer elevation should be noted. The present peak hourly dry weather flow [(1) on Figure 1 and Table 3] is peak hourly flow during the twenty-four hour period when the ground water is at or near normal and a runoff condition is not occurring. The measured flow should be plotted for a twenty-four hour period when ground water is high and a runoff condition is not occurring (Curve Y). The ground water elevation in relation to the sewer elevation should be noted. Number (2) on Figure 1 and Table 3 is the peak hourly flow during a high groundwater period for that specific area and system when a runoff condition is not occurring. This flow (2) minus the present peak hourly dry weather flow (1) is the peak hourly infiltration.

The measured flow should be plotted for a twenty-four hour period when the ground water is high and a runoff condition is not occurring (Curve Z). This should include overflow, bypasses, and emergency pumping. The amount of rainfall and its duration should be plotted on the same graph. The peak inflow is represented by the greatest distance between Curve Y and Curve Z. The present hourly flow at the point of greatest distance between Curve Y and Z [(5) on Figure 1 and Table 3] minus the present hourly flow during high ground water at the same time of day [(6) on Figure 1 and Table 3] is the peak hourly inflow. It may be necessary to adjust the measured flow based on a relationship between the data attained during a major storm event and the five-year one-hour designed storm event. Items (10) and (13) are determined through a cost effectiveness evaluation. The gpcd contribution for population increase in item (15) [also in (25), (33), and (41)] should be 100 gpcd.

Part B of the table determines the peak instantaneous wet weather flow. The present peak hourly inflow adjusted for a five-year one-hour rainfall event [see part A(8)] is subtracted from the peak hourly wet weather flow [see part A(19)]. To this number, add the present peak hourly inflow adjusted for a twenty-five year one-hour storm event. The resulting number is the peak instantaneous wet weather flow.

Part C of Table 3 determines the average dry weather flow. The present average dry weather flow (24) is the average flow received over a twenty-four hour period when the ground water is at or near normal and a runoff condition is not occurring. If the industrial flow varies during the day or week, the present average dry weather flow should be based on the average flow of the peak day during the period when the industry or industries are operating (rated flow). This also applies to the average flow from industrial increases.

Part D of the table determines the thirty-day average wet weather design flow. The average infiltration and inflow after rehabilitation (where rehabilitation is cost effective) is the wettest thirty-day average. The amount of infiltration after rehabilitation averaged over the thirty wettest days should be the same or nearly the same as the peak infiltration after rehabilitation. This is due to the fact that the ground water could stay high for a fairly extended period of time. The amount of inflow after rehabilitation averaged over the thirty wettest days depends on the type of sources, their location, the amount of rainfall that affects the source, etc.

Part E of Table 3 correlates all related information that can impact the degree of accuracy of the determination of design flows. It is recommended that a minimum of six months of accurate data be recorded. Minnesota Rules 7077.0150 subp. 2(b) requires a minimum of 30 consecutive days of actual flow monitoring. Data associated with the critical peak wet weather flow events for a sustained wet weather period are essential for accurate estimation of design flows. Critical peak wet weather flow events typically occur in the spring (March-
June) and must include the condition of high ground water with inflow.

**Controlled Discharge Pond Systems with Existing Sanitary Sewer Systems**

The peak hourly wet weather and the peak instantaneous wet weather design flows to a pond system with an existing sanitary sewer system are arrived at in the same manner as in Parts A and B of the previous section. If the present industrial flow varies during the day or week, the present average dry weather flow (24) and (30) may be based on a weekly average. When computing the average wet weather flow, the average infiltration after rehabilitation (31), and the average inflow after rehabilitation (32) are averages over the wettest 180 consecutive days.

**Flow Equalization**

This section applies to all treatment facilities except pond systems. During a period of high ground water for that area and system, if the ratio of peak hourly wet weather design flow to average wet weather design flow [which is (19) divided by (37)] is three or more, flow equalization shall be evaluated. When the ratio is three or more and flow equalization is not employed, an explanation must be included outlining how the plant will handle this transition from average wet weather design flow to peak hourly wet weather design flow.

During a normal ground water period, if the ratio of the peak hourly design flow during the five-year one-hour storm event [(1)+(14)+(15)+(17)+(18)] to the average dry weather design flow (29) is three or more, flow equalization shall be evaluated. When the ratio is three or more and flow equalization is not employed, an explanation must be included outlining how the plant will handle this flow transition.

**Infiltration and Inflow (I/I)**

Inflow means water other than wastewater that enters a sewer system from sources such as roof leaders, foundation drains, yard drains, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, storm water runoff and other drainage structures.

Infiltration means water other than wastewater that enters the sewer system from the ground through defective pipe, pipe joints, and manholes.

I/I is a part of every collection system and must be taken into account in the determination of an appropriate design flow.

Excessive infiltration means the quantity of flow that is more than 120 gpcd (domestic base flow and infiltration).

Excessive inflow means the quantity of flow during storm events that results in chronic operational problems related to hydraulic overloading of the treatment system or that results in a total flow of more than 275 gpcd (domestic and industrial base flow plus infiltration and inflow). Chronic operational problems may include surcharging, backups, bypasses, and overflows.

If excessive levels of infiltration or inflow exist in the system, a comparison of alternatives for elimination of the excessive flow and treating the excessive flow shall be included with the design summary.

**Essential Project Components Percentage**

Minnesota Rules 7077.0111 to 7077.0292 apply to the MPCA’s administration of financial assistance programs for the construction of municipal wastewater treatment systems. The assistance programs include the Wastewater Infrastructure Fund (WIF) and the State Revolving Fund (SRF) loan program. These rules require the calculation of an “essential project components percentage.” The percentage will be used by the Public Facilities Authority (PFA) in their determination of a project’s cost that may qualify for assistance with the WIF. Please see Table 4 for more information on calculating an essential project components percentage.

**Wastewater Treatment Plant Design Loading**

Table 5 should be used to determine the design loadings for the upgraded wastewater treatment plant.

**For More Information**

Please contact the engineer assigned to the project or District. If the engineer is unknown, contact the Customer Assistance Center.

Customer Assistance Center ..................... (651) 297-2274
MPCA .............................................. (651) 296-6300
Toll-free .............................................. (800) 657-3864
TTY .................................................. (651) 282-5332
Figure 1: Determination of Peak Hourly Flows Before Adjustment for Storm Event

N/A

Note: All flow measurements taken at treatment plant with adjustments for bypasses, overflows, and emergency pumping. Groundwater elevation in relation to sewers should be stated for several points in the sewer system. Dates of flow measurement should be stated.
# Table 3: Determination of Design Flows

## (A) For determination of peak hourly wet weather design flows (PHWW):

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Present peak hourly dry weather flow [200 employees*35 gpcd + mine area]</td>
<td>7,202</td>
</tr>
<tr>
<td>2</td>
<td>Present peak hourly flow during high ground water period (no runoff)</td>
<td>N/A</td>
</tr>
<tr>
<td>3</td>
<td>Present peak hourly dry weather flow [same as (1)]</td>
<td>N/A</td>
</tr>
<tr>
<td>4</td>
<td>Present peak hourly infiltration</td>
<td>16,000</td>
</tr>
<tr>
<td>5</td>
<td>Present hourly flow during high ground water period and runoff at point of greatest distance between Curves Y and Z</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>Present hourly flow during high ground water (no runoff) at same time of day as (5) measurement</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Present peak hourly inflow</td>
<td>24,000</td>
</tr>
<tr>
<td>8</td>
<td>Present peak hourly inflow adjusted for a 5-year 1-hour rainfall event</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>Present peak hourly infiltration [same as (4)]</td>
<td>See (4)</td>
</tr>
<tr>
<td>10</td>
<td>Peak hourly infiltration cost effective to eliminate</td>
<td>-10,800</td>
</tr>
<tr>
<td>11</td>
<td>Peak hourly infiltration after rehabilitation (where rehabilitation is cost effective)</td>
<td>5,200</td>
</tr>
<tr>
<td>12</td>
<td>Present peak hourly adjusted inflow [same as (8)]</td>
<td>N/A</td>
</tr>
<tr>
<td>13</td>
<td>Peak hourly inflow cost effective to eliminate</td>
<td>-16,200</td>
</tr>
<tr>
<td>14</td>
<td>Peak hourly inflow after rehabilitation (where rehabilitation is cost effective)</td>
<td>7,800</td>
</tr>
<tr>
<td>15</td>
<td>Population increase <em>150</em> @ <em>35</em> gpcd</td>
<td>5,250</td>
</tr>
<tr>
<td>16</td>
<td>Peak hourly flow from planned industrial increase</td>
<td>N/A</td>
</tr>
<tr>
<td>17</td>
<td>Estimated peak hourly flow from future unidentified industries</td>
<td>N/A</td>
</tr>
<tr>
<td>18</td>
<td>Peak hourly flow from other future increases (contractor’s employees, other)</td>
<td>1,300</td>
</tr>
<tr>
<td>19</td>
<td>Peak hourly wet weather design flow [(1)+(11)+(14)+(15)+(16)+(17)+(18)] = (PF = 4) 4x26,752</td>
<td>107,008</td>
</tr>
</tbody>
</table>

## (B) For determination of peak instantaneous wet weather design flow (PIWW):

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Peak hourly wet weather design flow [same as (19)]</td>
<td>107,008</td>
</tr>
<tr>
<td>21</td>
<td>Present peak hourly inflow adjusted for a 5-year 1-hour rainfall event [same as (8)]</td>
<td>N/A</td>
</tr>
<tr>
<td>22</td>
<td>Present peak inflow adjusted for a 25-year 1-hour rainfall event</td>
<td>N/A</td>
</tr>
<tr>
<td>23</td>
<td>Peak instantaneous wet weather design flow</td>
<td>107,008</td>
</tr>
</tbody>
</table>

## (C) For determination of average dry weather design flow (ADW):

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Gallons Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Present average dry weather flow [200 employees*35 gpcd + mine area]</td>
<td>7,202</td>
</tr>
<tr>
<td>25</td>
<td>Population increase <em>150</em> @ <em>35</em> gpcd</td>
<td>5,250</td>
</tr>
<tr>
<td>26</td>
<td>Average flow from planned industrial increase</td>
<td>0</td>
</tr>
<tr>
<td>27</td>
<td>Estimated average flow from other future unidentified industries</td>
<td>0</td>
</tr>
<tr>
<td>28</td>
<td>Average flow from other future increases (contractor’s employees, other)</td>
<td>1,300</td>
</tr>
<tr>
<td>29</td>
<td>Average dry weather design flow [(24)+(25)+(26)+(27)+(28)]</td>
<td>13,752</td>
</tr>
</tbody>
</table>
### Table 4: Essential Project Components Percentage

**Definitions:**

“Essential project components” means those components of a wastewater disposal system that are necessary to convey or treat a municipality’s existing wastewater flows and loadings and future flows and loadings based on the projected residential growth of the municipality for a 20-year period.

**Mass Loading (lbs./day)** = Flow (MGD) X Concentration (mg/l) X 8.34

<table>
<thead>
<tr>
<th></th>
<th>Total Existing Daily Conditions</th>
<th>Total Proposed 20-year Design Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow (MGD)</td>
<td>8.5E-3</td>
<td>13.75E-3</td>
</tr>
<tr>
<td>CBOD₅ (mg/l)</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Mass Loading (lbs./day)</td>
<td>15.6</td>
<td>25.2</td>
</tr>
</tbody>
</table>

Essential Project Components Percentage = \( 100 \times \frac{\text{Total Existing CBOD₅ Mass Loading}}{\text{Total 20-year Growth Mass Loading}} \)

\[
= 100 \times \left( \frac{26 \text{ lbs./day}}{36 \text{ lbs./day}} \right) \\
= 72 \%
\]
Table 5: Determination of Design Loadings

<table>
<thead>
<tr>
<th></th>
<th>Unit Basis</th>
<th>ADW</th>
<th>AWW</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Residential Waste</strong></td>
<td>Population</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plant Site/Other</strong></td>
<td>Number-Workers</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>200*35gpdc</td>
<td>8,300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dry+1300 other</td>
<td>8,300</td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td>220 mg/l</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>220 mg/l</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td>25 mg/l</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>8 mg/l</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Mine Area-Holding</strong></td>
<td>Number-workers</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>8*20gpdc</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td>7,000 mg/l</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>15,000 mg/l</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td>150 mg/l</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>250 mg/l</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Mine Area-Portable</strong></td>
<td>Number-workers</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flow, GPD</td>
<td>120/8 portc*20</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gpw/7dpw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td>7,000 mg/l</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>15,000 mg/l</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td>150 mg/l</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>250 mg/l</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Future Employees</strong></td>
<td>Flow, GPD</td>
<td>150 employees @</td>
<td>(150*35gpdc) =</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(_) (wet/dry) _ gpdc</td>
<td>5250</td>
</tr>
<tr>
<td></td>
<td>Rated Flow, GPD</td>
<td>Wet Weather PF = 4</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td>220 mg/l</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>220 mg/l</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td>25 mg/l</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>8 mg/l</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Infiltration</strong></td>
<td>GPD</td>
<td>0 - dry</td>
<td>7,800</td>
</tr>
<tr>
<td><strong>Inflow</strong></td>
<td>GPD</td>
<td>0 – dry</td>
<td>5,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>Flow, GPD</td>
<td>13,752</td>
<td>26,752</td>
</tr>
<tr>
<td></td>
<td>Rated Flow, GPD</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>BODs, mg/l</td>
<td>313</td>
<td>161</td>
</tr>
<tr>
<td></td>
<td>BODs, #/day</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>TSS, mg/l</td>
<td>435</td>
<td>224</td>
</tr>
<tr>
<td></td>
<td>TSS, #/day</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>NH3-N, mg/l</td>
<td>28</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>NH3-N, #/day</td>
<td>3.25</td>
<td>3.25</td>
</tr>
<tr>
<td></td>
<td>P, mg/l</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>P, #/day</td>
<td>1.4</td>
<td>1.4</td>
</tr>
</tbody>
</table>

* It may be necessary to also test for TKN for certain industrial contributors.
Attachment B

Sewage Treatment System Permit Application Support Drawing
DUPLEX SUSPENDED EFLUENT PUMP STATION
2. PUMPS: 185 GPM EACH
POND DRAWDOWN = 0.5" PER DAY

PROPOSED STABILIZATION PONDS
(3 - 1.44 ACRE CELLS)
ADG = 14,000 GPD; AWWF = 26,750 GPD
RBD = 49 LB/DAY

DUPLEX SUBMERSIBLE PUMP LIFT STATION
2. PUMPS: 675 GPM EACH
PWHF/PHWF = 107,000 GPD
Appendix D

Chemical Additives Safety Data Sheets
Appendix D
Chemical Additives Safety Data Sheets

July 2016

Contents

BT-205W (Anionic/Nonionic Surfactant Blend) ................................................................. D-1
BT-668 (Polysaccharide Surfactant Blend) ................................................................. D-9
Magnesium Chloride Aqueous Solution (Dustgard) .................................................. D-17
Roadsaver-C ........................................................................................................... D-25
Roadsaver .............................................................................................................. D-31
Durasoil .................................................................................................................. D-37
Gorilla-Snot .......................................................................................................... D-49
Soiltac .................................................................................................................... D-56
Coherex ................................................................................................................ D-63
BT-468 (Aqueous Amorphous Polymer Solution) .................................................... D-69
Calcium Chloride .................................................................................................. D-77
Liquid Alum .......................................................................................................... D-85
Chlorine ............................................................................................................... D-93
Aluminum Sulfate, 50% Solution ......................................................................... D-102
Potassium Permanganate ..................................................................................... D-110
Ammonia .............................................................................................................. D-121
1: IDENTIFICATION

Product Identifier: BT-205W

Recommended Use: Dust suppressant

Other Identification: Anionic Surfactant Blend

Supplier Details: Benetech, Inc.
2245 Sequoia Drive, Suite #300
Aurora, IL 60506
630-844-1300

Emergency Telephone: 1-800-535-5053 (US and Canada)
1-352-323-3500 (International)

2: HAZARD(S) IDENTIFICATION

Hazard pictogram and signal word:

Warning

Hazard classification: Eye irritant; category 2A.

Hazard statements: H319; Causes serious eye irritation.

Precautionary statements:

Prevention: P264; Wash exposed area thoroughly after handling. P280; Wear eye protection/face protection.

Response: P305 + P351 + P338; IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage: P403+P233; Store in well-ventilated place. Keep container tightly closed. P405; Store locked up.

Disposal: P501; Dispose of this material and its container in accordance with local, regional, national and/or international regulation.

Other hazards: Material spills may be very slippery.
3: INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary Blend</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

4: FIRST AID MEASURES

The following first aid procedures assume appropriate personal and industrial hygiene practices are followed.

**Eyes:** P305; If in eyes rinse with copious amounts of water. If symptoms are severe or persist, get medical attention.

**Skin contact:** Not expected to be a skin irritant. Wash any exposed areas thoroughly with water. Remove contaminated clothing. Launder contaminated clothing before re-use. If symptoms are severe or persist, get medical attention.

**Ingestion:** Small amounts are not expected to be harmful. Immediately drink two glasses of water and if instructed to do so by medical personnel, induce vomiting by either giving IPECAC syrup or by placing finger at back of throat. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention.

**Inhalation:** Product is non-volatile and inhalation is not an expected exposure route. Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, and quiet. If symptoms are severe or persist, get medical attention.

5: FIRE-FIGHTING MEASURES

**Suitable extinguishing media:** Class B fire extinguishers (i.e.: foam, powder)

**Specific combustion hazards:** None

**Special protective equipment and precautions for fire-fighters:** Wear full bunker gear and SCBA (Self-Contained Breathing Apparatus).

6: ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures:**
Wear Chemical Splash Goggles in compliance with OSHA regulations, impermeable gloves (natural rubber, nitrile, neoprene, etc.), impermeable clothing (coveralls), and waterproof footwear. Ventilate area with fresh air for personal comfort.

**Methods and materials for containment and cleaning up:**

- **Small Spill:** Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to appropriate container(s).
- **Large Spill:** Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into appropriate containers.

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

---

**7: HANDLING AND STORAGE**

**Precautions for safe handling:**
P270; Do not eat, drink, or smoke when using this product. P264; Wash skin exposed to product with soap and water. Wash hands after handling this product and before eating, drinking, or smoking. Avoid exposure to skin or eyes. Do not ingest. Do not breath aerosol containing this product. Use mechanical ventilation for personal comfort.

**Conditions for safe storage:**
Store material between 40°F and 120°F in original container. Protect from freezing.

---

**8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Control parameters:**
Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

**Engineering controls:**
Mechanical and/or engineered barriers to prevent contact with this material in concentrated form are preferred.

**Personal Protective Equipment:**

**Eye protection:** Chemical Splash Goggles in compliance with OSHA regulations are advised.
**Skin protection:** Avoid prolonged or repeated skin contact. Resistant gloves such as natural rubber, neoprene, nitrile rubber are recommended. Water-proof or chemical-resistant coveralls are recommended. Water-proof foot gear is recommended.

**Respiratory protection:** Avoid breathing aerosols, mists or sprays of this material if they were to form. If exposure to aerosols, mists, or sprays of this material in undiluted form are likely, wear a respirator designed to filter particulates and organic vapors.

**Prevention of ingestion:** Avoid ingesting this material. Do not eat, drink, or smoke when contamination with this material is possible. Wash hands with soap and water after handling this product and before eating, drinking, or smoking. Remove and launder contaminated clothing before eating, drinking, or smoking.

### 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Liquid Upper/Lower</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Liquid Flammability</td>
<td>Non-flammable</td>
</tr>
<tr>
<td>Solid, Gas Upper/Lower</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Solid. Gas Flammability</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>&gt;200°F (TCC)</td>
</tr>
<tr>
<td>pH</td>
<td>6.0 - 8.0</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>8.494 – 8.586-lbs./gal.</td>
</tr>
<tr>
<td>Viscosity</td>
<td>&lt;20 cPs</td>
</tr>
<tr>
<td>Melting point</td>
<td>No data available</td>
</tr>
<tr>
<td>Initial Freezing Point</td>
<td>32°F</td>
</tr>
<tr>
<td>Initial Boiling point</td>
<td>212°F</td>
</tr>
<tr>
<td>Boiling Range</td>
<td>No data available</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>&lt;1 mm Hg @ 68°F</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>&gt;1</td>
</tr>
<tr>
<td>Solubility, Aqueous</td>
<td>100% (miscible)</td>
</tr>
<tr>
<td>Partition Coefficient: n-octanol/water</td>
<td>No data available</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>As water</td>
</tr>
</tbody>
</table>

### 10: STABILITY AND REACTIVITY
Reactivity: Not reactive under normal conditions of use.
Chemical stability: Stable.
Possibility of hazardous reactions: None known.
Conditions to avoid: None known.
Incompatible materials: Alkali and alkaline earth metal compounds, salts, and bases. Strong oxidizers.
Hazardous decomposition products:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Toxic gas, vapor or particulate</td>
<td>During Combustion of Residue</td>
</tr>
</tbody>
</table>

11: TOXICOLOGICAL INFORMATION

Health and toxicological effects:

Likely exposure routes: ingestion, eye contact.

Symptoms of exposure: Gastrointestinal irritation, diarrhea, nausea, and vomiting. Severe eye irritation and pain.

Delayed and immediate effects: No significant acute or delayed adverse effects have been found in oral rat studies done on the components of this product relative to the composition of this blend. Severe contact with eyes could lead to injury.

Toxicity estimates:
Acute Toxicity:
Oral, mouse, LD$_{50}$ > 2000 mg/kg.
Dermal, mouse, LD$_{50}$ > 2000 mg/kg.
Inhalation, mouse, LC$_{50}$ > 20 mg/l.

Dermal Irritation: rabbit; non-irritant.
Ocular Irritation: rabbit; irritant.

This product is not considered a potential carcinogen by NPT, IARC, or OSHA.

12: ECOLOGICAL INFORMATION

Aquatic Toxicity
P. Promelas LC$_{50}$ est > 980 mg/l
C. Dubia EC$_{50}$ est > 840 mg/l

Persistence and Degradability
Biodegradability: No data available.
Bioaccumulative potential: No data available.
Mobility: No data available.

13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Allow waste and contaminated material to dry in open air or fume hood. Incinerate residue in an industrial or commercial facility in the presence of a combustible material, or handle as non-hazardous organic chemical waste.

14: TRANSPORT INFORMATION

DOT (US); Not dangerous goods.
IMDG; Not dangerous goods.
IATA; Not dangerous goods.

15: REGULATORY INFORMATION

This product is not considered hazardous under the Clean Water Act, the Clean Air Act, or RCRA. This product is not reportable under SARA Title III, Sec 313.

16: OTHER INFORMATION

<table>
<thead>
<tr>
<th>Revision History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>4/15/2015</td>
</tr>
</tbody>
</table>

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.
BT-205W

Warning

Causes serious eye irritation.

Wash exposed area thoroughly after handling. Wear eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Material spills may be very slippery

Store in well-ventilated place. Keep container tightly closed. Store locked up.

Benetech, 2245 Sequoia Drive, suite 300, Aurora, IL, 60506, US, 630-844-1300
PRODUCT BULLETIN

BT-205W

Product Description
A concentrated surfactant blend used as a wetting agent to reduce dust levels occurring above and below ground in the mining, transportation, and processing of coal and other fine solids. A single dose is effective through multiple transfer points in material handling systems.

Primary Uses
A cost competitive dust treatment chemical that controls airborne dust generated during the conveying process.

Benefits
- Concentrated product.
- Cost competitive.
- Effective through multiple transfer points.
- Excellent wetting characteristics.
- Mixes with water easily.
- Ecologically safe.
- Lowers required moisture for effective dust control.
- Biodegradable will not pollute underground water supply.

Dosage
Dilution ratio of BT-205W varies depending on water quality.

Application
BT-205W is applied through Benetech pumping systems or other appropriate wet suppression systems.

Shipping
Bulk tank trucks, 330 gallon totes or non-returnable 55 gallon drums.

Handling and Storage
- Avoid contact with skin and eyes.
- Protect from freezing.
- Wear eye protection, gloves and goggles required for chemical handling.
1: IDENTIFICATION

Product identifier: BT-668  
Recommended use: Dust suppressant

Other identification: Polysaccharide surfactant blend

Supplier details: Benetech, Inc.  
2245 Sequoia Drive, Suite #300  
Aurora, IL 60506  
(phone): 630-844-1300

Emergency phone: 1-800-535-5053 (US and Canada)  
1-352-323-3500 (International)

2: HAZARD(S) IDENTIFICATION

Hazard pictogram and signal word:

Hazard classification: Eye irritant; category 2A.

Hazard statements: H319; Causes serious eye irritation.

Warning

Precautionary statements:
Prevention: P264; Wash exposed area thoroughly after handling. P280;  
Wear eye protection/face protection.
Response: P305 + P351 + P338; IF IN EYES: Rinse cautiously with water for several  
minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Storage: P403+P233; Store in well-ventilated place. Keep container tightly closed.  
P405; Store locked up.
Disposal: P501; Dispose of this material and its container in accordance with local,  
regional, national and/or international regulation.

Other hazards: Material spills may be very slippery.
3: INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary Blend</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

4: FIRST AID MEASURES

The following first aid procedures assume appropriate personal and industrial hygiene practices are followed.

**Eyes:** P305; If in eyes rinse with copious amounts of water. If symptoms are severe or persist, get medical attention.

**Skin contact:** Not expected to be a skin irritant. Wash any exposed areas thoroughly with water. Remove contaminated clothing. Launder contaminated clothing before re-use. If symptoms are severe or persist, get medical attention.

**Ingestion:** Small amounts are not expected to be harmful. Immediately drink two glasses of water and if instructed to do so by medical personnel, induce vomiting by either giving IPECAC syrup or by placing finger at back of throat. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention.

**Inhalation:** Product is non-volatile and inhalation is not an expected exposure route. Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, and quiet. If symptoms are severe or persist, get medical attention.

5: FIRE-FIGHTING MEASURES

**Suitable extinguishing media:** Class B fire extinguishers (i.e.: foam, powder)

**Specific combustion hazards:** None

**Special protective equipment and precautions for fire-fighters:** Wear full bunker gear and SCBA (Self-Contained Breathing Apparatus).

6: ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures:**
Chemical Splash Goggles in compliance with OSHA regulations are advised., impermeable gloves (natural rubber, nitrile, neoprene, etc.), impermeable clothing (coveralls), and waterproof footwear. Ventilate area with fresh air for personal comfort.

**Methods and materials for containment and cleaning up:**

**Small Spill:** Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to appropriate container(s).

**Large Spill:** Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into appropriate containers.

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

---

**7: HANDLING AND STORAGE**

**Precautions for safe handling:**
P270; Do not eat, drink, or smoke when using this product. P264; Wash skin exposed to product with soap and water. Wash hands after handling this product and before eating, drinking, or smoking. Avoid exposure to skin or eyes. Do not ingest. Do not breath aerosol containing this product. Use mechanical ventilation for personal comfort.

**Conditions for safe storage:**
Store material between 40°F and 120°F in original container. Protect from freezing.

---

**8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Control parameters:**
Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

**Engineering controls:**
Mechanical and/or engineered barriers to prevent contact with this material in concentrated form are preferred.

**Personal Protective Equipment:**

**Eye protection:** Chemical Splash Goggles in compliance with OSHA regulations are advised. Chemical splash goggles or a face shield are recommended in emergency spill situations.
**Skin protection:** Avoid prolonged or repeated skin contact. Resistant gloves such as natural rubber, neoprene, nitrile rubber are recommended. Water-proof or chemical-resistant coveralls are recommended. Water-proof foot gear is recommended.

**Respiratory protection:** Avoid breathing aerosols, mists or sprays of this material if they were to form. If exposure to aerosols, mists, or sprays of this material in undiluted form are likely, wear a respirator designed to filter particulates and organic vapors.

**Prevention of ingestion:** Avoid ingesting this material. Do not eat, drink, or smoke when contamination with this material is possible. Wash hands with soap and water after handling this product and before eating, drinking, or smoking. Remove and launder contaminated clothing before eating, drinking, or smoking.

---

### 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td><strong>Liquid Upper/Lower Flammability/Explosive limits</strong></td>
<td><em>Not Applicable</em></td>
</tr>
<tr>
<td><strong>Liquid Flammability</strong></td>
<td>Non-flammable</td>
</tr>
<tr>
<td><strong>Solid, Gas Upper/Lower Flammability/Explosive limits</strong></td>
<td><em>Not Applicable</em></td>
</tr>
<tr>
<td><strong>Solid, Gas Flammability</strong></td>
<td><em>Not Applicable</em></td>
</tr>
<tr>
<td><strong>Autoignition temperature</strong></td>
<td><em>Not Applicable</em></td>
</tr>
<tr>
<td><strong>Decomposition Temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flash Point</strong></td>
<td>&gt;200°F (TCC)</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>7 (approx.)</td>
</tr>
<tr>
<td><strong>Specific Gravity</strong></td>
<td>8.4-lbs./gal.</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>&lt;20 cPs</td>
</tr>
<tr>
<td><strong>Melting point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Initial Freezing Point</strong></td>
<td>32°F</td>
</tr>
<tr>
<td><strong>Initial Boiling point</strong></td>
<td>212°F</td>
</tr>
<tr>
<td><strong>Boiling Range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Mild</td>
</tr>
<tr>
<td><strong>Odor Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapor Pressure</strong></td>
<td>&gt;1 mm Hg @ 68°F</td>
</tr>
<tr>
<td><strong>Vapor Density</strong></td>
<td>&gt;1 (air = 1)</td>
</tr>
<tr>
<td><strong>Solubility, Aqueous</strong></td>
<td>100% (miscible)</td>
</tr>
<tr>
<td><strong>Partition Coefficient: n-octanol/water</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Evaporation Rate</strong></td>
<td>As water</td>
</tr>
</tbody>
</table>
10: STABILITY AND REACTIVITY

Reactivity: Not reactive under normal conditions of use.
Chemical stability: Stable.
Possibility of hazardous reactions: None known.
Conditions to avoid: None known.
Incompatible materials: Alkali and alkaline earth metal compounds, salts, and bases. Strong oxidizers.
Hazardous decomposition products:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Toxic gas, vapor or particulate</td>
<td>During Combustion of Residue</td>
</tr>
</tbody>
</table>

11: TOXICOLOGICAL INFORMATION

Health and toxicological effects:

Likely exposure routes; ingestion, eye contact.

Symptoms of exposure; Gastrointestinal irritation, diarrhea, nausea, and vomiting. Severe eye irritation and pain.

Delayed and immediate effects; No significant acute or delayed adverse effects have been found in oral rat studies done on the components of this product relative to the composition of this blend. Severe contact with eyes could lead to injury.

Toxicity estimates;
Acute Toxicity;
Oral, mouse, LD$_{50}$ > 2000 mg/kg.
Dermal, mouse, LD$_{50}$ > 2000 mg/kg.
Inhalation, mouse, LC$_{50}$ > 20 mg/l.

Dermal Irritation; rabbit; non-irritant.
Ocular Irritation; rabbit; irritant.

This product is not considered a potential carcinogen by NPT, IARC, or OSHA.
12: ECOLOGICAL INFORMATION

Aquatic Toxicity:

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Concentration</th>
<th>Mortalities (0.0673%)</th>
<th>Concentration</th>
<th>Mortalities (0.0303%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/6/2011</td>
<td>50 mg/L</td>
<td>0%</td>
<td>50 mg/L</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>100 mg/L</td>
<td>0%</td>
<td>100 mg/L</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>200 mg/L</td>
<td>5%</td>
<td>200 mg/L</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>400 mg/L</td>
<td>0%</td>
<td>400 mg/L</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>800 mg/L</td>
<td>70%</td>
<td>800 mg/L</td>
<td>100%</td>
</tr>
</tbody>
</table>

*EC50 results are calculated using a mortality endpoint in which 50% mortality occurs in the resultant corresponding concentration.

13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Allow waste and contaminated material to dry in open air or fume hood. Incinerate residue in an industrial or commercial facility in the presence of a combustible material, or handle as non-hazardous organic chemical waste.

14: TRANSPORT INFORMATION

Transportation is as per non-hazardous material.

15: REGULATORY INFORMATION

This product is not subject to the reporting requirements of SARA Title III Section 313.

16: OTHER INFORMATION

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BT-668

Warning

Causes serious eye irritation.

Wash exposed area thoroughly after handling. Wear eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Store in well-ventilated place. Keep container tightly closed. Store locked up.

Benetech, 2245 Sequoia Drive, suite 300, Aurora, IL, 60506, US, 630-844-1300
PRODUCT BULLETIN
BT-668

Product Description ● A residual dust suppression chemical that contains a proprietary blend of specialty binders and surfactants. BT-668 provides superior residual characteristics.

Primary Uses ● A cost effective dust treatment chemical that controls airborne dust generated during the conveying process, and minimizes fugitive dust problems associated with coal stackout, stock piles, and coal moving equipment.

Benefits ● Cost effective
      ● Superior residual characteristics
      ● Easy application procedures
      ● Ecologically safe
      ● Reduces or eliminates clouds of fugitive dust caused by heavy moving equipment while on the stock pile
      ● Reduces fugitive dusting during the reclaim process
      ● Reduces airborne dust levels during the reclaim process
      ● Eliminate fugitive dust during the stack out process
      ● Will not pollute underground water supply

Dosage ● Application rate of BT-668 is directly related to coal handling practices and required residual effectiveness.

Application ● BT-668 is applied using a specifically designed pumping system. The Benetech, Inc. pumping system incorporates coal belt capacities, residual requirements and the application location.

Shipping ● Bulk tank trucks, 330 gallon totes or non-returnable 55 gallon drums.

Handling and Storage ● Avoid contact with skin and eyes.
      ● Storage can be mild steel or fiberglass construction.
      ● Will not corrode or pit.
SAFETY DATA SHEET

1. Product and Company Identification

Product identifier          Magnesium Chloride Aqueous Solution
Other means of identification 7786-30-3
FREEZGARD LITE CI PLUS
FREEZGARD ZERO CI PLUS
FREEZGARD LITE CI PLUS LS
DustGard
DustGard Plus
FreezGard Zero
FreezGard Lite
MagnaPro
Chlori-Mag
Recommended use Dust suppression, deicing, general industrial, and specialty uses.
Recommended restrictions None known.
Manufacturer North American Salt Company
A Compass Minerals Company
9900 West 109th Street, Suite 100
Overland Park, KS 66210 US
Phone: 913-344-9200
CHEMTREC 1-800-424-9300
CANUTEC 1-613-996-6666

2. Hazards Identification

Physical hazards Not classified.
Health hazards Not classified.
Environmental hazards Not classified.
OSHA defined hazards Not classified.
Label elements
Hazard symbol None.
Signal word None.
Hazard statement The substance does not meet the criteria for classification.
Precautionary statement
Prevention Observe good industrial hygiene practices.
Response Wash hands after handling.
Storage Store away from incompatible materials.
Disposal Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC) None known.
Supplemental information Not applicable.

3. Composition/Information on Ingredients

Mixture
Composition comments The criteria for listing components in this section are: Carcinogens, Respiratory Sensitizers, Mutagens, Teratogens and Reproductive toxins are listed when present at 0.1% or greater; components which are otherwise hazardous according to WHMIS/OSHA are listed when present at 1.0% or greater. Non hazardous components are not listed. The products pertaining to this SDS have various proportions of components which do not meet the listing criteria.

4. First Aid Measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.
Skin contact Rinse skin with water/shower. Get medical attention if irritation develops and persists.
Eye contact Rinse with water. Get medical attention if irritation develops and persists.
Ingestion Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.
Most important symptoms/effects, acute and delayed
Indication of immediate medical attention and special treatment needed
General information

5. Fire Fighting Measures

Suitable extinguishing media
Unsuitable extinguishing media
Specific hazards arising from the chemical
Special protective equipment and precautions for firefighters
Fire-fighting equipment/instructions
Specific methods
General fire hazards
Hazardous combustion products
Explosion data
- Sensitivity to mechanical impact
- Sensitivity to static discharge

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures
Methods and materials for containment and cleaning up
Environmental precautions

7. Handling and Storage

Precautions for safe handling
Conditions for safe storage, including any incompatibilities

8. Exposure Controls/Personal Protection

Occupational exposure limits
Biological limit values
Appropriate engineering controls

Individual protection measures, such as personal protective equipment
- Eye/face protection

Direct contact with eyes may cause temporary irritation.
Treat symptomatically.
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Treat for surrounding material.
None known.
During fire, gases hazardous to health may be formed.
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Use standard firefighting procedures and consider the hazards of other involved materials.
Cool containers exposed to flames with water until well after the fire is out.
No unusual fire or explosion hazards noted.
May include and are not limited to: Hydrogen chloride. Chlorine gas. Oxides of magnesium.
Not available.
Not available.

Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Before attempting clean up, refer to hazard data given above. Small spills may be absorbed with non-reactive absorbent and placed in suitable, covered, labelled containers. Prevent large spills from entering sewers or waterways. Contact emergency services and supplier for advice. For waste disposal, see section 13 of the SDS.
Avoid discharge into drains, water courses or onto the ground.

Avoid contact with eyes, skin and clothing. Use good industrial hygiene practices in handling this material.
Keep container tightly closed in a cool, dry and well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

No exposure limits noted for ingredient(s).
No biological exposure limits noted for the ingredient(s).
TWA PEL: No specific limits have been established for magnesium chloride (a soluble substance). As a guideline, OSHA (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates Not Otherwise Regulated (PNOR): 5mg/cu.m. Respirable Dust 8-Hour TWA PEL, 15mg/cu.m. Total Dust 8-Hour TWA PEL.

TWA TLV: No specific limits have been established for magnesium chloride (a soluble substance). As a guideline, ACGIH (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates (insolubles) Not Otherwise Classified (PNOC): 10mg/cu.m. Inhalable Particulate 8-Hours TWA TLV, 3mg/cu.m. Respirable Particulate TWA TLV.

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. If user operations generate dust, fumes, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Safety glasses
Skin protection
Hand protection Rubber gloves. Confirm with a reputable supplier first.
Other As required by employer code.
Respiratory protection Where exposure guideline levels may be exceeded, use an approved NIOSH respirator or NIOSH-approved filtering facepiece.
Thermal hazards Not applicable.
General hygiene considerations Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Form</td>
<td>Crystalline</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless to Light amber</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>7 - 9 (5% solution)</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>-1 °F (-18.33 °C) (30% solution, periodically mixed to ensure homogeneity)</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Pour point</td>
<td>Not available</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.24 - 1.34 (H2O = 1)</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>Not available</td>
</tr>
<tr>
<td>(n-octanol/water)</td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>Not available</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper/lower flammability or explosive limits</td>
<td></td>
</tr>
<tr>
<td>Flammability limit - lower (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Explosive limit - lower (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Explosive limit - upper (%)</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative density</td>
<td>Not available</td>
</tr>
<tr>
<td>Solubility(ies)</td>
<td>Easily soluble in cold water, hot water, methanol, acetone.</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
</tbody>
</table>

10. Stability and Reactivity

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactivity</td>
<td>Reactive with oxidizing agents, acids, metals in presence of moisture.</td>
</tr>
<tr>
<td>Possibility of hazardous reactions</td>
<td>No dangerous reaction known under conditions of normal use.</td>
</tr>
<tr>
<td>Chemical stability</td>
<td>Material is stable under normal conditions.</td>
</tr>
<tr>
<td>Conditions to avoid</td>
<td>Contact with incompatible materials.</td>
</tr>
<tr>
<td>Hazardous decomposition products</td>
<td>May include and are not limited to: Hydrogen chloride. Chlorine gas. Oxides of magnesium.</td>
</tr>
</tbody>
</table>

11. Toxicological Information

Information on likely routes of exposure
Ingestion Expected to be a low ingestion hazard.
| **Inhalation** | No adverse effects due to inhalation are expected. |
| **Skin contact** | No adverse effects due to skin contact are expected. |
| **Eye contact** | Direct contact with eyes may cause temporary irritation. |

**Symptoms related to the physical, chemical and toxicological characteristics**

**Information on toxicological effects**

**Acute toxicity**
Not classified.

**Skin corrosion/irritation**
Prolonged skin contact may cause temporary irritation.

**Exposure minutes**
Not available.

**Erythema value**
Not available.

**Oedema value**
Not available.

**Serious eye damage/eye irritation**
Direct contact with eyes may cause temporary irritation.

**Corneal opacity value**
Not available.

**Iris lesion value**
Not available.

**Conjunctival reddening value**
Not available.

**Conjunctival oedema value**
Not available.

**Recover days**
Not available.

**Respiratory or skin sensitization**

**Respiratory sensitization**
Not classified.

**Skin sensitization**
This product is not expected to cause skin sensitization.

**Germ cell mutagenicity**
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Mutagenicity**
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Carcinogenicity**
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

**Reproductive toxicity**
This product is not expected to cause reproductive or developmental effects.

**Teratogenicity**
Not classified.

**Specific target organ toxicity - single exposure**
Not classified.

**Specific target organ toxicity - repeated exposure**
Not classified.

**Aspiration hazard**
Not classified.

**Chronic effects**
Not classified.

**Further information**
This product has no known adverse effect on human health.

**Name of Toxicologically Synergistic Products**
Not available.

---

**12. Ecological Information**

**Ecotoxicity**
May be harmful to freshwater aquatic species and to plants that are not saline tolerant.

**Persistence and degradability**
No data is available on the degradability of this product.

**Bioaccumulative potential**
No data available.

**Mobility in soil**
No data available.

**Mobility in general**
Not available.

**Other adverse effects**
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

---

**13. Disposal Considerations**

**Disposal instructions**
Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

**Local disposal regulations**
Dispose in accordance with all applicable regulations.

**Hazardous waste code**
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products**
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging
Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

U.S. Department of Transportation (DOT)
Not regulated as dangerous goods.

Transportation of Dangerous Goods (TDG - Canada)
Not regulated as dangerous goods.

15. Regulatory Information

Canadian federal regulations
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

WHMIS status
Not Controlled

US federal regulations
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.
CERCLA Hazardous Substance List (40 CFR 302.4)
Not listed.
Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.
Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No
SARA 302 Extremely hazardous substance
No
SARA 311/312 Hazardous chemical
No
SARA 313 (TRI reporting)
Not regulated.

Other federal regulations
Safe Drinking Water Act (SDWA)
Not regulated.
Food and Drug Administration (FDA)
Total food additive
Direct food additive
GRAS food additive

US state regulations
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
Not listed.
US. Massachusetts RTK - Substance List
Not regulated.
US. Pennsylvania RTK - Hazardous Substances
Not regulated.
US. Rhode Island RTK
Not regulated.

Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
16. Other Information

**LEGEND**

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>4</td>
</tr>
<tr>
<td>Serious</td>
<td>3</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
</tr>
<tr>
<td>Slight</td>
<td>1</td>
</tr>
<tr>
<td>Minimal</td>
<td>0</td>
</tr>
</tbody>
</table>

**HEALTH** / 1

**FLAMMABILITY** 0

**PHYSICAL HAZARD** 0

**PERSONAL PROTECTION** X

**Disclaimer**
The information in the sheet was written based on the best knowledge and experience currently available. Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.

**Issue date**
16-January-2015

**Effective date**
15-January-2015

**Expiry date**
15-January-2018

**Further information**
For an updated SDS, please contact the supplier/manufacturer listed on the first page of the document.

**Prepared by**
Dell Tech Laboratories, Ltd. Phone: (519) 858-5021

**Other information**
This Safety Data Sheet was prepared to comply with the current OSHA Hazard Communication Standard (HCS) adoption of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
This SDS conforms to the ANSI Z400.1/Z129.1-2010 Standard.
Observe good industrial hygiene practices.

Wash hands after handling.

Store away from incompatible materials.

Compass Minerals, 9900 West 109th Street, Suite 100, Overland Park, KS, 66210, US, 913-344-9200

Observe good industrial hygiene practices.

Wash hands after handling.

Store away from incompatible materials.

Compass Minerals, 9900 West 109th Street, Suite 100, Overland Park, KS, 66210, US, 913-344-9200
DUSTGARD® LIQUID

PRODUCTION LOCATION
Ogden, Utah

PRODUCT DESCRIPTION
Produced naturally from the Great Salt Lake, DustGard Liquid is formulated to control dust and stabilize soil on unpaved roads, stockpiles, and other sources of fugitive dust. DustGard Liquid is a light amber liquid with a density of approximately 185 gallons per ton.

<table>
<thead>
<tr>
<th>Typical Analysis</th>
<th>Typical</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium Chloride</td>
<td>MgCl₂</td>
<td>30.5</td>
</tr>
<tr>
<td>Sulfate</td>
<td>SO₄²⁻</td>
<td>1.9</td>
</tr>
<tr>
<td>Potassium</td>
<td>K</td>
<td>0.3</td>
</tr>
<tr>
<td>Water</td>
<td>H₂O</td>
<td>68</td>
</tr>
</tbody>
</table>

PHYSICAL PROPERTIES
Specific Gravity: 1.31±/ 0.02
pH (5% Solution): 7.0 - 9.0
Weight: 10.7 - 11.1 lbs/gallon

METHOD OF ANALYSIS
All testing is from Compass Minerals' internal quality control procedures, which are available upon request.

APPLICATION AND STORAGE
This liquid MgCl₂ product in storage should be agitated regularly to minimize precipitation of undesirable solids/crystals. Application equipment should be washed daily with water. Storage equipment should be rinsed with water to prevent buildup of solids. Aluminum storage tanks or hauling equipment should not be grounded. Over application of MgCl₂ may result in unusually slippery road surfaces and should be avoided.

Information herein is intended to be indicative and not to be interpreted as a specification and no warranty is given
1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Roadsaver®-C

Recommended use of the chemical and restrictions on use: Road stabilization, dust control and de-icing

Manufacturer: EnviroTech Services, Inc.
910 54th Ave, Suite 230
Greeley, CO 80634
Telephone: (970) 346-3900

Emergency Phone: CHEMTREC: (800) 424-9300

SDS Date of Preparation: 4/23/2015

2. HAZARDS IDENTIFICATION

GHS Classification:

<table>
<thead>
<tr>
<th>Physical</th>
<th>Health</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Hazardous</td>
<td>Not Hazardous</td>
<td>Not Hazardous</td>
</tr>
</tbody>
</table>

GHS Label Elements:

Warning!

Causes serious eye irritation.

Wash thoroughly after handling.
Wear eye and face protection.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical attention.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>60-75%</td>
</tr>
<tr>
<td>Calcium Chloride</td>
<td>10043-52-4</td>
<td>25-40%</td>
</tr>
</tbody>
</table>

The exact concentration is determined according to customer request.

4. FIRST AID MEASURES
**Eye:** Flush victim's eyes with large quantities of water, while holding the eyelids apart. Get medical attention if irritation occurs and persists.

**Skin:** Wash skin thoroughly with soap and water. Get medical attention if irritation develops. Remove and launder clothing before reuse.

**Ingestion:** Do not induce vomiting. Rinse mouth with water and give one glass of water to drink. Never give anything by mouth an unconscious or convulsing person. Get medical attention if symptoms develop.

**Inhalation:** Remove victim to fresh air. If breathing is difficult or irritation persists, get medical attention.

**Most important Symptoms:** May cause slight eye and skin irritation.

**Indication of immediate medical attention/special treatment:** Immediate medical attention is not required.

---

### 5. FIRE FIGHTING MEASURES

**Suitable (and Unsuitable) Extinguishing Media:** Use media appropriate for surrounding fire. Cool fire exposed containers and structures with water.

**Specific hazards arising from the chemical:** Thermal decomposition may yield hydrogen chloride, halogenated compounds, and chlorine gas.

**Special Protective Equipment and Precautions for Fire-Fighting Instructions:** Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing. Aqueous solutions may cause surfaces to be extremely slippery and cause a slip hazard.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal Precautions, Protective Equipment, and Emergency Procedures:** Wear appropriate protective clothing as described in Section 8. Wash thoroughly after handling.

**Methods and Materials for Containment and Cleaning Up:** Dike and collect liquid or absorb with an inert absorbent and place in appropriate containers for disposal. Flush spill area with water. Report releases as required by local, state, and federal authorities.

### 7. HANDLING AND STORAGE

**Precautions for Safe Handling:** Avoid contact with the eyes, skin, and clothing. Avoid breathing mists or aerosols. Wear protective clothing and equipment as described in Section 8. Wash thoroughly with soap and water after handling. Keep containers closed when not in use.

**Conditions for Safe Storage, Including Any Incompatibilities:** Store in a cool, dry, well-ventilated area away from incompatible materials. Product may be corrosive to some metals.

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Exposure Guidelines:**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Exposure Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Chloride</td>
<td>None Established</td>
</tr>
<tr>
<td>Performance Additive</td>
<td>None Established</td>
</tr>
</tbody>
</table>
**Engineering Controls:** Use with adequate general ventilation to minimize exposures.  
**Respiratory Protection:** In operations where exposure levels are excessive, a NIOSH approved respirator with dust/mist cartridges or supplied air respirator appropriate for the form and concentration of the contaminants should be used. Selection and use of respiratory equipment must be in accordance with OSHA 1910.134 and good industrial hygiene practice.  
**Skin Protection:** Wear impervious gloves such as rubber or neoprene if needed to avoid prolonged skin contact.  
**Eye Protection:** Safety glasses recommended.  
**Other:** Long-sleeved clothing and long pants recommended to avoid prolonged skin contact. Suitable washing facilities should be available in the work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance And Odor:** Clear liquid with no odor.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not established</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Not determined</td>
</tr>
<tr>
<td>Initial Boiling Point/Range</td>
<td>110-122°C (230-252°F)</td>
</tr>
<tr>
<td>Solubility In Water</td>
<td>Soluble</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not determined</td>
</tr>
<tr>
<td>Relative Density</td>
<td>1.25-1.42</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not determined</td>
</tr>
<tr>
<td>Melting/Freezing Point</td>
<td>Not determined</td>
</tr>
<tr>
<td>VOC Content</td>
<td>Not determined</td>
</tr>
<tr>
<td>Octanol/Water Coefficient</td>
<td>Not determined</td>
</tr>
<tr>
<td>Solubility</td>
<td>Complete</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Viscosity</td>
<td>&lt;100 cP @ 70°F</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flashpoint</td>
<td>None</td>
</tr>
<tr>
<td>Autoignition Temperature</td>
<td>Not determined</td>
</tr>
<tr>
<td>Flammable Limits: LEL</td>
<td>Not determined</td>
</tr>
<tr>
<td>UEL</td>
<td>Not determined</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

**Reactivity:** Not normally reactive  
**Chemical Stability:** Stable under normal storage and handling conditions.  
**Possibility of Hazardous Reactions:** None known.  
**Conditions to Avoid:** None known.  
**Incompatible Materials:** Strong oxidizing agents, concentrated acids, and some metals.  
**Hazardous Decomposition Products:** When heated to decomposition emits hydrogen chloride, halogenated compounds, and chlorine gas.

11. TOXICOLOGICAL INFORMATION

**HEALTH HAZARDS:**  
**Ingestion:** Ingestion may cause slight irritation with nausea, vomiting, and diarrhea.  
**Inhalation:** Inhalation of mists may cause slight irritation of the nose throat and upper respiratory tract.  
**Eye:** May cause slight irritation with pain and tearing.  
**Skin:** May cause slight irritation on prolonged or repeated contact.  
**Sensitization:** This material is not known to cause sensitization.  
**Chronic:** None known.
Carcinogenicity: None of the components is listed as a carcinogen or suspected carcinogen by IARC, NTP, or OSHA.
Germ Cell Mutagenicity: None currently known.
Reproductive Toxicity: None currently known.

Numerical Measures of Toxicity:
No toxicity data available

12. ECOLOGICAL INFORMATION

Ecotoxicity: No data available
Persistence and Degradability: Biodegradation is not applicable to inorganic substances.
Bioaccumulative Potential: No data available
Mobility in Soil: No data available
Other Adverse Effects: None known

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with local, state, and federal environmental regulations.

14. TRANSPORT INFORMATION

DOT Hazardous Materials Description:
Proper Shipping Name: Not regulated
UN Number: None
Hazard Class/Packing Group: None
Labels Required: None

15. REGULATORY INFORMATION

CERCLA: This product is not subject to CERCLA release reporting. Many states have more stringent release reporting requirements. Report spills required under federal, state, and local regulations.

SARA Hazard Category (311/312): Not Hazardous

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements under SARA Title III, Section 313 (40 CFR 372): None

EPA TSCA Inventory: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA:
This product has been classified under the CPR and this MSDS discloses information elements required by the CPR.
Canadian CEPA: All the components of this product are listed on the Canadian DSL.
Canadian WHMIS Classification: Not classified as dangerous

16. OTHER INFORMATION

NFPA Rating: Health = 2 Flammability = 0 Instability = 0
HMIS Rating: Health = 2 Flammability = 0 Physical Hazard = 0

SDS Revision History:
5/15/2014: New SDS
4/23/2015: Updated SDS with new classification

Disclaimer: This Safety Data Sheet (SDS) is provided in response to customer requests to address the safe handling of the product. All statements, technical information and recommendations contained herein are the best of our knowledge, reliable and accurate. This SDS is not intended to make any representation as to how the product will perform when used for its intended purpose by a user. In that regards the product is sold “AS IS” and nothing in this SDS should be deemed to be a representation or warranty of any injury, loss, or damage, of any kind or nature, which are sustained by or arise from the use of the product. Nothing in this SDS is intended to be a representation or warranty by the manufacturer of the accuracy, safety, or usefulness for any purpose of any technical information, materials, techniques, or practices.

The information contained in this Safety Data Sheet is, to the best of our knowledge, accurate and reliable. This information should be provided to all individuals handling this product. Federal, state, and local regulations should be followed when handling this product.
Roadsaver-C

Warning
Causes serious eye irritation.

Wash thoroughly after handling Wear eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

EnviroTech, 910 54th Ave, Suite 230, Greely, CO, 80634, US, 970-346-3900
1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Roadsaver®

Recommended use of the chemical and restrictions on use: Road stabilization and dust control

Manufacturer: EnviroTech Services, Inc.
910 54th Ave, Suite 230
Greeley, CO 80634
Telephone: (970) 346-3900

Emergency Phone: CHEMTREC: (800) 424-9300

SDS Date of Preparation: 5/15/2014

2. HAZARDS IDENTIFICATION

GHS Classification:

<table>
<thead>
<tr>
<th>Physical</th>
<th>Health</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Hazardous</td>
<td>Not Hazardous</td>
<td>Not Hazardous</td>
</tr>
</tbody>
</table>

GHS Label Elements:
None Required

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS No.</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>65-75%</td>
</tr>
<tr>
<td>Magnesium Chloride</td>
<td>7791-18-6</td>
<td>25-35%</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>7487-88-9</td>
<td>&lt;5.0%</td>
</tr>
</tbody>
</table>

The exact concentration is being withheld as a trade secret.

4. FIRST AID MEASURES

Eye: Flush victim’s eyes with large quantities of water, while holding the eyelids apart. Get medical attention if irritation occurs and persists.

Skin: Wash skin thoroughly with soap and water. Get medical attention if irritation develops. Remove and launder clothing before reuse.

Ingestion: Do not induce vomiting. Rinse mouth with water and give one glass of water to drink. Never give anything by mouth to an unconscious or convulsing person. Get medical attention if symptoms develop.

Inhalation: Remove victim to fresh air. If breathing is difficult or irritation persists, get medical attention.

Most important Symptoms: May cause slight eye and skin irritation.

Indication of immediate medical attention/special treatment: Immediate medical attention is not required.
5. FIRE FIGHTING MEASURES

Suitable (and Unsuitable) Extinguishing Media: Use media appropriate for surrounding fire. Cool fire exposed containers and structures with water.
Specific hazards arising from the chemical: Thermal decomposition may yield hydrogen chloride, halogenated compounds, and chlorine gas.
Special Protective Equipment and Precautions for Fire-Fighting Instructions: Firefighters should wear positive pressure self-contained breathing apparatus and full protective clothing. Aqueous solutions may cause surfaces to be extremely slippery and cause a slip hazard.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures: Wear appropriate protective clothing as described in Section 8. Wash thoroughly after handling.

Methods and Materials for Containment and Cleaning Up: Dike and collect liquid or absorb with an inert absorbent and place in appropriate containers for disposal. Flush spill area with water. Report releases as required by local, state and federal authorities.

7. HANDLING AND STORAGE

Precautions for Safe Handling: Avoid contact with the eyes, skin and clothing. Avoid breathing mists or aerosols. Wear protective clothing and equipment as described in Section 8. Wash thoroughly with soap and water after handling. Keep containers closed when not in use.

Conditions for Safe Storage, Including Any Incompatibilities: Store in a cool, dry, well-ventilated area away from incompatible materials. Product may be corrosive to some metals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium chloride</td>
<td>None Established</td>
</tr>
</tbody>
</table>

Engineering Controls: Use with adequate general ventilation to minimize exposures.
Respiratory Protection: In operations where exposure levels are excessive, a NIOSH approved respirator with dust/mist cartridges or supplied air respirator appropriate for the form and concentration of the contaminants should be used. Selection and use of respiratory equipment must be in accordance with OSHA 1910.134 and good industrial hygiene practice.
Skin Protection: Wear impervious gloves such as rubber or neoprene if needed to avoid prolonged skin contact.
Eye Protection: Safety glasses recommended.
Other: Long-sleeved clothing and long pants recommended to avoid prolonged skin contact. Suitable washing facilities should be available in the work area.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance And Odor: Clear to slight yellow liquid with low or no odor.

<table>
<thead>
<tr>
<th>Physical State: Liquid</th>
<th>Odor Threshold: Not established</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapor Density: Not determined</td>
<td>Initial Boiling Point/Range: 107.2°C (225°F)</td>
</tr>
<tr>
<td>Solubility In Water: Soluble</td>
<td>Vapor Pressure: Not determined</td>
</tr>
<tr>
<td>Relative Density: 1.24-1.34</td>
<td>Evaporation Rate: Not determined</td>
</tr>
<tr>
<td>Melting/Freezing Point: Not determined</td>
<td>pH: 4-9</td>
</tr>
<tr>
<td>VOC Content: Not determined</td>
<td>Octanol/Water Coefficient: Not determined</td>
</tr>
<tr>
<td>Solubility: Complete</td>
<td>Decomposition Temperature: Not determined</td>
</tr>
<tr>
<td>Viscosity: &lt;60 cP @ 70°F</td>
<td>Flammability (solid, gas): Not applicable</td>
</tr>
<tr>
<td>Flashpoint: None</td>
<td>Autoignition Temperature: Not determined</td>
</tr>
<tr>
<td>Flammable Limits: LEL: Not determined</td>
<td>UEL: Not determined</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Reactivity: Not normally reactive
Chemical Stability: Stable under normal storage and handling conditions.
Possibility of Hazardous Reactions: None known.
Conditions to Avoid: None known.
Incompatible Materials: Strong oxidizing agents, concentrated acids, and some metals.
Hazardous Decomposition Products: When heated to decomposition emits hydrogen chloride, halogenated compounds, and chlorine gas.

11. TOXICOLOGICAL INFORMATION

HEALTH HAZARDS:
Ingestion: Ingestion may cause slight irritation with nausea, vomiting, and diarrhea.
Inhalation: Inhalation of mists may cause slight irritation of the nose, throat, and upper respiratory tract.
Eye: May cause slight irritation with pain and tearing.
Skin: May cause slight irritation on prolonged or repeated contact.
Sensitization: This material is not known to cause sensitization.
Chronic: None known.
Carcinogenicity: None of the components is listed as a carcinogen or suspected carcinogen by IARC, NTP, or OSHA.
Germ Cell Mutagenicity: None currently known.
Reproductive Toxicity: None currently known.

Numerical Measures of Toxicity:
No toxicity data available
12. ECOLOGICAL INFORMATION

Ecotoxicity:
Product: Fathead minnow NOEC: 1.00 g/L; Ceriodaphnia dubia NOEC: 1.00 g/L; Selenastrum growth NOEC: 2.00 g/L

Persistence and Degradability: Biodegradation is not applicable to inorganic substances.

Bioaccumulative Potential: No data available

Mobility in Soil: No data available

Other Adverse Effects: None known

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with local, state, and federal environmental regulations.

14. TRANSPORT INFORMATION

DOT Hazardous Materials Description:
Proper Shipping Name: Not regulated
UN Number: None
Hazard Class/Packing Group: None
Labels Required: None

15. REGULATORY INFORMATION

CERCLA: This product is not subject to CERCLA release reporting. Many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA Hazard Category (311/312): Not Hazardous

SARA 313: This product contains the following chemicals subject to Annual Release Reporting Requirements under SARA Title III, Section 313 (40 CFR 372): None

EPA TSCA Inventory: All of the ingredients in this product are listed on the EPA TSCA Inventory.

CANADA:
This product has been classified under the CPR and this SDS discloses information elements required by the CPR.

Canadian CEPA: All the components of this product are listed on the Canadian DSL.

Canadian WHMIS Classification: Not classified as dangerous
16. OTHER INFORMATION

NFPA Rating: Health = 0  Flammability = 0  Instability = 0
HMIS Rating: Health = 1  Flammability = 0  Physical Hazard = 0

SDS Revision History:
5/15/2014: New SDS
4/23/2015: Reviewed, no changes required

Disclaimer: This Safety Data Sheet (SDS) is provided in response to customer requests to address the safe handling of the product. All statements, technical information and recommendations contained herein are the best of our knowledge, reliable and accurate. This SDS is not intended to make any representation as to how the product will perform when used for its intended purpose by a user. In that regards the product is sold “AS IS” and nothing in this SDS should be deemed to be a representation or warranty of any injury, loss, or damage, of any kind or nature, which are sustained by or arise from the use of the product. Nothing in this SDS is intended to be a representation or warranty by the manufacturer of the accuracy, safety, or usefulness for any purpose of any technical information, materials, techniques, or practices.

The information contained in this Safety Data Sheet is, to the best of our knowledge, accurate and reliable. This information should be provided to all individuals handling this product. Federal, state, and local regulations should be followed when handling this product.
Roadsaver

EnviroTech, 910 54th Ave, Suite 230, Greely, CO, 80634, US, 970-346-3900

Roadsaver

EnviroTech, 910 54th Ave, Suite 230, Greely, CO, 80634, US, 970-346-3900
SECTION 1 – IDENTIFICATION

PRODUCT NAME

DURASOIL
Ultra-Pure Synthetic Dust Control Fluid

RELATED PATENTS

U.S. Patent No. 8,968,592
Additional patents may be pending in the U.S. and elsewhere

CHEMICAL FAMILY

Non-Petroleum Synthetic Alkane Fluid

COMMON NAMES

Dust Binder, Dust Control Agent, Dust Control Material, Dust Inhibitor, Dust Palliative, Dust Retardant, Dust Stabilizer and Dust Suppressant

MANUFACTURER

Soilworks, LLC – Soil Stabilization & Dust Control
7580 N Dobson Rd, Ste 320
Scottsdale, Arizona 85256 USA
(800) 545-5420 USA
+1 (480) 545-5454 International
info@soilworks.com
www.soilworks.com

EMERGENCY PHONE NUMBERS

(800) 545-5420 USA
+1 (480) 545-5454 International

U.S. DATA UNIVERSAL NUMBERING SYSTEM (DUNS NUMBER)

Soilworks, LLC 131946159

U.S. DEPARTMENT OF DEFENSE COMMERCIAL AND GOVERNMENT ENTITY CODE (CAGE CODE)

Soilworks, LLC 3FTH5

U.S. DEPARTMENT OF DEFENSE NATIONAL STOCK NUMBERS (NSN)

275-gallon (1,041 Liter) Intermediate Bulk Container (IBC) Tote 6850-01542-5354
55-gallon (208 Liter) Drum 6850-01-542-3715

U.S. GENERAL SERVICES ADMINISTRATION (GSA) CONTRACT

Soilworks, LLC GS-07F-5364P October 31, 2018

SYNONYMS/OTHER MEANS OF IDENTIFICATION

Durasoil is a synthetic fluid based dust binder, dust control agent, dust control fluid, dust control liquid, dust control material, dust control product, dust inhibitor, dust palliative, dust retardant, dust stabilizer and dust suppressant.

INTENDED USES

Durasoil is an environmentally safe, 100% non-petroleum, genuine synthetic fluid binder used for a wide variety of applications to abate dust, control dust, eliminate dust, inhibit dust, mitigate dust, reduce dust, retard dust, stabilize dust, stop dust and suppress dust for dust abatement, dust control, dust elimination, dust mitigation, dust reduction, dust stabilization and dust suppression.
SECTION 2 – HAZARDS IDENTIFICATION

This material is NOT considered hazardous according to OSHA criteria.

### Emergency Overview

**Appearance:** Bright clear (colorless) viscous liquid (fluid).

**Odor:** None. Odorless.

**Health Hazards:** Harmful: may cause lung damage if swallowed.

**Safety Hazards:** Nonflammable, but will burn on prolonged exposure to flame for high temperature.

**Environmental Hazards:** NOT classified as dangerous for the environment.

### HEALTH HAZARDS

**INHALATION**

Under normal conditions of use, this material is NOT expected to be a primary route of exposure.

**SKIN CONTACT**

Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as acne/folliculitis.

**EYE CONTACT**

May cause slight irritation to eyes.

**INGESTION**

Harmful: may cause lung damage if swallowed.

### SIGNS AND SYMPTOMS

If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure. Ingestion may result in nausea, vomiting and/or diarrhea.

### U.S. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 704 HAZARD CLASS

<table>
<thead>
<tr>
<th>Health</th>
<th>0</th>
<th>No unusual hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>1</td>
<td>Nonflammable, but will burn on prolonged exposure to flame for high temperature.</td>
</tr>
<tr>
<td>Reactivity</td>
<td>0</td>
<td>Stable, non-reactive and non-explosive</td>
</tr>
</tbody>
</table>

### U.S. HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS) RATING

<table>
<thead>
<tr>
<th>Health</th>
<th>0</th>
<th>No significant risk to health</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>1</td>
<td>Nonflammable, but will burn on prolonged exposure to flame for high temperature.</td>
</tr>
<tr>
<td>Physical Hazard</td>
<td>0</td>
<td>Stable, non-reactive and non-explosive</td>
</tr>
<tr>
<td>Personal Protection</td>
<td>-</td>
<td>No special hazard under normal use</td>
</tr>
</tbody>
</table>

SECTION 3 – COMPOSITION/ INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>#</th>
<th>COMPONENT</th>
<th>%</th>
<th>CASRN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A complex mixture of synthetic linear, branched and cyclic alkanes</td>
<td>Trade secret</td>
<td>Non-Hazardous</td>
</tr>
<tr>
<td>2.</td>
<td>Proprietary</td>
<td>Trade secret</td>
<td>Non-Hazardous</td>
</tr>
</tbody>
</table>

SECTION 4 – FIRST-AID MEASURES

### EYE CONTACT

If irritation or redness develops from exposure, flush eyes with clean water. If irritation persists, seek medical attention.

### SKIN CONTACT

No treatment necessary under normal conditions of use. Remove contaminated clothing. Wash affected area with mild soap and water. If irritation or redness develops and persists, seek medical attention.
INHALATION
No treatment necessary under normal conditions of use. If breathing difficulties develop move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek medical attention.

INGESTION
No treatment necessary under normal conditions of use. If swallowed do not induce vomiting. If symptoms persist, seek medical attention.

SECTION 5 – FIRE-FIGHTING MEASURES

FLAMMABILITY
Nonflammable, but will burn on prolonged exposure to flame or high temperature.

FLASH POINT
420° F (216° C)  ASTM D-93 (PMCC)
474° F (246° C)  ASTM D-92 (COC)

AUTOIGNITION TEMPERATURE
>605° F (>318° C)

EXTINGUISHING MEDIA
Use foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

SPECIAL FIRE FIGHTING PROCEDURES & PROTECTIVE EQUIPMENT
Do NOT use water in a jet. Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

SPECIFIC HAZARDS
Hazardous combustion products may include: a complex mixture of airborne solid and liquid particulates and gasses (smoke). Carbon monoxide. Unidentified compounds.

U.S. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 704 HAZARD CLASS

<table>
<thead>
<tr>
<th>Property</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>0</td>
<td>No unusual hazard</td>
</tr>
<tr>
<td>Flammability</td>
<td>1</td>
<td>Nonflammable, but will burn on prolonged exposure to flame or high temperature.</td>
</tr>
<tr>
<td>Reactivity</td>
<td>0</td>
<td>Stable, non-reactive and non-explosive</td>
</tr>
</tbody>
</table>

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Safety Data Sheet. See Chapter 13 for information on disposal. Observe the relevant local and international regulations.

PROTECTIVE MEASURES
Stop the leak, if possible. Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches, sewers, rivers or open bodies of water by using sand, earth or other appropriate barriers.

CLEAN-UP METHODS
Avoid accidents, clean up immediately. Slippery when spilled. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.
ADDITIONAL ADVICE
Local authorities should be advised if significant spillages cannot be contained.

SECTION 7 - HANDLING AND STORAGE

GENERAL PRECAUTIONS
Use local exhaust ventilation if there is risk of inhalation of vapors, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

STORAGE
Keep container tightly closed in a cool, well-ventilated place. Use properly labelled and closeable containers.

HANDLING
Avoid breathing vapors or mist. Avoid contact with eyes. Avoid prolonged or repeated contact with skin. Wash thoroughly after handling. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

RECOMMENDED MATERIALS
For containers or container linings, use mild steel or high density polyethylene.

ADDITIONAL INFORMATION
Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS
ACGIH (mist) : TWA (inhalable fraction) 5 mg/m³
OSHA Z1 (Mist): PEL 5 mg/m³
OSHA Z1A (Mist): TWA 5 mg/m³

EXPOSURE CONTROLS
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

PERSONAL PROTECTIVE EQUIPMENT
Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

RESPIRATORY PROTECTION
Respiratory protection is NOT required under normal conditions of use in a well-ventilated workplace. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapors.
**HAND PROTECTION**
Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed with soap and water and dried thoroughly.

**EYE PROTECTION**
Eye protection is NOT required under normal conditions of use. If material is handled such that it could be splashed into eyes, wear splash-proof safety goggles or full face shield.

**PROTECTIVE CLOTHING**
Skin protection is NOT required under normal conditions of use or for single, short duration exposures. For prolonged or repeated exposures, use impervious chemical resistant boots, gloves and/or aprons over parts of the body subject to exposure.

**MONITORING METHODS**
Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls.

---

### SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aniline Point</strong></td>
<td>235 °F (113 °C)</td>
</tr>
<tr>
<td><strong>Ash Content</strong></td>
<td>&lt;0.01% (None detected)</td>
</tr>
<tr>
<td><strong>Auto Ignition Temperature</strong></td>
<td>&gt;605°F (&gt;318 °C)</td>
</tr>
<tr>
<td><strong>Boiling Point</strong></td>
<td>464 °F (240 °C)</td>
</tr>
<tr>
<td><strong>Cloud Point</strong></td>
<td>-22 °F (-30 °C)</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>None. Colorless, clear and bright</td>
</tr>
<tr>
<td><strong>Conductivity</strong></td>
<td>5,886 pS/m</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>&lt;6.8 lb/gal (816 kg/m³) @ 59 °F (15 °C)</td>
</tr>
<tr>
<td><strong>Dielectric Strength</strong></td>
<td>46 MV/m</td>
</tr>
<tr>
<td><strong>Flash Point (ASTM D92 COC)</strong></td>
<td>474 °F (246 °C)</td>
</tr>
<tr>
<td><strong>Flash Point (ASTM D93 PMCC)</strong></td>
<td>420 °F (216 °C)</td>
</tr>
<tr>
<td><strong>Kinematic Viscosity</strong></td>
<td>4 cSt @ 212 °F (100 °C)</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>None, Odorless</td>
</tr>
<tr>
<td><strong>Oil Sheen</strong></td>
<td>None. Oil sheen free</td>
</tr>
<tr>
<td><strong>Physical Form</strong></td>
<td>Liquid, Synthetic Fluid</td>
</tr>
<tr>
<td><strong>Pour Point</strong></td>
<td>-40 °F (-40 °C)</td>
</tr>
<tr>
<td><strong>Specific Gravity</strong></td>
<td>0.8155 @ 59 °F (15 °C)</td>
</tr>
<tr>
<td><strong>Vapor Density (Air = 1)</strong></td>
<td>&gt;1</td>
</tr>
<tr>
<td><strong>Vapor Pressure</strong></td>
<td>&lt;0.5 Pa @ 68 °F (20 °C)</td>
</tr>
<tr>
<td><strong>Viscosity Index</strong></td>
<td>130 (minimal change with temperature)</td>
</tr>
<tr>
<td><strong>Water Content</strong></td>
<td>&lt;0.01% (None detected)</td>
</tr>
<tr>
<td><strong>Water Solubility</strong></td>
<td>Insoluble</td>
</tr>
</tbody>
</table>
SECTION 10 - STABILITY AND REACTIVITY

CHEMICAL STABILITY
Stable.

CONDITIONS TO AVOID
Extreme heat.

MATERIALS TO AVOID
Strong oxidizing agents.

HAZARDOUS DECOMPOSITION
Hazardous decomposition products are NOT expected to form during normal storage.

CORROSIVITY
Non-corrosive.

AIRCRAFT SURFACE REACTIVITY
Non-injurious to aircraft surfaces (Boeing Specification D6-17487 revision R)

<table>
<thead>
<tr>
<th>Property</th>
<th>Pass / Conforms</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandwich Corrosion</td>
<td>Pass / Conforms</td>
<td>No corrosion</td>
</tr>
<tr>
<td>Acrylic Crazing</td>
<td>Pass / Conforms</td>
<td>No crazing, cracking or etching</td>
</tr>
<tr>
<td>Paint Softening</td>
<td>Pass / Conforms</td>
<td>No hardness change, discoloration or staining</td>
</tr>
<tr>
<td>Hydrogen Embrittlement</td>
<td>Pass / Conforms</td>
<td>No failure</td>
</tr>
</tbody>
</table>

SECTION 11 - TOXICOLOGICAL INFORMATION

SKIN IRRITATION
Expected to be slightly irritating. Prolonged or repeated contact may cause defatting of the skin which can lead to dermatitis.

EYE IRRITATION
Expected to be slightly irritating.

RESPIRATORY IRRITATION
Inhalation of vapors or mists may cause irritation.

SENSITIZATION
NOT expected to be a skin sensitizer.

REPEATED DOSE TOXICITY
NOT expected to be a hazard.

CARCINOGENICITY
Components are NOT known to be associated with carcinogenic effects.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSHA</td>
<td>U.S. Occupational Safety and Health Administration</td>
</tr>
<tr>
<td>NTP</td>
<td>U.S. National Toxicology Program</td>
</tr>
<tr>
<td>IARC</td>
<td>World Health Organization International Agency for Research on Cancer</td>
</tr>
<tr>
<td>Prop 65</td>
<td>California Office of Environmental Health Hazard Assessment Proposition 65</td>
</tr>
</tbody>
</table>

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY
NOT expected to be a hazard.
BENZENE & NAPHTHALENE
None Detected – EPA 5030B & 8260B

DIOXINS & FURANS (PCDDs / PCDFs)
None Detected – QC066-97, GC-MS

HALOGENATED VOLATILE ORGANICS
None Detected – EPA 5030B & 8260B

METALS (TCLP)
None Detected - EPA 6010B & 7470A

METALS
None Detected - EPA 6020 & 3050B, ICP

MUTAGENICITY
None Detected – APHA 8030B

PESTICIDES, HERBICIDES AND PCBS
None Detected - EPA 8081A & 8151A

PHENOLIC COMPOUNDS
None Detected – QC066-97, GC-MS

POLYCHLORINATED BIPHENYL (PCBs)
None Detected – GC-MS

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)
None Detected – EPA 3510, QC058-97, GC-MS

SEMI-VOLATILE ORGANIC COMPOUNDS
None Detected - EPA 8270C

SEMI-VOLATILE ORGANIC COMPOUNDS (TCLP)
None Detected - EPA 8270 & 1311

VOLATILE ORGANIC COMPOUNDS (TCLP)
None Detected - EPA 8260

VOLATILE ORGANIC COMPOUNDS (VOC)
None Detected - EPA 8260B

SECTION 12 - ECOLOGICAL INFORMATION

Based on EPA guidelines, Durasoil is classified as practically non-toxic to all species. When used and applied properly, Durasoil is not known to pose any ecological problems.

AQUATIC TOXICITY

<table>
<thead>
<tr>
<th>Organism</th>
<th>Test Endpoint</th>
<th>EC50</th>
<th>LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterium</td>
<td>Alivibrio fischeri</td>
<td></td>
<td>&gt;500,000 mg/L</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>Pimephales promelas</td>
<td>IC50</td>
<td>&gt;2,000 mg/L</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>Pimephales promelas</td>
<td>IC25</td>
<td>&gt;39,000 mg/L</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>Pimephales promelas</td>
<td>IC50</td>
<td>&gt;28,000 mg/L</td>
</tr>
<tr>
<td>Microalga</td>
<td>Pseudokirchneriella subcapita</td>
<td>IC50</td>
<td>&gt;500,000 mg/L</td>
</tr>
<tr>
<td>Mysid Shrimp</td>
<td>Americamysis bahia</td>
<td>IC50</td>
<td>&gt;1,000 mg/L</td>
</tr>
<tr>
<td>Mysid Shrimp</td>
<td>Americamysis bahia</td>
<td>LC50</td>
<td>&gt;2,000 mg/L</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>Oncorhynchus mykiss</td>
<td>LC50</td>
<td>&gt;2,000 mg/L</td>
</tr>
<tr>
<td>Water Flea</td>
<td>Daphnia magna</td>
<td>LC50</td>
<td>18,000 mg/L</td>
</tr>
</tbody>
</table>

TERRESTRIAL TOXICITY

<table>
<thead>
<tr>
<th>Organism</th>
<th>Test Endpoint</th>
<th>LC50</th>
<th>EC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce</td>
<td>Seed germination</td>
<td>&gt;680,000 mg/L</td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>Root elongation</td>
<td>&gt;13,000 mg/L</td>
<td></td>
</tr>
<tr>
<td>Earthworm</td>
<td>Eisenia andrei</td>
<td>&gt;670,000 mg/L</td>
<td></td>
</tr>
</tbody>
</table>

DEGRADABILITY

Major constituents are expected to be readily biodegradable

MOBILITY

Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to the soil particles and will NOT be mobile.
OTHER ADVERSE EFFECTS
The synthetic fluid contains non-volatile components, which are NOT expected to be released to air in any significant quantities. Synthetic fluid is NOT expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

SECTION 13 - DISPOSAL CONSIDERATIONS

MATERIAL DISPOSAL
Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do NOT dispose into the environment, in drains or in water courses.

CONTAINER DISPOSAL
Dispose in accordance with prevailing regulations, preferably to a recognized collector or contractor. The competence of the collector or contractor should be established beforehand.

LOCAL LEGISLATION
Dispose in accordance with applicable regional, national and local laws and regulations.

SECTION 14 - TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)
NOT regulated. This material is NOT subject to DOT regulations under 49 CFR Parts 171-180.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)
NOT regulated. This material is NOT classified as dangerous under IMDG regulations.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)
NOT regulated. This material is either NOT classified as dangerous under IATA regulations or needs to follow country specific requirements.

SECTION 15 - REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

U.S. FEDERAL REGULATIONS

EPA COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)
This material does NOT contain any chemicals with U.S. EPA CERCLA reportable quantities.

EPA SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA)
This material does NOT contain any chemicals with SARA reportable quantities.

EPA TOXIC SUBSTANCES CONTROL ACT (TSCA)
All components listed.

EPA CERCLA/SARA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES AND TPQS
This material does NOT contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.
EPA CERCLA/SARA SECTION 311/312 (TITLE III HAZARD CATEGORIES)

Acute Health: No
Chronic Health: No
Fire Hazard: No
Pressure Hazard: No
Reactive Hazard: No

EPA CERCLA/SARA SECTION 313 AND 40 CFR 372

This material does NOT contain any chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372.

U.S. STATE REGULATIONS

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65)

This material does NOT contain any chemicals known to the State of California to cause cancer, birth defects or reproductive harm.

CANADIAN REGULATIONS

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the regulations.

CANADIAN DOMESTIC SUBSTANCES LIST (DSL)

All components listed.

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHIMIS)

None. This synthetic fluid is NOT a controlled product under the Canadian WHIMIS.

BUREAU DE NORMALIZATION DU QUÉBEC (BNQ)


EUROPEAN REGULATIONS

EUROPEAN INVENTORY OF EXISTING COMMERCIAL SUBSTANCES (EINECS)

All components listed.

SECTION 16 – OTHER INFORMATION

SDS VERSION NUMBER
1.1

SDS EFFECTIVE DATE
2/27/2015

SDS REGULATIONS

The content and format of this SDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SDS DISTRIBUTION

The information in this document should be made available to all who may handle the product.
DISCLAIMER
The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.
Durasoil

May cause lung damage if swallowed. Nonflammable but will burn on prolonged exposure to flame for high temperature.

Soilworks, 7580 N Dobson Rd, Ste 320, Scottsdale, AZ, 800-545-5420, US, 800-545-5420

Durasoil

May cause lung damage if swallowed. Nonflammable but will burn on prolonged exposure to flame for high temperature.

Soilworks, 7580 N Dobson Rd, Ste 320, Scottsdale, AZ, 800-545-5420, US, 800-545-5420
Ultra-Pure Synthetic Dust Control Fluid

Volume*: 275 gal (1,041 L)
Gross Weight*: 2,040 lbs (925 kg)
Dimensions*: 40 x 48 x 42 in (100 x 120 x 116 cm)

*Figures are approximate

Read Material Safety Data Sheet before using this product
Keep out of reach of children
For industrial and professional use only

FIRST AID
Inhalation: no treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice. Skin: Remove contaminated clothing. Flush exposed area with water and follow by washing with soap. Eyes: flush with copious quantities of water. If persistent irritation occurs, obtain medical attention. Ingestion: if swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment.

FIRE
Foam, water spray or fog.

SPILLS
Slippery when spilled. Avoid accidents and clean up immediately. Prevent from spreading or entering drains. Do not let open bodies of water by making barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent such as clay, sand or other suitable material and dispose of properly.

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health</th>
<th>Fire</th>
<th>React</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Manufactured & Distributed by
Soilworks, LLC
Soil Stabilization & Dust Control
7580 N Dobson Rd, Ste 320, Scottsdale, AZ 85256
800.545.5420 USA | 001.480.545.5454 International
www.soilworks.com | info@soilworks.com
MATERIAL SAFETY DATA SHEET

SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME
GORILLA-SNOT*
*GORILLA-SNOT is a registered trademark of Soilworks, LLC.
MANUFACTURER
Soilworks, LLC.
ONLINE INFORMATION
www.soilworks.com
EMERGENCY TELEPHONE NUMBERS
800.545.5420 USA
001.480.545-5454 International
REVISION DATE
August 2013 (supersedes November 2007)
PHYSICAL FORM
Mobile liquid
COLOR
Milky White (transparent once cured)
ODOR
Mild / Slight (no odor once cured)
C.A.S. CHEMICAL NAME
Mixture
SYNONYMS
Soil stabilizer, soil stabilization agent, soil solidifier, soil amendment, soil additive, soil crusting agent, dust control agent, dust inhibitor, dust palliative, dust suppressant, dust retardant

CHEMICAL FAMILY
Vinyl Copolymer Emulsion
EMPIRICAL FORMULA
Mixure
INTENDED USE
Soil stabilization, soil solidification, fugitive dust control, dust suppression, dust abatement, tackifier, dust abatement, FMx and PMx air quality control and erosion control

SECTION 2 - INGREDIENTS

<table>
<thead>
<tr>
<th>%</th>
<th>CAS Number</th>
<th>Chemical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-60</td>
<td>Proprietary</td>
<td>Vinyl Copolymer</td>
</tr>
<tr>
<td>80-40</td>
<td>7732-18-5</td>
<td>Water</td>
</tr>
</tbody>
</table>

SECTION 3 - HEALTH HAZARDS

ROUTES OF ENTRY
Eye Contact, Skin Contact, Ingestion and Inhalation

SIGNS AND SYMPTOMS OF ACUTE EXPOSURE
Eyes: Direct contact with this material may cause eye irritation including lachrymation (tearing).
Inhalation: Inhalation of vapor or aerosol may cause irritation to the respiratory tract (nose, throat, and lungs).
Skin: Contact may cause skin irritation.
Ingestion: No hazard in normal industrial use.

SIGNS AND SYMPTOMS OF CHRONIC EXPOSURE
Prolonged or repeated contact with skin may cause irritation and dermatitis (inflammation).

CARCINOGENICITY
This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 4 - FIRST AID

EYE CONTACT
Flush eyes with clean water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT
Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation develops or persists.

SGS1306065 Gorilla-Snot MSDS
Revised: 3/14/14
INHALATION
Move patient to fresh air. If breathing has stopped or is labored give assisted respiration (e.g. mouth-to-mouth). Supplemental oxygen may be indicated. Seek medical advice.

INGESTION
Give the victim one or two glasses of water or milk to drink. Get immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION 5 – FIRE AND EXPLOSION DATA

FLASH POINT (closed cup)
Not applicable

UPPER EXPLOSION LIMIT (UEL)
Not applicable

LOWER EXPLOSION LIMIT (LEL)
Not applicable

AUTOIGNITION TEMPERATURE
Not applicable

FIRE HAZARD CLASSIFICATION (OSHA/NFPA)
Non-Combustible

EXTINGUISHING MEDIA
Product does not burn. The product will only burn after the water it contains is driven off. For dry polymer use carbon dioxide, foam, dry chemical or water fog to extinguish fire. Aqueous solution is not flammable.

FIRE FIGHTING EQUIPMENT
Wear self-contained breathing apparatus (SCBA) and full fire fighting protective clothing. Thoroughly decontaminate all protective equipment after use.

FIRE FIGHTING INSTRUCTIONS
Containers of this material may build up pressure if exposed to heat (fire). Use water spray to cool fire-exposed containers.

FIRE AND EXPLOSION HAZARDS
This material will not burn unless it is evaporated to dryness. Closed containers may rupture when exposed to extreme heat.

HAZARDOUS COMBUSTION PRODUCTS
When dried polymer burns, water (H₂O), carbon dioxide (CO₂), carbon monoxide (CO) and smoke are produced.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

CONTAINMENT TECHNIQUES (Removal of ignition sources, diking etc)
Stop the leak, if possible. Ventilate the space involved.

CLEAN-UP PROCEDURES
Wear suitable protective equipment. If recovery is not feasible, add mix with dry soil, sand or non-reactive absorbent and place in an appropriate chemical waste container. Prevent spilled material from entering sanitary sewers, storm sewers, drainage systems and from entering bodies of water or ditches that lead to waterways. Transfer to containers by suction, preparatory for later disposal. Place in metal containers for recovery or disposal. Flush area with water spray. Wash contaminated property (e.g., automobiles) quickly before the material dries. For large spills, recover spilled material with a vacuum truck.

OTHER EMERGENCY ADVICE
Spilled polymer emulsion is very slippery. Use care to avoid falls. A film will form on drying. Remove saturated clothing and wash contacted skin area with soap and water. Product imparts a milky white color to contaminated waters. Foaming may result. Sewage treatment plants may not be able to remove the white color imparted to the water.

SECTION 7 – HANDLING AND STORAGE

STORAGE
Keep from freezing. Store in a dry area. Keep containers closed when not in use to minimize contact with atmospheric air and prevent inoculation with microorganisms.

HANDLING
Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors. Avoid prolonged or repeated contact with skin. Wash hands thoroughly after handling and before eating or drinking.
SECTION 8 - PERSONAL PROTECTION / EXPOSURE CONTROLS

EXPOSURE GUIDELINES
There are no Occupational Safety and Health (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) or Short Term Exposure Limits (STEL) established for the component(s) of this product.

EYE PROTECTION
Chemical safety glasses.

HAND PROTECTION
Rubber Gloves. The breakthrough time of the selected glove(s) must be greater than the intended use period.

RESPIRATORY PROTECTION
Not required under normal use.

PROTECTIVE CLOTHING
No specific recommendation.

ENGINEERING CONTROLS
Good general ventilation should be sufficient to control airborne levels of irritating vapors.

SECTION 9 - TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL FORM</td>
<td>Liquid</td>
</tr>
<tr>
<td>COLOR</td>
<td>Milky White (transparent once cured)</td>
</tr>
<tr>
<td>ODOR</td>
<td>Mild / Slight (no odor once cured)</td>
</tr>
<tr>
<td>pH</td>
<td>4-9</td>
</tr>
<tr>
<td>EVAPORATION RATE</td>
<td>&lt; 1 (BuAc = 1)</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>&gt; 1 (Air = 1)</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>&gt;100.00°C (&gt;212.00°F)</td>
</tr>
<tr>
<td>FREEZING POINT</td>
<td>&lt;0°C (&lt;32°F)</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER</td>
<td>Completely (100%) (until cured)</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY (Water = 1)</td>
<td>1.02-1.10</td>
</tr>
</tbody>
</table>

SECTION 10 - STABILITY AND REACTIVITY

STABILITY
Stable at ambient temperatures. Coagulation may occur following freezing, thawing or boiling.

INCOMPATIBILITY (Materials to Avoid)
No incompatibilities have been identified.

HAZARDOUS DECOMPOSITION PRODUCTS
Thermal decomposition may form: Acetic acid and Acrolein. Thermal decomposition may produce various hydrocarbons and irritating, acrid vapors.

HAZARDOUS POLYMERIZATION
Will not occur

CONDITIONS TO AVOID
Freezing temperatures (until cured).

SECTION 11 - TOXICOLOGICAL PROPERTIES

ACUTE EYE TOXICITY
No Information is available.

ACUTE ORAL TOXICITY
No Information is available.

ACUTE SKIN TOXICITY
No Information is available.

ACUTE INHALATION TOXICITY
No Information is available.
CHRONIC/CARCINOGENIC
This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicsrlogy Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 12 - ECOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Species</th>
<th>Test</th>
<th>Result</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Algae</td>
<td>Raphidocelus Subcapitata</td>
<td>96-hr chronic LC50</td>
<td>&gt;1,000</td>
<td>Undiluted</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>Pimephales Promelas</td>
<td>96-hr acute LC50</td>
<td>&gt;1,208</td>
<td>Undiluted</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>Oncorhynchus Mykiss</td>
<td>96-hr acute LC50</td>
<td>&gt;1,000</td>
<td>Undiluted</td>
</tr>
</tbody>
</table>

ENVIRONMENTAL FATE
No data is available.

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD
This material is not a RCRA hazardous waste. Disposal of this material is not regulated under RCRA. Consult federal, state and local regulations to ensure that this material and its containers, if discarded, is disposed of in compliance with all regulatory requirements. NOTE: As supplied or diluted, product material (foam included), when splashed on automobiles or other personal property, is difficult to remove if allowed to dry.

RCRA HAZARD CLASS
This material is not a RCRA hazardous waste. When discarded in its purchased form, this material would not be regulated as a RCRA Hazardous waste under 40 CFR 261.

SECTION 14 - TRANSPORT INFORMATION

DOT NON-BULK SHIPPING NAME
Refer to Bill of Lading - Not DOT Regulated // Keep From Freezing // Not dangerous goods

DOT BULK SHIPPING NAME
Refer to Bill of Lading.

IMO SHIPPING DATA
Refer to Bill of Lading.

ICAO/IATA SHIPPING DATA
Refer to Bill of Lading - Not IATA Regulated // Keep From Freezing // Not dangerous goods

CFR
Not Regulated // Keep From Freezing // Not dangerous goods

IMDG
Not Regulated // Keep From Freezing // Not dangerous goods

CTC
Not Regulated // Keep From Freezing // Not dangerous goods

SECTION 15 - REGULATORY INFORMATION

TSCA SECTION 8(b) INVENTORY STATUS
All components are included in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

TSCA SECTION 12(b) EXPORT NOTIFICATION
This material does not contain any components that are subject to the U.S. Toxic Substances Control Act (TSCA) Section 12 (b) Export Notification requirements.

This material is not classified as hazardous under the criteria of the U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200

EPA SARA Title III Section 304 CERCLA
Reportable quantities have not been established for any of this material's components.

EPA SARA Title III Section 311/312 HAZARD COMMUNICATION STANDARD (HCS)
This material is not a hazardous chemical.

EPA SARA Title III Section 313 TOXIC CHEMICAL LIST (TCL)
This product does not contain Section 313 Reportable Ingredients.

CANADIAN INVENTORY STATUS
All components of this material are listed on the Canadian Domestic Substances List (DSL)
CANADIAN WHMIS
This material is not classified as a controlled product under the Canadian Workplace Hazardous Material Information System.

ADDITIONAL CANADIAN REGULATORY INFORMATION
This product does not contain a substance present on the WHMIS Ingredient Disclosure List (IDL) which is at or above the specified concentration limit.

EUROPEAN INVENTORY STATUS (EINECS)
The polymer portion of this product is manufactured from reactants which are listed in EINECS and meets the EINECS definition of an exempt polymer.

AICS (Australia)
Included on Inventory

ENCS (Japan)
Included on Inventory

ECL (South Korea)
Included on Inventory

SEPA (China)
Included on Inventory

SECTION 16 – OTHER INFORMATION

HMIS and NFPA Classification
Health : 1
Flammability : 0
Reactivity : 0
Special Hazard : 0
Gorilla Snot

Direct contact with this material may cause eye irritation including lachrymation (tearing).

Inhalation of vapor or aerosol may cause irritation to the respiratory tract.

Contact may cause skin irritation.

Eye contact: flush eyes with clean water for at least 15 minutes. Get immediate medical attention.

Skin contact: Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation persists.

Inhalation: Move patient to fresh air. If breathing has stopped or is labored give assisted respiration. Supplemented oxygen may be indicated. Seek medical advice.

Ingestion: Give the victim one or two glasses of water or milk to drink. Get immediate medical attention.

Soilworks, 7580 N Dobson Rd, Ste 320, Scottsdale, AZ, 800-545-5420, US, 800-545-5420
Vinyl Copolymer Soil Stabilizer & Dust Control Agent

Volume*: 275 gal (1,041 L)
Gross Weight*: 2,500 lbs (1,135 kg)
Dimensions*: 40 x 48 x 42 in (100 x 120 x 116 cm)

*Unless otherwise specified

First Aid

Inhalation: No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice. Skin: Remove contaminated clothing. Flush exposed area with water and follow by washing with soap. Eyes: flush with copious quantities of water. If persistent irritation occurs, obtain medical attention. Ingestion: If swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment.

Spills

Slippery when spilled. Avoid accidents and clean up immediately. Prevent from spreading or entering drains, ditches or open bodies of water by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent such as clay, sand or other suitable material and dispose of properly.

HMIS

<table>
<thead>
<tr>
<th></th>
<th>Health</th>
<th>Fire</th>
<th>React</th>
<th>Special</th>
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<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

Manufactured & Distributed by Soilworks, LLC
Soil Stabilization & Dust Control
7580 N Dobson Rd, Ste 320, Scottsdale, AZ 85256
800.545.5420 USA | 001.480.545.5454 International
www.soilworks.com | info@soilworks.com
SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME
SOILTAC*

*SOILTAC is a registered trademark of Soilworks, LLC.

MANUFACTURER
Soilworks, LLC
1750 E Northrop Blvd, Suite 250
Chandler, Arizona 85286-1747 USA

www.soilworks.com

TELEPHONE NUMBER
800-545-5420 Toll Free USA / +1.480.545.5454 (International)

ONLINE INFORMATION
www.Soilworks.com

EMERGENCY TELEPHONE NUMBERS
800-545-5420 Toll Free USA / +1.480.545.5454 (International)

REVISION DATE
June 2013 (supersedes November 2006)

PHYSICAL FORM
Mobile liquid

COLOR
Milky white (transparent once cured)

ODOR
Mild / Slight (no odor once cured)

C.A.S. CHEMICAL NAME
Mixture

SYNONYMS
Soil stabilizer, soil stabilization agent, soil solidifier, soil
amendment, soil additive, soil crusting agent, dust control agent,
dust inhibitor, dust palliative, dust suppressant, dust retardant

CHEMICAL FAMILY
Vinyl Copolymer Emulsion

EMPirical FORMULA
Mixture

INTENDED USE
Soil stabilization, soil solidification, fugitive dust control, dust
suppression, dust abatement, tackifier, dust abatement, PM10 and
PM2.5 air quality control and erosion control

SECTION 2 - INGREDIENTS

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<th>%</th>
<th>CAS Number</th>
<th>Chemical Name</th>
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<td>50-60</td>
<td>Proprietary</td>
<td>Vinyl Copolymer</td>
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<tr>
<td>40-50</td>
<td>7732-18.5</td>
<td>Water</td>
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</tbody>
</table>

SECTION 3 - HEALTH HAZARDS

ROUTES OF ENTRY
Eye Contact, Skin Contact, Ingestion and Inhalation

SIGNS AND SYMPTOMS OF ACUTE EXPOSURE
- Eyes: Direct contact with this material may cause eye irritation including lachrymation (tearing).
- Inhalation: Inhalation of vapor or aerosol may cause irritation to the respiratory tract (nose, throat, and lungs).
- Skin: Contact may cause skin irritation.
- Ingestion: No hazard in normal industrial use.

SIGNS AND SYMPTOMS OF CHRONIC EXPOSURE
Prolonged or repeated contact with skin may cause irritation and dermatitis (inflammation).

CARCINOGENICITY
This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on
Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health
Administration (OSHA) as a carcinogen.

SECTION 4 - FIRST AID

EYE CONTACT
Flush eyes with clean water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT
Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if
irritation develops or persists.

INHALATION
Move patient to fresh air. If breathing has stopped or is labored give assisted respiration (e.g. mouth-to-mouth).
Supplemental oxygen may be indicated. Seek medical advice.
INGESTION
Give the victim one or two glasses of water or milk to drink. Get immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE AND EXPLOSION DATA

FLASH POINT (closed cup)
Upper Explosion Limit (UEL)
Lower Explosion Limit (LEL)
Autoignition Temperature
Fire Hazard Classification (OSHA/NFPA)

Not applicable
Not applicable
Not applicable
Not applicable
Non-Combustible

Extinguishing Media
Product does not burn. The product will only burn after the water it contains is driven off. For dry polymer use carbon dioxide, foam, dry chemical or water fog to extinguish fire. Aqueous solution is not flammable.

Fire Fighting Equipment
Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing. Thoroughly decontaminate all protective equipment after use.

Fire Fighting Instructions
Containers of this material may build up pressure if exposed to heat (fire). Use water spray to cool fire-exposed containers.

Fire and Explosion Hazards
This material will not burn unless it is evaporated to dryness. Closed containers may rupture when exposed to extreme heat.

Hazardous Combustion Products
When dried polymer burns, water (H₂O), carbon dioxide (CO₂), carbon monoxide (CO) and smoke are produced.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Containment Techniques (Removal of ignition sources, diking etc)
Stop the leak, if possible. Ventilate the space involved.

Clean-Up Procedures
Wear suitable protective equipment. If recovery is not feasible, admix with dry soil, sand or non-reactive absorbent and place in an appropriate chemical waste container. Prevent spilled material from entering sanitary sewers, storm sewers, drainage systems and from entering bodies of water or ditches that lead to waterways. Transfer to containers by suction, preparatory for later disposal. Place in metal containers for recovery or disposal. Flush area with water spray. Wash contaminated property (e.g., automobiles) quickly before the material dries. For large spills, recover spilled material with a vacuum truck.

Other Emergency Advice
Spilled polymer emulsion is very slippery. Use care to avoid falls. A film will form on drying. Remove saturated clothing and wash contacted skin area with soap and water. Product imparts a milky white color to contaminated waters. Foaming may result. Sewage treatment plants may not be able to remove the white color imparted to the water.

SECTION 7 - HANDLING AND STORAGE

Storage
Keep from freezing. Store in a dry area. Keep containers closed when not in use to minimize contact with atmospheric air and prevent inoculation with microorganisms.

Handling
Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors. Avoid prolonged or repeated contact with skin. Wash hands thoroughly after handling and before eating or drinking.

SECTION 8 - PERSONAL PROTECTION / EXPOSURE CONTROLS

Exposure Guidelines
There are no Occupational Safety and Health (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) or Short Term Exposure Limits (STEL) established for the component(s) of this product.

Eye Protection
Chemical safety glasses.

Hand Protection
Rubber Gloves. The breakthrough time of the selected glove(s) must be greater than the intended use period.

Respiratory Protection
Not required under normal use.
PROTECTIVE CLOTHING
No specific recommendation.

ENGINEERING CONTROLS
Good general ventilation should be sufficient to control airborne levels of irritating vapors.

SECTION 9 - TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL FORM</td>
<td>liquid</td>
</tr>
<tr>
<td>COLOR</td>
<td>Milky White (transparent once cured)</td>
</tr>
<tr>
<td>ODOR</td>
<td>Mild / Slight (no odor once cured)</td>
</tr>
<tr>
<td>pH</td>
<td>4.5-6.0</td>
</tr>
<tr>
<td>EVAPORATION RATE</td>
<td>&lt; 1 (BuAc=1)</td>
</tr>
<tr>
<td>VAPOR DENSITY</td>
<td>&gt; 1 (Air = 1)</td>
</tr>
<tr>
<td>BOILING POINT</td>
<td>&gt;100.00°C (&gt;212.00°F)</td>
</tr>
<tr>
<td>FREEZING POINT</td>
<td>&lt;0°C (&lt;32°F)</td>
</tr>
<tr>
<td>SOLUBILITY IN WATER</td>
<td>Completely (100%) (until cured)</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY (Water = 1)</td>
<td>1.05-1.10</td>
</tr>
</tbody>
</table>

SECTION 10 - STABILITY AND REACTIVITY

STABILITY
Stable at ambient temperatures. Coagulation may occur following freezing, thawing or boiling.

INCOMPATIBILITY (Materials to Avoid)
No incompatibilities have been identified.

HAZARDOUS DECOMPOSITION PRODUCTS
Thermal decomposition may form: Acetic acid and Acrolein. Thermal decomposition may produce various hydrocarbons and irritating, acrid vapors.

HAZARDOUS POLYMERIZATION
Will not occur

CONDITIONS TO AVOID
Freezing temperatures (until cured).

SECTION 11 - TOXICOLOGICAL PROPERTIES

ACUTE EYE TOXICITY
No Information is available.

ACUTE ORAL TOXICITY
No Information is available.

ACUTE SKIN TOXICITY
No Information is available.

ACUTE INHALATION TOXICITY
No Information is available.

CHRONIC/CARCINOGENICITY
This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 12 - ECOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Species</th>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raphidocelus Subcapitata</td>
<td>96-hr chronic LC50</td>
<td>&gt;1,000 Undiluted</td>
</tr>
<tr>
<td>Pimephales Promelas</td>
<td>96-hr acute LC50</td>
<td>&gt;1,208 Undiluted</td>
</tr>
<tr>
<td>Oncorhynchus Mykiss</td>
<td>96-hr acute LC50</td>
<td>&gt;1,000 Undiluted</td>
</tr>
</tbody>
</table>

ENVIRONMENTAL FATE
No data is available.
SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD
This material is not a RCRA hazardous waste. Disposal of this material is not regulated under RCRA. Consult federal, state and local regulations to ensure that this material and its containers, if discarded, is disposed of in compliance with all regulatory requirements. NOTE: As supplied or diluted, product material (foam included), when splashed on automobiles or other personal property, is difficult to remove if allowed to dry.

RCRA HAZARD CLASS
This material is not a RCRA hazardous waste. When discarded in its purchased form, this material would not be regulated as a RCRA Hazardous waste under 40 CFR 261.

SECTION 14 - TRANSPORT INFORMATION

DOT NON-BULK SHIPPING NAME
Refer to Bill of Lading - Not DOT Regulated // Keep From Freezing // Not dangerous goods

DOT BULK SHIPPING NAME
Refer to Bill of Lading.

IMO SHIPPING DATA
Refer to Bill of Lading.

ICAO/IATA SHIPPING DATA
dangerous goods
Refer to Bill of Lading - Not IATA Regulated // Keep From Freezing // Not dangerous goods

CFR
Not Regulated // Keep From Freezing // Not dangerous goods

IMDG
Not Regulated // Keep From Freezing // Not dangerous goods

CTC
Not Regulated // Keep From Freezing // Not dangerous goods

SECTION 15 - REGULATORY INFORMATION

TSCA SECTION 8(b) INVENTORY STATUS
All components are included in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

TSCA SECTION 12(b) EXPORT NOTIFICATION
This material does not contain any components that are subject to the U.S. Toxic Substances Control Act (TSCA) Section 12 (b) Export Notification requirements.

This material is not classified as hazardous under the criteria of the U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200

EPA SARA Title III Section 304 CERCLA
Reportable quantities have not been established for any of this material's components.

EPA SARA Title III Section 311/312 HAZARD COMMUNICATION STANDARD (HCS)
This material is not a hazardous chemical.

EPA SARA Title III Section 313 TOXIC CHEMICAL LIST (TCL)
This product does not contain Section 313 Reportable Ingredients.

CANADIAN INVENTORY STATUS
All components of this material are listed on the Canadian Domestic Substances List (DSL)

CANADIAN WHMIS
This material is not classified as a controlled product under the Canadian Workplace Hazardous Material Information System.

ADDITIONAL CANADIAN REGULATORY INFORMATION
This product does not contain a substance present on the WHMIS Ingredient Disclosure List (IDL) which is at or above the specified concentration limit.

EUROPEAN INVENTORY STATUS (EINECS)
The polymer portion of this product is manufactured from reactants which are listed on EINECS and meets the EINECS definition of an exempt polymer.

AICS (Australia)
Included on inventory

ENCS (Japan)
Included on Inventory

ECL (South Korea)
Included on inventory

SEPA (China)
Included on inventory
SECTION 16 – OTHER INFORMATION

HMIS and NFPA Classification

Health : 1
Flammability : 0
Reactivity : 0
Special Hazard : 0
Soiltac

Direct contact with this material may cause eye irritation including lychrymation (tearing). Flush eyes with water for at least 15 minutes. Get medical attention.

Inhalation of vapor or aerosol may cause irritation to the respiratory tract. Move patient to fresh air. If breathing has stopped or is labored give assisted respiration. Supplemental oxygen may be indicated. Seek medical advice.

Contact may cause skin irritation. Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation develops or persists.

Soilworks, 7580 N Dobson Rd, Ste 320, Scottsdale, AZ, 800-545-5420, US, 800-545-5420

Soiltac

Direct contact with this material may cause eye irritation including lychrymation (tearing). Flush eyes with water for at least 15 minutes. Get medical attention.

Inhalation of vapor or aerosol may cause irritation to the respiratory tract. Move patient to fresh air. If breathing has stopped or is labored give assisted respiration. Supplemental oxygen may be indicated. Seek medical advice.

Contact may cause skin irritation. Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation develops or persists.

Soilworks, 7580 N Dobson Rd, Ste 320, Scottsdale, AZ, 800-545-5420, US, 800-545-5420
Vinyl Copolymer Soil Stabilizer & Dust Control Agent

- **Volume**: 275 gal (1,041 L)
- **Gross Weight**: 2,600 lb (1,180 kg)
- **Dimensions**: 40 x 48 x 42 in (100 x 120 x 116 cm)

**HMIS**

<table>
<thead>
<tr>
<th>Health</th>
<th>Fire</th>
<th>React</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

**FIRST AID**

**Inhalation**: no treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
**Skin**: Remove contaminated clothing. Wash exposed area with water and follow by washing with soap. **Eyes**: flush with copious quantities of water. If persistent irritation occurs, obtain medical attention.
**Ingestion**: if swallowed, do not induce vomiting; transport to nearest medical facility for additional treatment.

**SPILLS**

Slippery when spilled. Avoid accidents and clean up immediately. Prevent from spreading or entering drains, ditches or open bodies of water by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent such as clay, sand or other suitable material and dispose of properly.

Manufactured & Distributed by Soilworks, LLC
Soil Stabilization & Dust Control
7580 N Dobson Rd, Ste 320, Scottsdale, AZ 85256
800.545.5420 USA | 001.480.545.5454 International
www.soilworks.com | info@soilworks.com
MATERIAL SAFETY DATA SHEET
NAME OF PRODUCT: COHEREX
FILE NUMBER: 1900
DATE PREPARED: 8/09/06

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: COHEREX
SYNONYMS: PETROLEUM EMULSION
PRODUCT CODES: 1900
MANUFACTURER: TRICOR REFINING, LLC
DIVISION: BAKERSFIELD
ADDRESS: P.O. BOX 5877, BAKERSFIELD, CA 93388
EMERGENCY PHONE: (661) 353-7110
PREPARED BY: TRICOR REFINING, LLC HEALTH, SAFETY AND ENVIRONMENTAL DEPARTMENT

SECTION 2: HAZARDOUS INGREDIENTS / IDENTITY INFORMATION

CHEMICAL FAMILY: PETROLEUM HYDROCARBON IN WATER EMULSION

<table>
<thead>
<tr>
<th>HAZARDOUS COMPONENT(S)</th>
<th>CAL-OSHA PEL-TWA (8 HOUR)</th>
<th>ACGIH TLV TWA (8 HOUR)</th>
<th>OTHER LIMITS RECOMMENDED</th>
<th>% BY WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Naphthenic Distillate Solvent Extract CAS No. 64742-11-6</td>
<td>5 mg/m³ (As mineral oil mist)</td>
<td>5 mg/m³ (As mineral oil mist)</td>
<td>None</td>
<td>100</td>
</tr>
</tbody>
</table>

SECTION 3: HEALTH HAZARDS IDENTIFICATION

ROUTES OF ENTRY: EYES: Yes SKIN: Yes INGESTION: Yes INHALATION: Yes

HEALTH HAZARDS (ACUTE AND CHRONIC):

EYES: No data available.
SKIN: Prolonged skin contact may cause irritation.
INGESTION: This product is not expected to be acutely toxic by ingestion. If swallowed, do not induce vomiting. Call a physician.
INHALATION: Remove the person to fresh air if respiratory discomfort occurs.

CARCINOGENICITY: ACGIH, NTP, OSHA and IARC carcinogen lists were checked for those components with CAS Registry Numbers 64742-11-6.

ACGIH: This product contains no ingredients classified as carcinogens.
IARC: This product contains petroleum oils similar to ones categorized by the International Agency for Research on Cancer as causing skin cancer in laboratory animals when the oil was repeatedly applied for most of the lifetime of the animal with no effort made to remove the oil between applications. Handling instructions and precautions outlined in this MSDS should be followed when handling this product.
NTP: This product contains no ingredients classified as carcinogens.
Code: 1900
OSHA: This product contains no ingredients classified as carcinogens.

CA PROP 65: This product contains chemicals in trace quantities that are on the California Proposition 65 List.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Persons susceptible to dermatitis (skin rash) may aggravate their condition by skin contact with this product.

SECTION 4: EMERGENCY AND FIRST AID MEASURES

EYES: Immediately flush eyes with water for a minimum of 15 minutes. Seek medical attention immediately.

SKIN: Wash with soap and water.

INGESTION: Contact a physician immediately.

INHALATION: If operating conditions create airborne concentrations that exceed the exposure standard, move the person to fresh air. Administer CPR if required. Provide oxygen if breathing is difficult. Seek medical attention immediately.

SECTION 5: FIRE AND EXPLOSION HAZARD DATA

FLAMMABLE LIMITS IN AIR, (% BY VOLUME): UPPER: No data available
FLASH POINT: COC °F: LOWER: No data available
EXTINGUISHING MEDIA: Not applicable
SPECIAL FIRE FIGHTING PROCEDURES: None
HAZARDOUS DECOMPOSITION PRODUCTS: Normal combustion forms carbon dioxide and water vapor, and may produce oxides of sulfur and nitrogen. Incomplete combustion can produce carbon monoxide.

SECTION 6: SPILL OR LEAK PROCEDURES

ACCIDENTAL RELEASE MEASURES: In case of spill, clean up using absorbent material such as earth or sand. If spilled into the water, remove the bulk of the product by skimming. If spilled into a navigable waterway in the United States or that may enter the United States, and a film, sheen or discoloration of any water surface is observed, the spill must be reported to the United States National Response Center by calling (800) 424-8802.

WASTE DISPOSAL METHOD: Dispose of in accordance with all applicable Federal, Provincial and Local Regulations.

SECTION 7: HANDLING AND STORAGE

HANDLING AND STORAGE: Avoid fire, sparks or open flame. Wear appropriate personal protective equipment to ensure that this product does not contact the eyes or skin.

VENTILATION: Use adequate ventilation to keep the airborne concentrations of this material below the established exposure limits.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION: If operating conditions create airborne concentrations that exceed the exposure standard for mineral oil mists, the use of an approved NIOSH/OSHA respirator for organic vapors or air supplied breathing equipment is recommended.

EYE PROTECTION: Wear appropriate safety glasses, goggles or face shield.

Code: 1900
SKIN PROTECTION: Long sleeve cotton shirt and cotton pants are recommended. Wear appropriate gloves.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: N/T (non Transparent) Yellow
ODOR: Petroleum Odor
PHYSICAL STATE: Liquid
INITIAL BOILING POINT: Greater than 100 °C (212 °F)

VAPOR PRESSURE (mmHg): Same as water
VAPOR DENSITY (AIR = 1): Same as water
SPECIFIC GRAVITY (H2O = 1): 1.0

PERCENT VOLATILE (% BY VOL.): 1
EVAPORATION RATE (WATER = 1): NA
SOLUBILITY IN WATER: Readily dispersible

SECTION 10: REACTIVITY DATA

STABILITY: Stable
CONDITIONS CONTRIBUTING TO INSTABILITY: None
INCOMPATIBILITY (MATERIAL TO AVOID): May react with strong oxidizers.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Normal combustion forms carbon dioxide and water vapor, and may produce oxides of sulfur and nitrogen. Incomplete combustion can produce carbon monoxide.

HAZARDOUS POLYMERIZATION: Will not occur

SECTION 11: TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION Not regulated as a hazardous material for transportation.

SECTION 12: REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

TSCA (TOXIC SUBSTANCE CONTROL ACT) REGISTRY: Listed
CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT):

Petroleum emulsions are not a hazardous substance under CERCLA.

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT):

Section 302/304: Petroleum emulsions are not a hazardous chemical under 40 CFR Part 355. Petroleum emulsions are not listed as an extremely hazardous substance in 40 CFR Part 355, and are not known to contain an extremely hazardous substance in a concentration greater than one percent by weight.

Section 311/312: Acute Health Hazard: No
Chronic Health Hazard: Yes
Fire Hazard: No
Pressure Release Hazard: No
Reactivity Hazard: No

Section 313: This product is not known to contain any components in concentrations above de minimus levels that are listed as toxic in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA.

Code: 1900

D-65
WHMIS: D2A

OSHA: 29 CFR 1910.1200 (Hazard Communication) required

UNITED STATES REGULATIONS: Mineral oil, petroleum extracts, heavy naphthenic distillate solvent appears on one or more of the hazardous substances lists in the following states:

MA

The information provided in this Material Safety Data Sheet is believed to be accurate and reliable on and as of the date on page one. However, this Material Safety Data Sheet is not a guarantee or warranty of any kind, express or implied. Any and all warranties of merchantability and/or fitness for a particular purpose are specifically disclaimed. It is the user's responsibility to determine the conditions under which the product is used, including the selection of engineering controls, work practices and Personal Protective Equipment to minimize hazards.
Skin: Prolonged skin contact may cause irritation. Wash with soap and water.

Ingestion: If swallowed call a physician. Do not induce vomiting.

Inhalation: Remove the person to fresh air if respiratory discomfort occurs. Administer CPR if required. Provide oxygen if breathing is difficult. Seek Medical attention immediately.

Eyes: Immediately flush eyes with water for at least 15 minutes. Seek medical attention immediately.
**Specifications: Coherex Dust Control Agent**

<table>
<thead>
<tr>
<th>Tests:</th>
<th>Test Method</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASTM</td>
<td>AASHTO</td>
</tr>
<tr>
<td>Viscosity @ 25°C, SFS</td>
<td>D-244</td>
<td>T-59</td>
</tr>
<tr>
<td>Sieve Test, % w(^{1})</td>
<td>D-244</td>
<td>T-59</td>
</tr>
<tr>
<td>Residue, % w(^{2})</td>
<td>D-244</td>
<td>T-59</td>
</tr>
<tr>
<td>Particle Charge Test</td>
<td>D-244</td>
<td>T-59</td>
</tr>
</tbody>
</table>

\(^{1}\)Test procedure identical with ASTM except that distilled water shall be used in place of 2% sodium oleate solution.

\(^{2}\)ASTM D-244 Evaporation Test for percent of residue is modified by heating 50 gram sample to 149°C (300°F) until foaming ceases, then cooling immediately and calculating results.

Note: For gallon conversion use 242 gallon.

**Specifications: Coherex Base**

<table>
<thead>
<tr>
<th>Tests:</th>
<th>Test Method</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ASTM</td>
<td>AASHTO</td>
</tr>
<tr>
<td>Viscosity @ 100°C, cSt</td>
<td>D-445</td>
<td>---</td>
</tr>
<tr>
<td>Flash Point, COC, °C</td>
<td>D-92</td>
<td>T-48</td>
</tr>
<tr>
<td>Asphaltenes, %w</td>
<td>D-2006-70</td>
<td>---</td>
</tr>
<tr>
<td>Saturated Hydrocarbons, %w</td>
<td>D-2006-70</td>
<td>---</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>D-1298</td>
<td>T-277</td>
</tr>
</tbody>
</table>

Note: Data presented are typical. Slight variation may occur from lot to lot.

No warranties, expressed or implied, including warranties of merchantability or fitness for a particular use, are made with respect to the products described herein. Nothing contained herein shall constitute a permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent.
1: IDENTIFICATION

Product identifier: BT-468  
Recommended use: Dust suppressant

Other identification: Aqueous amorphous polymer solution

Supplier details: Benetech, Inc.  
2245 Sequoia Drive, Suite #300  
Aurora, IL 60506  
(phone): 630-844-1300

Emergency phone: 1-800-535-5053 (US and Canada)  
1-352-323-3500 (International)

2: HAZARD(S) IDENTIFICATION

Hazard pictogram and signal word:

Warning

Hazard classification: Eye irritant; category 2A.

Hazard statements: H319; Causes serious eye irritation.

Precautionary statements:

Prevention: P264; Wash exposed area thoroughly after handling. P280; Wear eye protection/face protection.

Response: P305 + P351 + P338; IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Storage: P403+P233; Store in well-ventilated place. Keep container tightly closed. P405; Store locked up.

Disposal: P501; Dispose of this material and its container in accordance with local, regional, national and/or international regulation.

Other hazards: Material spills may be very slippery.
3: INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS Number</th>
<th>% by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary Blend</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

4: FIRST AID MEASURES

The following first aid procedures assume appropriate personal and industrial hygiene practices are followed.

**Eyes:**
Flush with copious amounts of water. If symptoms are severe or persist, get medical attention.

**Skin Contact:**
Not expected to be a skin irritant. Wash thoroughly with water. Remove contaminated clothing. Launder contaminated clothing before re-use. If symptoms are severe or persist, get medical attention.

**Ingestion:**
Small amounts are not expected to be harmful. If instructed to do so by medical personnel, induce vomiting by either giving IPECAC syrup or by placing finger at back of throat. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. Get medical attention.

**Inhalation:**
Product is non-volatile and inhalation is not an expected exposure route. Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Keep person warm, and quiet. If symptoms are severe or persist, get medical attention.

5: FIRE-FIGHTING MEASURES

**Suitable extinguishing media:** Class B fire extinguishers (i.e.: foam, powder)

**Specific combustion hazards:** None

**Special protective equipment and precautions for fire-fighters:** Wear full bunker gear and SCBA (Self-Contained Breathing Apparatus).
6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:
Chemical Splash Goggles in compliance with OSHA regulations are advised, impermeable gloves (natural rubber, nitrile, neoprene, etc.), impermeable clothing (coveralls), and waterproof footwear. Ventilate area with fresh air for personal comfort.

Methods and materials for containment and cleaning up:

Small Spill: Absorb liquid on paper, vermiculite, floor absorbent, or other absorbent material and transfer to appropriate container(s).

Large Spill: Stop spill at source, dike area of spill to prevent spreading, pump liquid to salvage tank. Remaining liquid may be taken up on sand, clay, earth, floor absorbent, or other absorbent material and shoveled into appropriate containers.

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

7: HANDLING AND STORAGE

Precautions for safe handling:
P270; Do not eat, drink, or smoke when using this product. P264; Wash skin exposed to product with soap and water. Wash hands after handling this product and before eating, drinking, or smoking. Avoid exposure to skin or eyes. Do not ingest. Do not breath aerosol containing this product. Use mechanical ventilation for personal comfort.

Conditions for safe storage:
Store material between 40°F and 120°F in original container. Protect from freezing.

8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters: Ventilation: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Engineering controls: Mechanical and/or engineered barriers to prevent contact with this material in concentrated form are preferred.

Personal Protective Equipment:

Eye protection: Wear eye protection/face protection. Chemical splash goggles or a face shield are recommended in emergency spill situations.
**Skin protection:** Avoid prolonged or repeated skin contact. Resistant gloves such as natural rubber, neoprene, nitrile rubber are recommended. Water-proof or chemical-resistant coveralls are recommended. Water-proof foot gear is recommended.

**Respiratory protection:** Avoid breathing aerosols, mists or sprays of this material if they were to form. If exposure to aerosols, mists, or sprays of this material in undiluted form are likely, wear a respirator designed to filter particulates and organic vapors.

**Prevention of ingestion:** Avoid ingesting this material. Do not eat, drink, or smoke when contamination with this material is possible. Wash hands with soap and water after handling this product and before eating, drinking, or smoking. Remove and launder contaminated clothing before eating, drinking, or smoking.

### 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Brown liquid</td>
</tr>
<tr>
<td><strong>Liquid Upper/Lower Flammability/Explosive limits</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Liquid Flammability</strong></td>
<td>Non-flammable</td>
</tr>
<tr>
<td><strong>Solid, Gas Upper/Lower Flammability/Explosive limits</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Solid, Gas Flammability</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Autoignition temperature</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Decomposition Temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Flash Point</strong></td>
<td>Non-flammable</td>
</tr>
<tr>
<td><strong>pH (3% Soln.)</strong></td>
<td>7 - 9</td>
</tr>
<tr>
<td><strong>Specific Gravity</strong></td>
<td>10.87-lbs./gal.</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>&lt;100-cP</td>
</tr>
<tr>
<td><strong>Melting point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Initial Freezing Point</strong></td>
<td>28.5°F</td>
</tr>
<tr>
<td><strong>Initial Boiling point</strong></td>
<td>219°F</td>
</tr>
<tr>
<td><strong>Boiling Range</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Slight</td>
</tr>
<tr>
<td><strong>Odor Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapor Pressure</strong></td>
<td>14.2 mm Hg @ 68°F</td>
</tr>
<tr>
<td><strong>Vapor Density</strong></td>
<td>1.25 @ 68°F</td>
</tr>
<tr>
<td><strong>Solubility, Aqueous</strong></td>
<td>100% (miscible)</td>
</tr>
<tr>
<td><strong>Partition Coefficient: n-octanol/water</strong></td>
<td>100% in water</td>
</tr>
<tr>
<td><strong>Evaporation Rate</strong></td>
<td>Normal 0.4 (water)</td>
</tr>
</tbody>
</table>

### 10: STABILITY AND REACTIVITY
Reactivity: Strong oxidizing agents, caustics.
Chemical stability: Stable.
Possibility of hazardous reactions: Will not occur.
Conditions to avoid: None known.
Incompatible materials: Oxidizers, salts.

Hazardous Decomposition Products:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>During Combustion of Residue</td>
</tr>
<tr>
<td>Toxic gas, vapor or particulate</td>
<td>During Combustion of Residue</td>
</tr>
</tbody>
</table>

11: TOXICOLOGICAL INFORMATION

Health and toxicological effects:

Likely exposure routes; ingestion, eye contact.

Symptoms of exposure; None known.

Delayed and immediate effects; No significant acute or delayed adverse effects have been found in oral rat studies done on the components of this product relative to the composition of this blend.

Acute Toxicity:
Oral; mouse, LD$_{50}$ > 5000 mg/kg.
Dermal; mouse, No data available.
Inhalation; mouse, Not applicable.

This product is not considered a potential carcinogen by NPT, IARC, or OSHA.

12: ECOLOGICAL INFORMATION

Aquatic Toxicity:
P. Promelas LC$_{50}$: 3.7 grams/liters (3700 ppm).
C. Dubia EC$_{50}$: 2.04 grams/liter (2040 ppm).

Persistence and Degradability:

Bioaccumulative potential is low, biological oxygen demand(BOD); 0.260 lbs BOD/lb solids,
Chemical oxygen demand(COD); 0.919 lbs COD/lb of solids.
13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Allow waste and contaminated material to dry in open air or fume hood. Dispose of as non hazardous waste.

14: TRANSPORT INFORMATION

DOT Non-Bulk; Not regulated.
DOT Bulk; Not regulated.
IMDG; Not regulated.
ICAO/IATA; Not regulated.
CERCLA; Not regulated

15: REGULATORY INFORMATION

This product is not considered hazardous under the Clean Water Act, the Clean Air Act, or RCRA. This product is not reportable under SARA Title III, Sec 313.

16: OTHER INFORMATION

<table>
<thead>
<tr>
<th>Revision History</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
</tr>
<tr>
<td>4/16/2015</td>
</tr>
</tbody>
</table>

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.
Warning

H319: Causes serious eye irritation,
P264: Wash exposed area thoroughly after handling, P280: Wear chemical splash goggles when handling, Wear impermeable gloves when handling. Wear impermeable clothing or apron when handling, P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Remove contaminated clothing and launder after use, Wash hands after handling and before eating, drinking, or smoking.

Benetech, Inc.
2245 Sequoia Dr. Suite 300
Aurora, IL 60506-6220
www.Benetechglobal.com
1-352-323-3500
PRODUCT BULLETIN

Haul Road Dust Suppressant
BT-468(BT-RDL)

Product Description
• Benetech BT-468 controls airborne dust caused by the heavy moving equipment and road traffic. It is a lignosulfonate based haul road dust suppressant formulated with surfactant additives to promote penetration and improve spreadability.

Primary Uses
• This product is a cost effective means of reducing dust on haul roads, parking lots, and other high traffic dirt, gravel, or coal surfaces.

Benefits
• Cost competitive
• Non-oil based, ecologically safe
• Protects against wind erosion
• Easy application procedures
• Non-corrosive
• Contains additives to promote penetration, improve spreadability, and prevent excessive run-off.
• Easy clean-up

Application
• BT-468 should be applied with a hydro-seeder water truck, or water wagon equipped with standard spraying equipment for adequate application. Consult your Benetech representative for specific application rates.

Shipping
• Bulk tank trucks.

Handling And Storage
• BT-468 is non-hazardous but should be handled with appropriate caution.
• Storage can be mild steel or fiberglass construction. Recommended storage limit 12 months.
SAFETY DATA SHEET

1. Product and Company Identification

Product identifier Calcium Chloride
Other means of identification IceAway Max
Safe Step Extreme 7300 Calcium Chloride
Recommended use De-icer.
Recommended restrictions None known.
Manufacturer Compass Minerals International
9900 West 109th Street, Suite 100
Overland Park, KS 66210 US
Phone 913-344-9200
Emergency US CHEMTREC 1-800-424-9300
Emergency Canada CANUTEC 1-613-996-6666
CHEMTREC 1-800-424-9300
CANUTEC 1-613-996-6666

2. Hazards Identification

Physical hazards Not classified.
Health hazards Acute toxicity, oral Category 4
Serious eye damage/eye irritation Category 2A
Environmental hazards Not classified.
OSHA defined hazards Not classified.
Label elements

Signal word Warning
Hazard statement Harmful if swallowed.
Causes serious eye irritation.
Precautionary statement
Prevention Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Wear eye/face protection.
Response If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
Storage Store away from incompatible materials.
Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC) None known.
Supplemental information 100% of the mixture consists of component(s) of unknown acute inhalation toxicity.

3. Composition/Information on Ingredients

Mixture

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride</td>
<td></td>
<td>10043-52-4</td>
<td>60-100</td>
</tr>
</tbody>
</table>

Composition comments US GHS: The exact percentage (concentration) of composition has been withheld as a trade secret in accordance with paragraph (l) of §1910.1200.

4. First Aid Measures

Inhalation If symptoms develop move victim to fresh air. If symptoms persist, obtain medical attention.
Skin contact Flush with cool water. Wash with soap and water. Obtain medical attention if irritation persists.
Eye contact If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
### Ingestion
If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth.

Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

### Indication of immediate medical attention and special treatment needed
Treat patient symptomatically.

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes. Keep out of reach of children.

### 5. Fire Fighting Measures

<table>
<thead>
<tr>
<th>Suitable extinguishing media</th>
<th>Dry chemical, CO2, water spray or regular foam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsuitable extinguishing media</td>
<td>Not available.</td>
</tr>
<tr>
<td>Specific hazards arising from the chemical</td>
<td>Firefighters should wear a self-contained breathing apparatus.</td>
</tr>
<tr>
<td>Special protective equipment and precautions for firefighters</td>
<td>Firefighters should wear full protective clothing including self contained breathing apparatus.</td>
</tr>
<tr>
<td>Fire-fighting equipment/instructions</td>
<td>In the event of fire, cool tanks with water spray. Cool containers with flooding quantities of water until well after fire is out.</td>
</tr>
<tr>
<td>Specific methods</td>
<td>Use standard firefighting procedures and consider the hazards of other involved materials.</td>
</tr>
<tr>
<td>General fire hazards</td>
<td>No unusual fire or explosion hazards noted.</td>
</tr>
<tr>
<td>Hazardous combustion products</td>
<td>May include and are not limited to: Hydrogen chloride. Chlorine gas. Calcium oxide</td>
</tr>
<tr>
<td>Explosion data</td>
<td>Sensitivity to mechanical impact: Not available.</td>
</tr>
<tr>
<td>Sensitivity to static discharge: Not available.</td>
<td></td>
</tr>
</tbody>
</table>

### 6. Accidental Release Measures

| Personal precautions, protective equipment and emergency procedures | Keep people away from and upwind of spill/leak. Keep out of low areas. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS. |
| Methods and materials for containment and cleaning up | Before attempting clean up, refer to hazard data given above. Use broom or dry vacuum to collect material for proper disposal without raising dust. Rinse area with water. Prevent large spills from entering sewers or waterways. Contact emergency services and supplier for advice. For waste disposal, see section 13 of the SDS. |
| Environmental precautions | Do not discharge into lakes, streams, ponds or public waters. |

### 7. Handling and Storage

| Precautions for safe handling | Avoid contact with eyes. Avoid breathing dust. Use only with adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices. Wash thoroughly after handling. When using do not eat or drink. |
| Conditions for safe storage, including any incompatibilities | Store in a closed container. Store away from incompatible materials (see Section 10 of the SDS). Keep out of reach of children. |

### 8. Exposure Controls/Personal Protection

| Occupational exposure limits | No exposure limits noted for ingredient(s). |
| Biological limit values | No biological exposure limits noted for the ingredient(s). |
Exposure guidelines

TWA PEL: No specific limits have been established for calcium chloride (soluble substance). As a guideline, OSHA (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates Not Otherwise Regulated (PNOR): 5mg/cu.m. Respirable Dust 8-Hour TWA PEL, 15mg/cu.m. Total Dust 8-Hour TWA PEL.

TWA TLV: No specific limits have been established for calcium chloride (soluble substance). As a guideline, ACGIH (United States) has established the following limits which are generally recognized for inert or nuisance dust. Particulates (insolubles) Not Otherwise Classified (PNOC): 10mg/cu.m. Inhalable Particulate 8-Hours TWA TLV, 3mg/cu.m. Respirable Particulate TWA TLV.

Appropriate engineering controls

Individual protection measures, such as personal protective equipment
Eye/face protection Wear safety glasses with side shields (or goggles).
Skin protection
Hand protection Wear suitable gloves.
Other As required by employer code.
Respiratory protection Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.
Thermal hazards Not applicable.
General hygiene considerations Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product. When using do not eat or drink.

9. Physical and Chemical Properties

Appearance Pellets
Physical state Solid.
Form Solid.
Color White
Odor Odorless
Odor threshold Not applicable
pH Not available
Melting point/freezing point 1421.6 °F (772 °C)
Initial boiling point and boiling range 3515 °F (1935 °C)
Pour point Not applicable
Specific gravity Not available
Partition coefficient (n-octanol/water) Not applicable
Flash point Not applicable
Evaporation rate Not applicable
Flammability (solid, gas) Not applicable.
Upper/lower flammability or explosive limits
Flammability limit - lower (%) Not available.
Flammability limit - upper (%) Not available.
Explosive limit - lower (%) Not available.
Explosive limit - upper (%) Not available.

Vapor pressure Not applicable
Vapor density Not applicable
Relative density 0.75 g/cm³ @ 20°C
Solubility(ies) 745 g/l
Auto-ignition temperature Not applicable
Decomposition temperature Not available.
Viscosity Not applicable

10. Stability and Reactivity

Reactivity This product may react with oxidizing agents.
Possibility of hazardous reactions Hazardous polymerization does not occur.

**11. Toxicological Information**

**Routes of exposure**
- Eye, Skin contact, Inhalation, Ingestion.

**Information on likely routes of exposure**
- **Ingestion**: Not a normal route of exposure. May cause stomach distress, nausea or vomiting.
- **Inhalation**: Not a normal route of exposure. May cause respiratory tract irritation.
- **Skin contact**: No adverse effects due to skin contact are expected.
- **Eye contact**: Causes serious eye irritation.

**Symptoms related to the physical, chemical and toxicological characteristics**
Symptoms may include stinging, tearing, redness, swelling, and blurred vision.

**Information on toxicological effects**

**Acute toxicity**
- Harmful if swallowed.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calcium chloride (CAS 10043-52-4)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acute</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dermal</td>
<td>Rat</td>
<td>2630 mg/kg</td>
</tr>
<tr>
<td>LD50</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td><strong>Oral</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD50</td>
<td>Mouse</td>
<td>1940 mg/kg</td>
</tr>
<tr>
<td>Rat</td>
<td>1000 mg/kg</td>
<td></td>
</tr>
<tr>
<td><strong>Skin corrosion/irritation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged skin contact may cause temporary irritation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exposure minutes</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Erythema value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Oedema value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Serious eye damage/eye irritation</strong></td>
<td></td>
<td>Causes serious eye irritation.</td>
</tr>
<tr>
<td><strong>Corneal opacity value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Iris lesion value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Conjunctival reddening value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Conjunctival oedema value</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Recover days</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Respiratory or skin sensitization</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Respiratory sensitization</strong></td>
<td></td>
<td>This product is not expected to cause skin sensitization.</td>
</tr>
<tr>
<td><strong>Skin sensitization</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Germ cell mutagenicity</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Mutagenicity</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Carcinogenicity</strong></td>
<td></td>
<td>Not classified or listed by IARC, NTP, OSHA and ACGIH.</td>
</tr>
<tr>
<td><strong>Reproductive toxicity</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Teratogenicity</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Specific target organ toxicity - single exposure</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Specific target organ toxicity - repeated exposure</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Aspiration hazard</strong></td>
<td></td>
<td>Not classified.</td>
</tr>
<tr>
<td><strong>Chronic effects</strong></td>
<td></td>
<td>Not available.</td>
</tr>
<tr>
<td><strong>Further information</strong></td>
<td></td>
<td>Not available.</td>
</tr>
</tbody>
</table>
12. Ecological Information

<table>
<thead>
<tr>
<th>Ecotoxicity</th>
<th>See below</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Components</strong></td>
<td><strong>Species</strong></td>
</tr>
<tr>
<td>Calcium chloride (CAS 10043-52-4)</td>
<td>Daphnia</td>
</tr>
<tr>
<td>Crustacea</td>
<td></td>
</tr>
<tr>
<td><strong>Aquatic</strong></td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>Fathead minnow (Pimephales promelas)</td>
</tr>
</tbody>
</table>

**Persistence and degradability**

No data is available on the degradability of this product.

**Bioaccumulative potential**

No data available.

**Mobility in soil**

No data available.

**Mobility in general**

Not available.

**Other adverse effects**

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal Considerations

**Disposal instructions**
Dispose of contents/container in accordance with local/regional/national/international regulations.

**Local disposal regulations**
Dispose in accordance with all applicable regulations.

**Hazardous waste code**
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

**Waste from residues / unused products**
Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

**Contaminated packaging**
Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport Information

**General**
Canada: TDG Proof of Classification: In accordance with Part 2.2.1 (SOR/2014-152) of the Transportation of Dangerous Goods Regulations, we certify that the classification of this product is correct as of the SDS date of issue. If applicable, the technical name and the classification of the product will appear below.

**U.S. Department of Transportation (DOT)**
Not regulated as dangerous goods.

**Transportation of Dangerous Goods (TDG - Canada)**
Not regulated as dangerous goods.

15. Regulatory Information

**Canadian federal regulations**
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

**Canada Priority Substances List (Second List): Listed substance**
Calcium chloride (CAS 10043-52-4) Listed.

**WHMIS status**
Controlled

**WHMIS classification**
Class D - Division 2B

**WHMIS labeling**

**US federal regulations**
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List.

**TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)**
Not regulated.

**CERCLA Hazardous Substance List (40 CFR 302.4)**
Not listed.

**Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)**
Not regulated.
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No
SARA 302 Extremely hazardous substance
No
SARA 311/312 Hazardous chemical
No
SARA 313 (TRI reporting)
Not regulated.

Other federal regulations
Safe Drinking Water Act (SDWA)
Not regulated.
Food and Drug Administration (FDA)
Not regulated.

US state regulations
This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
Not listed.
US - Texas Effects Screening Levels: Listed substance
Calcium chloride (CAS 10043-52-4) Listed.

US. Massachusetts RTK - Substance List
Not regulated.

US. Pennsylvania RTK - Hazardous Substances
Not regulated.

US. Rhode Island RTK
Not regulated.

Inventory status
Country(s) or region Inventory name On inventory (yes/no)*
Canada Domestic Substances List (DSL) Yes
Canada Non-Domestic Substances List (NDSL) No
United States & Puerto Rico Toxic Substances Control Act (TSCA) Inventory Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

LEGEND

| Severe | 4 |
| Serious | 3 |
| Moderate | 2 |
| Slight | 1 |
| Minimal | 0 |

Disclaimer
Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.

Issue date 24-June-2015
Effective date 15-June-2015
Expiry date 15-June-2018
Further information For an updated SDS, please contact the supplier/manufacturer listed on the first page of the document.
Prepared by Dell Tech Laboratories, Ltd. Phone: (519) 858-5021
This Safety Data Sheet was prepared to comply with the current OSHA Hazard Communication Standard (HCS) adoption of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).
This SDS conforms to the ANSI Z400.1/Z129.1-2010 Standard.
Calcium Chloride

Warning

Harmful if swallowed.
Causes serious eye irritation.

Wash thoroughly after handling. Do not eat, drink or smoke when using this product. IF SWALLOWED: Immediately call a POISON CENTER/doctor if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Rinse Mouth. If eye irritation persists: Get medical advice/attention. Dispose of contents/container in accordance with specified local/regional/national/international regulations for disposal.

Store away from incompatible materials.

Tricor Refining LLC, P.O. Box 5877, Bakersfield, CA, 93388, US, 661-393-7110
SECTION 1: IDENTIFICATION

Product Identifier
Product Form: Mixture
Product Name: Liquid Alum
Formula: Al₂(SO₄)₃•14 H₂O (Dry Equivalent)

Intended Use of the Product
Alum is used as a coagulating agent in municipal and industrial water and wastewater treatment and as an additive in papermaking.

Name, Address, and Telephone of the Responsible Party
Manufacturer
CHEMTRADE LOGISTICS INC.
155 Gordon Baker Road
Suite 300
Toronto, Ontario M2H 3N5
For SDS Info: (416) 496-5856
www.chemtradelogistics.com

Emergency Telephone Number
Emergency Number :
Canada: CANUTEC +1-613-996-6666 / US: CHEMTREC +1-800-424-9300
Chemtrade Emergency Contact: (866) 416-4404
For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture
Classification (GHS-US)
Met. Corr. 1 H290
Skin Corr. 1A H314
Eye Dam. 1 H318
Aquatic Acute 3 H402
Full text of H-phrases: see section 16

Label Elements
GHS-US Labeling
Hazard Pictograms (GHS-US) :

Signal Word (GHS-US) :
Hazard Statements (GHS-US)
H290 - May be corrosive to metals
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H402 - Harmful to aquatic life

Precautionary Statements (GHS-US)
P234 - Keep only in original container.
P260 - Do not breathe vapors, mist, or spray.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P273 - Avoid release to the environment.
P280 - Wear eye protection, protective clothing, protective gloves.
P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting.
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304+P340 - IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Liquid Alum

Safety Data Sheet
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

P310 - Immediately call a doctor.
P321 - Specific treatment (see section 4 on this SDS).
P363 - Wash contaminated clothing before reuse.
P390 - Absorb spillage to prevent material damage.
P405 - Store locked up.
P406 - Store in corrosive resistant container with a resistant inner liner.
P501 - Dispose of contents/container in accordance with local, regional, national, and international regulations.

Other Hazards
Other Hazards Not Contributing to the Classification: Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions.

Unknown Acute Toxicity (GHS-US) Not available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>% (w/w)</th>
<th>Classification (GHS-US)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>(CAS No) 7732-18-5</td>
<td>30 - 60</td>
<td>Not classified</td>
</tr>
<tr>
<td>Sulfuric acid, aluminum salt (3:2)</td>
<td>(CAS No) 10043-01-3</td>
<td>30 - 60</td>
<td>Met. Corr. 1, H290</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Dam. 1, H318</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Acute 3, H402</td>
</tr>
</tbody>
</table>

*As Al₂(SO₄)₃•14 H₂O (Dry Aluminum Sulfate).
The specific chemical identity and/or exact percentage of composition have been withheld as a trade secret [29 CFR 1910.1200].
A range of concentration as prescribed by the Controlled Products Regulations has been used where necessary, due to varying composition.

Full text of H-phrases: see section 16

SECTION 4: FIRST AID MEASURES

Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label if possible).

Inhalation: Remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists.

Skin Contact: Rinse immediately with plenty of water. Obtain medical attention if irritation develops or persists.

Eye Contact: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention.

Ingestion: Do NOT induce vomiting. Rinse mouth. Immediately call a POISON CENTER or doctor/physician.

Most Important Symptoms and Effects Both Acute and Delayed

General: Causes severe skin burns and eye damage.

Inhalation: May cause respiratory irritation.

Skin Contact: Redness. Pain. Serious skin burns. Blisters.

Eye Contact: Redness. Pain. Blurred vision. Severe burns. Causes permanent damage to the cornea, iris, or conjunctiva.

Ingestion: Ingestion is likely to be harmful or have adverse effects.

Chronic Symptoms: None expected under normal conditions of use.

Indication of Any Immediate Medical Attention and Special Treatment Needed

If you feel unwell, seek medical advice (show the label where possible).

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Unsuitable Extinguishing Media: Do not use a heavy water stream. Use of heavy stream of water may spread fire.

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not considered flammable but may burn at high temperatures.

Explosion Hazard: Product is not explosive.

Reactivity: Hazardous reactions will not occur under normal conditions. Liquid alum may react with some metals, to give flammable, potentially explosive hydrogen gas. Hydrogen gas can accumulate to explosive concentrations inside confined spaces.
Liquid Alum
Safety Data Sheet
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

**Advisory for Firefighters**
Precautionary Measures: Fire: Not available
Firefighting Instructions: Use water spray or fog for cooling exposed containers. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion.
Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.
Hazardous Combustion Products: Forms aluminum oxide, sulfur dioxide and/or sulfur trioxide at temperatures above 760°C (1400°F) or when dry alum is encompassed in a fire involving other burning materials.
Other Information: Refer to Section 9 for flammability properties.

**Reference to Other Sections**
Refer to section 9 for flammability properties.

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

**Personal Precautions, Protective Equipment and Emergency Procedures**
General Measures: Avoid all contact with skin, eyes, or clothing. Avoid breathing (dust, vapor, mist, gas).
For Non-Emergency Personnel
Protective Equipment: Use appropriate personal protection equipment (PPE).
For Emergency Personnel
Protective Equipment: Equip cleanup crew with proper protection.

**Environmental Precautions**
Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

**Methods and Material for Containment and Cleaning Up**
For Containment: Contain any spills with dike or absorbents to prevent migration and entry into sewers or streams.
Methods for Cleaning Up: Collect spillage. Dispose in a safe manner in accordance with local/national regulations.

**Reference to Other Sections**
See Heading 8. Exposure controls and personal protection.

**SECTION 7: HANDLING AND STORAGE**

**Precautions for Safe Handling**
Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Use good housekeeping practices during storage, transfer, handling, to avoid excessive dust accumulation. Protect from moisture.

**Conditions for Safe Storage, Including Any Incompatibilities**
Technical Measures: Comply with applicable regulations.
Storage Conditions: Store in a dry, cool and well-ventilated place. Keep container closed when not in use. Keep/Store away from direct sunlight, extremely high or low temperatures and incompatible materials.
Incompatible Materials: Strong bases.
Special Rules on Packaging: Store in original container or corrosive resistant and/or lined container.
Specific End Use(s)
For professional use only.

**SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Control Parameters**
For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

**Exposure Controls**
Appropriate Engineering Controls: Ensure adequate ventilation, especially in confined areas. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure all national/local regulations are observed.

Materials for Protective Clothing: Chemically resistant materials and fabrics.
Hand Protection: Wear chemically resistant protective gloves.
Liquid Alum

Safety Data Sheet
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Eye Protection: Chemical goggles or safety glasses.

Skin and Body Protection: Wear suitable protective clothing.

Respiratory Protection: Use NIOSH-approved dust mask if dust has the potential to become airborne.

Environmental Exposure Controls: Do not allow the product to be released into the environment.

Consumer Exposure Controls: Do not eat, drink or smoke during use.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State: Liquid

Appearance: Clear, light green, slight yellow, brow, amber, or orange like tint

Odor: Odorless

Odor Threshold: Not available

pH: 1.4 - 2.6

Melting Point: Not applicable

Freezing Point: -15.56 °C (4°F)

Boiling Point: 101 °C (213.80 °F)

Flash Point: Not flammable

Auto-ignition Temperature: Not available

Decomposition Temperature: Not available

Flammability (solid, gas): Not applicable

Lower Flammable Limit: Not available

Upper Flammable Limit: Not available

Vapor Pressure: Not available

Relative Vapor Density at 20 °C: Not available

Relative Density: Not available

Specific Gravity: 1.30-1.35

Solubility: Water: Completely miscible in water.

Partition Coefficient: N-Octanol/Water: Not available

Viscosity: Not available

Explosion Data – Sensitivity to Mechanical Impact: Not expected to present an explosion hazard due to mechanical impact.

Explosion Data – Sensitivity to Static Discharge: Not expected to present an explosion hazard due to static discharge.

SECTION 10: STABILITY AND REACTIVITY

Reactivity: Hazardous reactions will not occur under normal conditions. Liquid alum may react with some metals, to give flammable, potentially explosive hydrogen gas. Hydrogen gas can accumulate to explosive concentrations inside confined spaces.

Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.


Hazardous Decomposition Products: Oxides of aluminum. The decomposition products are corrosive and hazardous to health.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity: Not classified

LD50 and LC50 Data: Not available

Skin Corrosion/Irritation: Causes severe skin burns and eye damage.

pH: 1.5 - 2.5

Serious Eye Damage/Irritation: Causes serious eye damage.

pH: 1.5 - 2.5

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Teratogenicity: Not available
Liquid Alum
Safety Data Sheet
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Carcinogenicity: Not classified
Specific Target Organ Toxicity (Repeated Exposure): Not classified
Reproductive Toxicity: Not classified
Specific Target Organ Toxicity (Single Exposure): Not classified
Aspiration Hazard: Not classified
Symptoms/Injuries After Inhalation: May cause respiratory irritation.
Symptoms/Injuries After Ingestion: Ingestion is likely to be harmful or have adverse effects.
Chronic Symptoms: None expected under normal conditions of use.
Information on Toxicological Effects - Ingredient(s)
LD50 and LC50 Data:

| Water (7732-18-5) | LD50 Oral Rat | > 90000 mg/kg |

SECTION 12: ECOLOGICAL INFORMATION
Toxicity Not classified
Persistence and Degradability Not available
Bioaccumulative Potential Not available
Mobility in Soil Not available
Other Adverse Effects
Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS
Waste Disposal Recommendations: Dispose of waste material in accordance with all local, regional, national, and international regulations.

SECTION 14: TRANSPORT INFORMATION
14.1 In Accordance with DOT
Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS ALUMINUM SULFATE)
Hazard Class: 8
Identification Number: UN3264
Label Codes: 8
Packing Group: III
ERG Number: 154

14.2 In Accordance with IMDG
Proper Shipping Name: CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS ALUMINUM SULFATE)
Hazard Class: 8
Identification Number: UN3264
Packing Group: III
Label Codes: 8
EmS-No. (Fire): F-A
EmS-No. (Spillage): S-B
**Liquid Alum**  
**Safety Data Sheet**  
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

### 14.3 In Accordance with IATA

<table>
<thead>
<tr>
<th>Proper Shipping Name</th>
<th>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS ALUMINUM SULFATE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
<tr>
<td>Identification Number</td>
<td>UN3264</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>8</td>
</tr>
<tr>
<td>Label Codes</td>
<td>8</td>
</tr>
<tr>
<td>ERG Code (IATA)</td>
<td>8L</td>
</tr>
</tbody>
</table>

### 14.4 In Accordance with TDG

<table>
<thead>
<tr>
<th>Proper Shipping Name</th>
<th>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS ALUMINUM SULFATE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing Group</td>
<td>III</td>
</tr>
<tr>
<td>Hazard Class</td>
<td>8</td>
</tr>
<tr>
<td>Identification Number</td>
<td>UN3264</td>
</tr>
<tr>
<td>Label Codes</td>
<td>8</td>
</tr>
</tbody>
</table>

### SECTION 15: REGULATORY INFORMATION

#### US Federal Regulations

<table>
<thead>
<tr>
<th>Liquid Alum</th>
<th>Clean Water Act</th>
<th>Reportable Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ingredient Name</td>
<td>Aluminum sulfate (10043-01-3)</td>
</tr>
</tbody>
</table>

**Liquid Alum**

- **SARA Section 311/312 Hazard Classes**: Immediate (acute) health hazard

**Water (7732-18-5)**

- Listed on the United States TSCA (Toxic Substances Control Act) inventory

**Sulfuric acid, aluminum salt (3:2) (10043-01-3)**

- Listed on the United States TSCA (Toxic Substances Control Act) inventory

#### US State Regulations

<table>
<thead>
<tr>
<th>Liquid Alum</th>
</tr>
</thead>
</table>

- **Sulfuric acid, aluminum salt (3:2) (10043-01-3)**
  - U.S. - Massachusetts - Right To Know List
  - U.S. - New Jersey - Right to Know Hazardous Substance List
  - U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List
  - U.S. - Pennsylvania - RTK (Right to Know) List

#### Canadian Regulations

<table>
<thead>
<tr>
<th>Liquid Alum</th>
</tr>
</thead>
</table>

- **WHMIS Classification**
  - Class D Division 2 Subdivision B - Toxic material causing other toxic effects
  - Class E - Corrosive Material

**Water (7732-18-5)**

- Listed on the Canadian DSL (Domestic Substances List)

**WHMIS Classification**

- Uncontrolled product according to WHMIS classification criteria

**Sulfuric acid, aluminum salt (3:2) (10043-01-3)**

- Listed on the Canadian DSL (Domestic Substances List)
Liquid Alum
Safety Data Sheet
According to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

WHMIS Classification: Class E - Corrosive Material

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all of the information required by CPR.

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Revision Date: 10/22/15
Revision Summary: Sections 9 and 16
Other Information: This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

GHS Full Text Phrases:

<table>
<thead>
<tr>
<th>Aquatic Acute 3</th>
<th>Hazardous to the aquatic environment - Acute Hazard Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Dam. 1</td>
<td>Serious eye damage/eye irritation Category 1</td>
</tr>
<tr>
<td>Met. Corr. 1</td>
<td>Corrosive to metals Category 1</td>
</tr>
<tr>
<td>Skin Corr. 1A</td>
<td>Skin corrosion/irritation Category 1A</td>
</tr>
<tr>
<td>H290</td>
<td>May be corrosive to metals</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>H402</td>
<td>Harmful to aquatic life</td>
</tr>
</tbody>
</table>

Party Responsible for the Preparation of This Document
CHEMTRADE LOGISTICS, INC.
For SDS Info: (416) 496-5856

Handle product with due care and avoid unnecessary contact. This information is supplied under U.S. OSHA’S “Right to Know” (29 CFR 1910.1200) and Canada’s WHMIS regulations. Although certain hazards are described herein, we cannot guarantee these are the only hazards that exist. The information contained herein is based on data available to us and is believed to be true and accurate but it is not offered as a product specification. No warranty, expressed or implied, regarding the accuracy of this data, the hazards connected with the use of the product, or the results to be obtained from the use thereof, is made and Chemtrade and its affiliates assume no responsibility. Chemtrade is a member of the CIAC (Chemistry Industry Association of Canada) and adheres to the codes and principles of Responsible Care™.
Danger

Liquid Alum

May be corrosive to metals - Causes severe skin burns and eye damage - Causes serious eye damage - Harmful to aquatic life

Keep only in original container. - Do not breathe dust/fume/gas/mist/vapours/spray. - Wash hands, forearms, and other exposed areas thoroughly after handling. - Avoid release to the environment. - Wear protective gloves/protective clothing/eye protection/face protection. - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - Immediately call a POISON CENTER or doctor/physician. - Specific treatment (see section 4 on this SDS). - Wash contaminated clothing before reuse. - Absorb spillage to prevent material damage. - Store locked up. - Store in corrosive resistant container with a resistant inner liner. - Dispose of contents/container in accordance with local, regional, national, and international regulations.

Please refer to the original SDS for more information
SAFETY DATA SHEET

1. Identification of the Substance / Preparation and of the Company / Undertaking

Product Name: Chlorine
UN/ID No: UN1017
Formula: Cl₂
Molecular Weight: 70.91

Company Name:
Hawkins, Inc. 3100 E. Hennepin Avenue Minneapolis, MN 55413 (612-331-6910)

Emergency Telephone:
CHEMTREC (US): 1-800-424-9300

2. Hazards Identification

GHS - Classification

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute toxicity - Inhalation (Gases)</td>
<td>Category 1</td>
</tr>
<tr>
<td>Acute toxicity - Inhalation (Dusts/Mists)</td>
<td>Category 1</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 1 Category 1A</td>
</tr>
<tr>
<td>Serious eye damage/eye irritation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (repeated exposure)</td>
<td>Category 1</td>
</tr>
<tr>
<td>Acute aquatic toxicity</td>
<td>Category 1</td>
</tr>
<tr>
<td>Chronic aquatic toxicity</td>
<td>Category 1</td>
</tr>
</tbody>
</table>

Signal Word: Danger

Hazard Statements:
• Fatal if inhaled
• Causes severe skin burns and eye damage
• Causes damage to organs
• Causes damage to organs through prolonged or repeated exposure
• Very toxic to aquatic life with long lasting effects

Physical Hazards

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizing gases</td>
<td>Category 1</td>
</tr>
<tr>
<td>Corrosive to metals</td>
<td>Category 1</td>
</tr>
</tbody>
</table>

• May cause or intensify fire; oxidizer
• May be corrosive to metals

Precautionary Statements:
• P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
• P303 + P361 + P353 - IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
• P363 - Wash contaminated clothing before reuse
• P280 - Wear protective gloves/protective clothing/eye protection/face protection
• P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
• P307 + P311 - IF exposed: Call a POISON CENTER or doctor/physician
• P264 - Wash face, hands and any exposed skin thoroughly after handling
• P270 - Do not eat, drink or smoke when using this product
• P314 - Get medical advice/attention if you feel unwell
• P501 - Dispose of contents/container to industrial incineration plant
• P273 - Avoid release to the environment
• P220 - Keep/Store away from clothing/ combustible materials
• P244 - Keep reduction valves free from grease and oil
• P370 + P376 - In case of fire: Stop leak if safe to do so
• P403 - Store in a well-ventilated place
• P334 - Immerse in cool water/wrap in wet bandages
• P390 - Absorb spillage to prevent material damage
• P406 - Store in corrosive resistant aluminum container with a resistant inliner
• P260 - Do not breathe dust/fume/gas/mist/vapors/spray
• P271 - Use only outdoors or in a well-ventilated area
• P284 - Wear respiratory protection
• P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
• P310 - Immediately call a POISON CENTER or doctor/physician
• P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
• P405 - Store locked up
• P501 - Dispose of contents/ container to an approved waste disposal plant

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>EC No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>7782-50-5</td>
<td>99.5-100</td>
<td>231-959-5</td>
</tr>
</tbody>
</table>

4. First Aid Measures

General Advice: Immediate medical attention is required. If symptoms persist, call a physician. Immediate medical attention is not required. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible). No hazards which require special first aid measures.

Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Call a physician immediately. If symptoms persist, call a physician. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists: Get medical advice/attention.
4800 Chlorine

Skin Contact: Immediate medical attention is required. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash contaminated clothing before reuse. Wash off immediately with plenty of water. If skin irritation persists, call a physician. Immediate medical attention is not required. Wash off immediately with soap and plenty of water.

Inhalation: Immediate medical attention is required. Move to fresh air. If not breathing, give artificial respiration. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Artificial respiration and/or oxygen may be necessary. Obtain medical attention. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician. Vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing. Immediately give oxygen if victim turns blue (lips, ears, fingernails). Call a physician or poison control center immediately.

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person. Drink plenty of water. Clean mouth with water and drink afterwards plenty of water. Obtain medical attention. Consult a physician if necessary.

Note to Physicians: Treat symptomatically.

Self-protection of the First Aider: Use personal protective equipment as required. Avoid contact with skin, eyes or clothing.

5. Fire-fighting Measures

Flammable Properties: Not considered to be a fire hazard

Explosive Properties: Reacts explosively or forms explosive compounds, with many chemicals, such as acetylene, turpentine, ether, ammonia gas, hydrogen and finely divided metals

Suitable Extinguishing Media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment

Unsuitable Extinguishing Media: No information available

Protective Equipment and Precautions for Firefighters: In the event of a fire, wear full protective clothing and MSHA/NIOSH (approved or equivalent) self-contained breathing apparatus with full facepiece operated in the pressure-demand or other positive pressure mode

6. Accidental Release Measures

Personal Precautions: Use personal protective equipment as required. Keep people away from and upwind of spill/leak. Evacuate personnel to safe areas.

Environmental Precautions: Prevent further leakage or spillage if safe to do so. Prevent product from entering drains. Do not flush into surface water or sanitary sewer system.

Methods for Containment: Prevent further leakage or spillage if safe to do so. Cover powder spill with plastic sheet or tarp to minimize spreading. Dike far ahead of liquid spill for later disposal.

Methods for Cleaning Up: Cover liquid spill with sand, earth or other non-combustible absorbent material. Cover powder spill with plastic sheet or tarp to minimize spreading. Sweep up and shovel into suitable containers for disposal. Soak up with inert absorbent material. Dam up. Pick up and transfer to properly labeled containers.

Other Information: Not applicable.
7. Handling and Storage

**Advice on Safe Handling:**
Use personal protective equipment as required. Avoid contact with skin, eyes or clothing. Wash contaminated clothing before reuse. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Use with local exhaust ventilation. Do not breathe dust/fume/gas/mist/vapors/spray. Do not smoke.

**Storage Conditions:**
Keep out of the reach of children. Keep container tightly closed in a dry and well-ventilated place. Keep containers tightly closed in a cool, well-ventilated place. Keep in properly labeled containers. Keep containers tightly closed in a dry, cool and well-ventilated place.

**Incompatible Materials:**
Tin; Metals; Sulfides; Titanium. Reacts with most metals at high temperatures. Reacts with water to produce hydrochloric acids, which are corrosive to most metals. Ammonia, elemental metals, certain metal hydroxides, carbides, nitriles, oxides, phosphides and sulfides, easily oxidized materials, organic materials (e.g. oil grease) and unstable and reactive compounds.

8. Exposure Controls / Personal Protection

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>European Union</th>
<th>China</th>
<th>Japan</th>
<th>Korea</th>
<th>Australia</th>
<th>Taiwan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>Ceiling: 1 mg/m³ Ceiling</td>
<td>Ceiling: 1.5 mg/m³ Ceiling</td>
<td>ISSH/ACL: 0.5 ppm Ceiling</td>
<td>STEL: 1 ppm TWA: 0.5 ppm</td>
<td>STEL: 3 mg/m³ TWA: 0.5 ppm</td>
<td>1 ppm Peak 3 mg/m³ Peak</td>
</tr>
</tbody>
</table>

**Exposure Guidelines:**
Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992)

**Engineering Controls:**
Ensure adequate ventilation, especially in confined areas

**Personal protective equipment (PPE):**

- **Eye/Face Protection:** Tight sealing safety goggles. Face protection shield. Avoid contact with eyes.
- **Body Protection:** Suitable protective clothing. Gloves made of plastic or rubber. Suitable protective clothing. Apron.

**General Hygiene Considerations:**
When using do not eat, drink or smoke. Regular cleaning of equipment, work area and clothing is recommended. Avoid contact with skin, eyes or clothing. Wash hands thoroughly after handling. Keep away from food, drink and animal feeding stuffs. Handle in accordance with good industrial hygiene and safety practice. Keep working clothes separately.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks • Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid Gas</td>
<td>No information available</td>
</tr>
<tr>
<td>Appearance</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Color</td>
<td>Amber Green Yellow</td>
<td>No information available</td>
</tr>
<tr>
<td>Odor</td>
<td>Pungent</td>
<td>No information available</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>pH</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>“Salt Out” Point (°F)</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Melting Point/Freezing Point</td>
<td>-101 °C / -150 °F</td>
<td>No information available</td>
</tr>
<tr>
<td>Boiling Point/Boiling Range</td>
<td>-34 °C / -29 °F</td>
<td>No information available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Evaporation Rate (BuAc=1)</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability Limits in Air</td>
<td>No information available</td>
<td>No information available</td>
</tr>
<tr>
<td>Upper Flammability Limit</td>
<td>No information available</td>
<td>No information available</td>
</tr>
</tbody>
</table>
4800 Chlorine

Lower Flammability Limit: 3671
Vapor Pressure (mm Hg): 3671
Vapor density (Air =1): 2.5
Specific Gravity (H₂O=1): No information available
Specific Gravity (2nd value): No information available
Water Solubility: Slightly soluble
Solubility(ies): No information available
Partition Coefficient (n-octanol/water): No information available
Autoignition Temperature: No information available
Decomposition Temperature: No information available
Kinematic Viscosity: No information available
Dynamic Viscosity: No information available
Oxidizing Properties: Reacts explosively or forms explosive compounds, with many chemicals, such as acetylene, turpentine, ether, ammonia gas, hydrogen and finely divided metals
Explosive Properties: No information available

9.2. Other information
Softening Point: No information available
Molecular Weight: 70.91
VOC Content(%): No information available
Density: 1401.97g/Liter @ 15.6°C
Bulk Density: No information available
% Volatiles by Volume @ 21°C (70°F): 100

10. Stability and Reactivity
Stability: Stable under normal conditions of use and storage
Conditions to Avoid: Heat, flames and sparks; Incompatibles; Moisture
Incompatible Materials: Tin; Metals; Sulfides; Titanium. Reacts with most metals at high temperatures. Reacts with water to produce hydrochloric acids, which are corrosive to most metals. Ammonia, elemental metals, certain metal hydroxides, carbides, nitrides, oxides, phosphides and sulfides, easily oxidized materials, organic materials (e.g. oil grease) and unstable and reactive compounds
Hazardous Decomposition Products: None under normal use conditions
Possibility of Hazardous Reactions: None under normal processing

11. Toxicological Information

Product Information
Acute Toxicity: 0% of the mixture consists of ingredient(s) of unknown toxicity.
The following values are calculated based on chapter 3.1 of the GHS document

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD₅₀</th>
<th>Dermal LD₅₀</th>
<th>LC₅₀ (Lethal Concentration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td></td>
<td></td>
<td>0.86 mg/L ( Rat ) 1 h 293 ppm ( Rat ) 1 h</td>
</tr>
</tbody>
</table>
4800 Chlorine

Carcinogenicity: This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP

Target Organ Effects: Eyes, Respiratory system, Skin

12. Ecological Information

Ecotoxicity

0.25% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Toxic to aquatic life with long lasting effects Very toxic to aquatic life with long lasting effects

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicity to algae</th>
<th>Toxicity to fish</th>
<th>Toxicity to daphnia and other aquatic invertebrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>0.44: 96 h Lepomis macrochirus mg/L LC50 flow-through 0.014: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 0.014: 96 h Oncorhynchus mykiss mg/L LC50 0.104 - 0.168: 96 h Oncorhynchus mykiss mg/L LC50 static 0.08: 96 h Pimephales promelas mg/L LC50 flow-through 0.1: 96 h Pimephales promelas mg/L LC50</td>
<td>0.017: 48 h Daphnia magna mg/L LC50</td>
<td></td>
</tr>
</tbody>
</table>

Persistence and Degradability: No information available.

Bioaccumulation: No information available.

Mobility: No information available.

13. Disposal Considerations

Waste from Residues/Unused Products: Disposal should be in accordance with applicable regional, national and local laws and regulations

14. Transport Information

DOT

Proper shipping name CHLORINE
Hazard Class 2.3
Subsidiary Class 8
Subsidiary Class 2 5.1
UN/ID No UN1017
Reportable Quantity (RQ) 10
Marine pollutant
Description This product contains a chemical which is listed as a marine pollutant according to DOT. UN1017, CHLORINE, 2.3 (8, 5.1), POISON INHALATION HAZARD ZONE B, MARINE POLLUTANT
15. Regulatory Information

International Inventories
All of the components in the product are on the following Inventory lists: TSCA (United States); Canada (DSL/NDSL), Europe (EINECS/ELINCS/NL), Australia (AICS), South Korea (KECL); China (IECSC), Philippines (PICCS), This product contains a substance not listed on international inventories - it is for research and development use only.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>AICS</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>Listed</td>
<td>Listed</td>
<td>Listed</td>
<td>-</td>
<td>Listed</td>
<td>-</td>
<td>Listed</td>
<td>KE-05486</td>
<td>Present</td>
<td></td>
</tr>
</tbody>
</table>

Inventory Legend
AICS - Australian Inventory of Chemical Substances
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

RESTRICTIONS - REACH TITLE VII  No information available

US Federal Regulations

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CERCLA Hazardous Substances and the Reportable Quantities</th>
<th>SARA Extremely Hazardous Substances EPCRA RQ</th>
<th>SARA Extremely Hazardous Substances TPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>10 lb 4.54 kg</td>
<td>10 lb EPCRA RQ</td>
<td>100 lb TPQ</td>
</tr>
</tbody>
</table>

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine (elemental Cl and hypochlorite salts)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories
- Acute health hazard: Yes
- Chronic health hazard: No
- Fire hazard: Yes
- Sudden release of pressure hazard: Yes
- Reactive hazard: No
U.S. State Right-to-Know Regulations

California Proposition 65:
This product does not contain any Proposition 65 chemicals

16. Other Information

National Fire Protection Association (NFPA) Ratings

![NFPA Ratings Image]

NSF Certification

Certified to NSF/ANSI 60

Maximum Use (mg/L unless otherwise indicated): 30

Prepared By: HSE Department

Issue Date: 03-May-2012

Revision Date: 23-Jul-2012

Revision Note: MSDS converted to GHS SDS Format.

Disclaimer:
Please be advised that it is your responsibility to inform your employees of the hazards of this substance, to advise them of what these properties mean and be sure they understand exposure information. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication.

The information presented herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge. No warranty or guaranty, express or implied, is made regarding performance, stability, or otherwise. This information is not intended to be all-inclusive as to the manner and conditions of use, handling, and storage. Other factors may require additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, the handling and use remains the responsibility of the consumer. No suggestions are intended as, and should not be constructed as, a recommendation to infringe on any existing patents or to violate any Federal, State, or local laws.

End of Safety Data Sheet
Signal Word/ Emergency Overview

Danger.

Fatal if inhaled. Causes severe skin burns and eye damage. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Very toxic to aquatic life with long lasting effects.

Oxidizing gases Corrosive to metals

First Aid Treatment

General Advice: Immediate medical attention is required if symptoms persist. Call a physician. Immediate medical attention is not required in case of accident or unwellness. Seek medical advice immediately. Use directions for use or safety data sheet if possible. No hazards which require special first aid measures.

Skin Contact: Immediate medical attention is required. Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash contaminated clothing before reuse. Wash off immediately with plenty of water. If skin irritation persists, call a physician. Immediate medical attention is not required. Wash off immediately with soap and plenty of water.

Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Call a physician immediately. If symptoms persist, call a physician. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If eye irritation persists, Get medical advice attention.

Inhalation: Immediate medical attention is required. Move to fresh air. If not breathing, give artificial respiration. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Artificial respiration and/or oxygen may be necessary. Obtain medical attention. Immediate medical attention is not required. Move to fresh air in case of accidental inhalation of vapors. If symptoms persist, call a physician. Vapors are heavier than air and can cause suffocation by reducing oxygen available for breathing. Immediately give oxygen if victim turns blue (lips, ears, fingernails). Call a physician or Poison Control Center immediately.

Ingestion: Do not induce vomiting. Call a physician or Poison Control Center immediately. Never give anything by mouth to an unconscious person.

Storage and Handling Requirements

Neatly packaged, store at room temperature. Do not expose to temperatures above 120°F (49°C). Keep out of the reach of children. Keep container tightly closed in a cool, well-ventilated place. Keep in properly labeled containers. Keep container tightly closed in a dry, cool and well-ventilated place.

This Product Freezes at (°F): -150

Product Name: Chlorine - EPA Reg. No. 7870-2

Lot Number:

Product Number: 4800

Net Weight: 150 lb / 68 kg

Date of Manufacture:

Maximum Use (mg/L unless otherwise indicated): 30

Chemtrec: 800-424-9300
SAFETY DATA SHEET

1. Identification
Product identifier          ALUMINUM SULFATE 50%
Other means of identification None.
Recommended use            ALL PROPER AND LEGAL PURPOSES
Recommended restrictions   None known.
Manufacturer/Importer/Supplier/Distributor information
Manufacturer
  Company name          Brenntag Mid-South, Inc.
  Address              1405 Highway 136, West
                        Henderson, KY 42420
  Telephone            270-830-1222
  E-mail               Not available.
  Emergency phone number 800-424-9300 CHEMTREC

2. Hazard(s) identification
Physical hazards            Not classified.
Health hazards
  Acute toxicity, oral       Category 4
  Skin corrosion/irritation  Category 1C
  Serious eye damage/eye irritation Category 1

Environmental hazards
  Hazardous to the aquatic environment, acute hazard Category 2
  Hazardous to the aquatic environment, long-term hazard Category 2

OSHA defined hazards        Not classified.
Label elements

Signal word                Danger
Hazard statement           Harmful if swallowed. Causes severe skin burns and eye damage. Causes serious eye damage. Toxic to aquatic life. Toxic to aquatic life with long lasting effects.
Precautionary statement
  Prevention
  Do not breathe mist or vapor. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear eye protection/face protection. Wear protective gloves/protective clothing/eye protection/face protection.
  Response
  If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Wash contaminated clothing before reuse. Collect spillage.
  Storage
  Store locked up.
  Disposal
  Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)          None known.
Supplemental information   None.

3. Composition/information on ingredients
Mixtures


<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULFURIC ACID, ALUMINUM SALT (8:2)</td>
<td></td>
<td>10043-01-3</td>
<td>50</td>
</tr>
</tbody>
</table>

**Other components below reportable levels** 50

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

### 4. First-aid measures

**Inhalation**
Move to fresh air. Call a physician if symptoms develop or persist.

**Skin contact**
Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

**Eye contact**
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.

**Ingestion**
Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach contents don't get into the lungs.

**Most important symptoms/effects, acute and delayed**
Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

**Indication of immediate medical attention and special treatment needed**
Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

**General information**
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

### 5. Fire-fighting measures

**Suitable extinguishing media**
Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

**Unsuitable extinguishing media**
Do not use water jet as an extinguisher, as this will spread the fire.

**Specific hazards arising from the chemical**
During fire, gases hazardous to health may be formed.

**Special protective equipment and precautions for firefighters**
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

**Fire fighting equipment/instructions**
Move containers from fire area if you can do so without risk.

**Specific methods**
Use standard firefighting procedures and consider the hazards of other involved materials.

**General fire hazards**
No unusual fire or explosion hazards noted.

### 6. Accidental release measures

**Personal precautions, protective equipment and emergency procedures**
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist or vapor. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

**Methods and materials for containment and cleaning up**
Large Spills: Stop the flow of material. If this is without risk. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Prevent entry into waterways, sewer, basements or confined areas. Following product recovery, flush area with water.

Small Spills: Wipe up with absorbent material (e.g., cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

**Environmental precautions**
Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. Inform appropriate managerial or supervisory personnel of all environmental releases.

### 7. Handling and storage

**Precautions for safe handling**
Provide adequate ventilation. Do not breathe mist or vapor. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. When using, do not eat, drink or smoke. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities

Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

No exposure limits noted for ingredient(s).

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.

Other

Wear appropriate chemical resistant clothing.

Respiratory protection

In case of insufficient ventilation, wear suitable respiratory equipment.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state

Liquid.

Form

Liquid.

Color

Colorless to amber

Odor

NO ODOR

Odor threshold

Not available.

pH

Not available.

Melting point/freezing point

1418 °F (770 °C) estimated / 999 °F (537.22 °C)

Initial boiling point and boiling range

212 °F (100 °C) estimated

Flash point

999.0 °F (537.2 °C)

Evaporation rate

Not available.

Flammability (solid, gas)

Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)

Not available.

Flammability limit - upper (%)

Not available.

Explosive limit - lower (%)

Not available.

Explosive limit - upper (%)

Not available.

Vapor pressure

0.00001 hPa estimated

Vapor density

Not available.

Relative density

Not available.

Solubility (s)es

Solubility (water)

Not available.

Partition coefficient (n-octanol/water)

Not available.

Auto-ignition temperature

Not available.

 Decomposition temperature

Not available.

Viscosity

Not available.
Other information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>13.44 lbs/gal estimated</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive.</td>
</tr>
<tr>
<td>Flammability class</td>
<td>Combustible IIIB estimated</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Not oxidizing.</td>
</tr>
<tr>
<td>Percent volatile</td>
<td>50 % estimated</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>1.61 estimated</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactivity The product is stable and non-reactive under normal conditions of use, storage and transport.

Chemical stability Material is stable under normal conditions.

Possibility of hazardous reactions Hazardous polymerization does not occur.

Conditions to avoid Contact with incompatible materials.

Incompatible materials Strong oxidizing agents.

Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

- Inhalation May cause irritation to the respiratory system.
- Skin contact Causes severe skin burns.
- Eye contact Causes serious eye damage.
- Ingestion Causes digestive tract burns. Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components | Species | Test Results |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute Oral LD50</td>
<td>Guinea pig</td>
<td>490 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Mouse</td>
<td>&gt; 730 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Rat</td>
<td>1930 mg/kg</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation Causes severe skin burns and eye damage.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

- Respiratory sensitization Not a respiratory sensitizer.
- Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

- Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.
Specific target organ toxicity - repeated exposure
Not classified.

Aspiration hazard
Not an aspiration hazard.

12. Ecological information
Ecotoxicity
Toxic to aquatic life with long lasting effects.

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)</td>
<td>Aquatic</td>
<td></td>
</tr>
<tr>
<td>Crustacea</td>
<td>EC50</td>
<td>Amphipod (Crangonyx pseudogracilis)</td>
</tr>
<tr>
<td>Fish</td>
<td>LC50</td>
<td>Fathead minnow (Pimephales promelas)</td>
</tr>
</tbody>
</table>

* Estimates for product may be based on additional component data not shown.

Persistence and degradability
No data is available on the degradability of this product.

Bioaccumulative potential
No data available.

Mobility in soil
No data available.

Other adverse effects
No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations
Disposal instructions
Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations
Dispose in accordance with all applicable regulations.

Hazardous waste code
The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products
Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging
Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT
UN number
UN3264
UN proper shipping name
CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S., (ALUMINUM SULFATE)

Transport hazard class(es)
Class 8
Subsidary risk -
Packing group III

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.
ERG number 154

DOT information on packaging may be different from that listed.

Material name: ALUMINUM SULFATE 50%

IMDG Regulated Marine Pollutant.
15. Regulatory information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)
SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3) Listed.

SARA 304 Emergency release notification
Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1201-1205)
Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)
Hazard categories
Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical
No

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations
Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)
Not regulated.

Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations
US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)
Not listed.

US. Massachusetts RTK - Substance List
SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)

US. New Jersey Worker and Community Right-to-Know Act
SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)

US. Pennsylvania Worker and Community Right-to-Know Law
SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)

US. Rhode Island RTK
SULFURIC ACID, ALUMINUM SALT (3:2) (CAS 10043-01-3)

US. California Proposition 65
California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSSL)</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECS)</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
</tr>
</tbody>
</table>

On inventory (yes/no)*

Yes
Yes
No
Yes
Yes
No
Yes
Country(s) or region | Inventory name                                                                 | On inventory (yes/no)*
--- | --- | ---
Korea | Existing Chemicals List (ECL) | Yes
New Zealand | New Zealand Inventory | Yes
Philippines | Philippine Inventory of Chemicals and Chemical Substances (PICCS) | Yes
United States & Puerto Rico | Toxic Substances Control Act (TSCA) Inventory | Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s). A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date | 05-06-2015
Revision date | 06-01-2015
Version # | 04

HMIS® ratings

- Health: 3
- Flammability: 0
- Physical hazard: 0

NFPA ratings

- Health: 3
- Flammability: 0
- Instability: 0

Disclaimer

BNA cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user’s responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.
ALUMINUM SULFATE 50%

Causes severe skin burns and eye damage - Causes serious eye damage - Toxic to aquatic life - Harmful if swallowed

Do not breathe dust/fume/gas/mist/vapours/spray. - Wash thoroughly after handling. - Do not eat, drink or smoke when using this product. - Avoid release to the environment. - Wear protective gloves/protective clothing/eye protection/face protection. - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - Store locked up.

Please refer to the original SDS for more information
Safety Data Sheet

SECTION 1: Identification

1.1. Product Identifier

Trade Name or Designation: Potassium Permanganate, 4% (w/v)

Product Number: 6359
Other Identifying Product Numbers: 6359-16, 6359-32

1.2. Recommended Use and Restrictions on Use

General Laboratory Reagent

1.3. Details of the Supplier of the Safety Data Sheet

Company: Ricca Chemical Company

Address: 448 West Fork Drive
          Arlington, TX  76012  USA

Telephone: 888-467-4222

1.4. Emergency Telephone Number (24 hr)

CHEMTREC (USA)  800-424-9300
CHEMTREC (International)  1+ 703-527-3887

SECTION 2: Hazard(s) Identification

2.1. Classification of the Substance or Mixture (in accordance with OSHA HCS 29 CFR 1910.1200)

For the full text of the Hazard and Precautionary Statements listed below, see Section 16.

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Category</th>
<th>Hazard Statement</th>
<th>Precautionary Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Corrosion / Irritation</td>
<td>Category 2</td>
<td>H315</td>
<td>P264, P280, P302-P352, P321, P332-P313, P362</td>
</tr>
<tr>
<td>Eye Damage / Irritation</td>
<td>Category 1</td>
<td>H318</td>
<td>P280, P305-P351-P338, P310</td>
</tr>
<tr>
<td>Germ Cell Mutagenicity</td>
<td>Category 2</td>
<td>H341</td>
<td>P201, P202, P280, P308-P313, P405, P501</td>
</tr>
<tr>
<td>Reproductive Toxicity</td>
<td>Category 2</td>
<td>H361</td>
<td>P201, P202, P280, P308-P313, P405, P501</td>
</tr>
<tr>
<td>Specific Target Organs/Systemic Toxicity Following Single Exposure</td>
<td>Category 1</td>
<td>H370</td>
<td>P260, P264, P270, P307-P311, P321, P405, P501</td>
</tr>
<tr>
<td>Specific Target Organs/Systemic Toxicity Following Repeated Exposure</td>
<td>Category 1</td>
<td>H372</td>
<td>P260, P264, P270, P314, P501</td>
</tr>
<tr>
<td>Hazardous to the Aquatic Environment (Acute)</td>
<td>Category 2</td>
<td>H401</td>
<td>P273, P501</td>
</tr>
<tr>
<td>Hazardous to the Aquatic Environment (Chronic)</td>
<td>Category 2</td>
<td>H401</td>
<td>P273, P501</td>
</tr>
</tbody>
</table>
## Safety Data Sheet

### 2.2. GHS Label Elements

**Pictograms:**

- [Image of pictograms]

**Signal Word:** Danger

### Hazard Statements:

<table>
<thead>
<tr>
<th>Hazard Number</th>
<th>Hazard Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>H315</td>
<td>Causes skin irritation.</td>
</tr>
<tr>
<td>H318</td>
<td>Causes serious eye damage.</td>
</tr>
<tr>
<td>H341</td>
<td>Suspected of causing genetic defects.</td>
</tr>
<tr>
<td>H361</td>
<td>Suspected of damaging fertility or the unborn child.</td>
</tr>
<tr>
<td>H370</td>
<td>Causes damage to organs.</td>
</tr>
<tr>
<td>H372</td>
<td>Causes damage to organs through prolonged or repeated exposure.</td>
</tr>
<tr>
<td>H401</td>
<td>Toxic to aquatic life.</td>
</tr>
</tbody>
</table>

### Precautionary Statements:

<table>
<thead>
<tr>
<th>Precautionary Number</th>
<th>Precautionary Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>P201</td>
<td>Obtain special instructions before use.</td>
</tr>
<tr>
<td>P202</td>
<td>Do not handle until all safety precautions have been read and understood.</td>
</tr>
<tr>
<td>P260</td>
<td>Do not breathe dust, fumes or mist.</td>
</tr>
<tr>
<td>P264</td>
<td>Wash arms, hands and face thoroughly after handling.</td>
</tr>
<tr>
<td>P270</td>
<td>Do not eat, drink or smoke when using this product.</td>
</tr>
<tr>
<td>P273</td>
<td>Avoid release to the environment.</td>
</tr>
<tr>
<td>P280</td>
<td>Wear protective gloves and eye protection.</td>
</tr>
<tr>
<td>P302+P352</td>
<td>IF ON SKIN: Wash with plenty of soap and water.</td>
</tr>
<tr>
<td>P305+P351+P338</td>
<td>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.</td>
</tr>
<tr>
<td>P307+P311</td>
<td>IF exposed: Call a POISON CENTER or physician.</td>
</tr>
<tr>
<td>P308+P313</td>
<td>IF exposed or concerned: Get medical attention.</td>
</tr>
<tr>
<td>P310</td>
<td>Immediately call a POISON CENTER or physician.</td>
</tr>
<tr>
<td>P314</td>
<td>Get medical attention if you feel unwell.</td>
</tr>
<tr>
<td>P321</td>
<td>Specific treatment (Wash areas of contact with water).</td>
</tr>
<tr>
<td>P332+P313</td>
<td>If skin irritation occurs: Get medical attention.</td>
</tr>
<tr>
<td>P362</td>
<td>Take off contaminated clothing and wash it before reuse.</td>
</tr>
<tr>
<td>P405</td>
<td>Store locked up.</td>
</tr>
<tr>
<td>P501</td>
<td>Dispose of contents in accordance with local, state, federal and international regulations.</td>
</tr>
</tbody>
</table>
2.3. WHMIS Classification
WHMIS classification is not included based on the recommended option (Option 4) found in the Canada Gazette Part II, Vol. 149, No.3, page 458

2.4. Hazards not Otherwise Classified or Covered by GHS
Data not available.

SECTION 3: Composition / Information on Ingredients

3.1. Components of Substance or Mixture

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Formula</th>
<th>Molecular Weight</th>
<th>CAS Number</th>
<th>Weight%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>H₂O</td>
<td>18.01 g/mol</td>
<td>7732-18-5</td>
<td>96.10%</td>
</tr>
<tr>
<td>Potassium Permanganate</td>
<td>KMnO₄</td>
<td>158.03 g/mol</td>
<td>7722-64-7</td>
<td>3.90%</td>
</tr>
</tbody>
</table>

SECTION 4: First-Aid Measures

4.1. General First Aid Information

**Eye Contact:** IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. May cause irritation, redness, pain, and tearing.

**Inhalation:** Not expected to require first aid. If necessary, remove to fresh air.

**Skin Contact:** IF ON SKIN: Wash with plenty of soap and water. May cause irritation, redness, and pain.

**Ingestion:** Dilute immediately with water or milk. Induce vomiting. Call a physician.

4.2. Most Important Symptoms and Effects, Acute and Delayed
Harmful if swallowed. If ingested, dilute immediately with water, induce vomiting, and call a physician. May cause irritation to areas of contact. Wash areas of contact with plenty of water. For eyes, get medical attention. EYE CONTACT: May cause irritation, redness, pain, and tearing. SKIN CONTACT: May cause irritation, redness, and pain. CHRONIC EFFECTS / CARCINOGENICITY: Prolonged or repeated exposure may cause dermatitis.

4.3. Medical Attention or Special Treatment Needed
Immediately call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water).

SECTION 5: Fire-Fighting Measures

5.1. Extinguishing Media
Use any means suitable for extinguishing surrounding fire.

5.2. Specific Hazards Arising from the Substance or Mixture
Not considered to be a fire or explosion hazard.

5.3. Special Protective Equipment for Firefighters
Use protective clothing and breathing equipment appropriate for the surrounding fire.
SECTION 6: Accidental Release Measures

6.1. Personal Precautions, Protective Equipment and Emergency Procedures
Wear protective gloves and eye protection.

6.2. Cleanup and Containment Methods and Materials
Absorb with suitable material and treat as normal refuse. Small amounts of the liquid may be flushed to the drain with excess water. Always dispose of in accordance with local regulations.

SECTION 7: Handling and Storage

7.1. Precautions for Safe Handling and Storage Conditions
Store locked up. As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SECTION 8: Exposure Controls / Personal Protection

8.1. Control Parameters

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Limit Type</th>
<th>Country</th>
<th>Exposure Limit</th>
<th>Information Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium Permanganate</td>
<td>TLV-TWA</td>
<td>USA</td>
<td>0.02 mg/m³ TWA (as Mn, listed under respirable fraction)</td>
<td>ACGIH - Threshold Limit Values - Time Weighted Averages (TLV-TWA)</td>
</tr>
<tr>
<td>(7722-64-7)</td>
<td></td>
<td></td>
<td>0.1 mg/m³ TWA (as Mn)</td>
<td></td>
</tr>
<tr>
<td>Potassium Permanganate</td>
<td>PEL-Ceiling</td>
<td>USA</td>
<td>5 mg/m³ Ceiling (as Mn)</td>
<td>U.S. - OSHA - Final PELs - Ceiling Limits</td>
</tr>
<tr>
<td>(7722-64-7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8.2. Exposure Controls

**Engineering Controls:** No specific controls are needed. Normal room ventilation is adequate.

**Respiratory Protection:** Normal room ventilation is adequate.

**Skin Protection:** Wear protective gloves and eye protection. Chemical resistant gloves.

**Eye Protection:** Wear protective gloves and eye protection. Safety glasses or goggles.

8.3. Personal Protective Equipment
Wear protective gloves and eye protection. Normal room ventilation is adequate. Chemical resistant gloves. Safety glasses or goggles.
SECTION 9: Physical and Chemical Properties

9.1. Basic Physical and Chemical Properties

   Appearance: Purple liquid
   Physical State: Liquid
   Odor: Odorless
   Odor Threshold: Data not available.
   pH: Data not available.
   Melting/Freezing Point: Approximately 0°C
   Initial Boiling Point /Range: Approximately 102°C - Approximately 102°C
   Flash Point: Data not available.
   Evaporation Rate: Data not available.
   Flammability: Data not available.
   Flammability/Explosive Limits: Data not available.
   Vapor Pressure: Data not available.
   Vapor Density: Data not available.
   Relative Density: 1.03
   Solubility: Miscible
   Partition Coefficient (n-Octanol/Water): Data not available.
   Auto-Ignition Temperature: Data not available.
   Decomposition Temperature: Data not available.
   Viscosity: Data not available.
   Explosive Properties: Data not available.
   Oxidizing Properties: Data not available.

SECTION 10: Stability and Reactivity

10.1. Reactivity and Chemical Stability
   Stable under normal conditions of use and storage.

10.2. Possibility of Hazardous Reactions
   Data not available.

10.3. Conditions to Avoid and Incompatible Materials
   Reducing agents, flammables, reactive organic materials, metals, Sulfuric Acid.

10.4. Hazardous Decomposition Products
   Will not occur.
SECTION 11: Toxicological Information

11.1. Information on Toxicological Effects

Acute Toxicity - Oral Exposure:
Not applicable.

Acute Toxicity - Dermal Exposure:
Not applicable.

Acute Toxicity - Inhalation Exposure:
Not applicable.

Acute Toxicity - Other Information:
LD50, Oral, Rat: 1090 mg/kg (Potassium Permanganate), details of toxic effects not reported other than lethal dose value.

Skin Corrosion and Irritation:
Causes skin irritation. Wash arms, hands and face thoroughly after handling. Wear protective gloves and eye protection. IF ON SKIN: Wash with plenty of soap and water. Specific treatment (Wash areas of contact with water). If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

Serious Eye Damage and Irritation:
Causes serious eye damage. Wear protective gloves and eye protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Respiratory Sensitization:
Not applicable.

Skin Sensitization:
Not applicable.

Germ Cell Mutagenicity:
Suspected of causing genetic defects. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves and eye protection. IF exposed or concerned: Get medical attention. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

Carcinogenicity:
Not applicable.

Reproductive Toxicity:
Suspected of damaging fertility or the unborn child. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves and eye protection. IF exposed or concerned: Get medical attention. Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.

Specific Target Organ Toxicity from Single Exposure:
Causes damage to organs. Do not breathe dust, fumes or mist. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. IF exposed: Call a POISON CENTER or physician. Specific treatment (Wash areas of contact with water). Store locked up. Dispose of contents in accordance with local, state, federal and international regulations.
Safety Data Sheet

Specific Target Organ Toxicity from Repeated Exposure:
Causes damage to organs through prolonged or repeated exposure. Do not breathe dust, fumes or mist. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Get medical attention if you feel unwell. Dispose of contents in accordance with local, state, federal and international regulations.

Aspiration Hazard:
Not applicable.

Additional Toxicology Information:
Data not available.

SECTION 12: Ecological Information

12.1. Ecotoxicity
Toxic to aquatic life. Avoid release to the environment. Dispose of contents in accordance with local, state, federal and international regulations. Toxic to aquatic life. Avoid release to the environment. Dispose of contents in accordance with local, state, federal and international regulations.

12.2. Persistence and Degradability
Data not available.

12.3. Bioaccumulative Potential
Data not available.

12.4. Mobility in Soil
Data not available.

12.5. Other Adverse Ecological Effects
Data not available.

SECTION 13: Disposal Considerations

13.1. Waste Treatment Methods
Data not available.

SECTION 14: Transportation Information

14.1. Transportation by Land - Department of Transportation (DOT, United States of America)

Not regulated according to DOT Regulations.
15.1. Occupational Safety and Health Administration (OSHA) Hazards
Not listed.

15.2. Superfund Amendments and Reauthorization Act (SARA) 302 Extremely Hazardous Substances
Not listed.

15.3. Superfund Amendments and Reauthorization Act (SARA) 311/312 Hazardous Chemicals
Potassium Permanganate (CAS # 7722-64-7): 100 lb final RQ; 45.4 kg final RQ

15.4. Superfund Amendments and Reauthorization Act (SARA) 313 Toxic Release Inventory (TRI)
Potassium Permanganate (CAS # 7722-64-7): 1.0 % de minimis concentration (listed under Chemical Category N450)

15.5. Massachusetts Right-to-Know Substance List
Potassium Permanganate (CAS # 7722-64-7): Present

15.6. Pennsylvania Right-to-Know Hazardous Substances
Potassium Permanganate (CAS # 7722-64-7): Environmental hazard
Potassium Permanganate (CAS # 7722-64-7): Present
Water (CAS # 7732-18-5): Present

15.7. New Jersey Worker and Community Right-to-Know Components
Potassium Permanganate (CAS # 7722-64-7): sn 1578
Potassium Permanganate (CAS # 7722-64-7): sn 2324
Potassium Permanganate (CAS # 7722-64-7): SN 2324 TPQ: 500 lb (Category Code N450. Includes any unique chemical substance that contains the named metal as part of that chemical structure)

15.8. California Proposition 65
Not listed.

15.9. Canada Domestic Substances List / Non-Domestic Substances List (DSL/NDSL)
Potassium Permanganate (CAS # 7722-64-7): Present
Water (CAS # 7732-18-5): Present

15.10. United States of America Toxic Substances Control Act (TSCA) List
Potassium Permanganate (CAS # 7722-64-7): Present
Water (CAS # 7732-18-5): Present

15.11. European Inventory of Existing Commercial Chemical Substances (EINECS),
European List of Notified Chemical Substances (ELINCS), and No Longer Polymers (NLP)
Not listed.
SECTION 16: Other Information

16.1. Full Text of Hazard Statements and Precautionary Statements

Causes skin irritation. Causes serious eye damage. Suspected of causing genetic defects. Suspected of damaging fertility or the unborn child. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Toxic to aquatic life.

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust, fumes or mist. Wash arms, hands and face thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear protective gloves and eye protection.

IF ON SKIN: Wash with plenty of soap and water. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed: Call a POISON CENTER or physician. Get medical attention if you feel unwell. Specific treatment (Wash areas of contact with water). If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

Store locked up.

Dispose of contents in accordance with local, state, federal and international regulations.

16.2. Miscellaneous Hazard Classes

**Canadian Carcinogenicity Hazard Class:** Not Applicable.

**Physical Hazards Not Otherwise Classified (PHNOC):** Not Applicable.

**Health Hazards Not Otherwise Classified (HHNOC):** Not Applicable.

16.3. National Fire Protection Association (NFPA) Rating

Health: 1
Flammability: 0
Reactivity: 0
Special Hazard:

16.4. Document Revision

**Last Revision Date:** 5/1/2015
DISCLAIMER

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.
Potassium Permanganate, 4% (w/v)

Causes skin irritation - Causes serious eye damage - Suspected of causing genetic defects (state route of exposure if it is conclusively proven that no other routes of exposure cause hazard) - Suspected of damaging fertility or the unborn child (state specific effect if known)(state route of exposure if it is conclusively proven that no other routes of exposure cause hazard)

Obtain special instructions before use. - Do not handle until all safety precautions have been read and understood. - Do not breathe dust/fume/gas/mist/vapours/spray. - Wash arms, hands and face thoroughly after handling. - Do not eat, drink or smoke when using this product. - Avoid release to the environment. - Wear protective gloves/protective clothing/eye protection/face protection. - IF ON SKIN: Wash with plenty of soap and water. - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - IF exposed: Call a POISON CENTER or doctor/physician. - IF exposed or concerned: Get medical advice/attention. - IF exposed or concerned: Get medical advice/attention if you feel unwell. - Specific treatment (Wash areas of contact with water). - If skin irritation occurs: Get medical advice/attention. - Take off contaminated clothing and wash before reuse. - Store locked up. - Dispose of contents in accordance with local, state, federal and international regulations.

Please refer to the original SDS for more information
**SECTION 1: Product and company identification**

1.1. **Product identifier**

<table>
<thead>
<tr>
<th>Product form</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Ammonia, anhydrous</td>
</tr>
<tr>
<td>CAS No</td>
<td>7664-41-7</td>
</tr>
<tr>
<td>Formula</td>
<td>NH3</td>
</tr>
</tbody>
</table>

1.2. **Relevant identified uses of the substance or mixture and uses advised against**

Use of the substance/mixture: Industrial use. Use as directed.

1.3. **Details of the supplier of the safety data sheet**

Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113 - USA
T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. **Emergency telephone number**

Emergency number: Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7 days/week — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887 (collect calls accepted, Contract 17729)

**SECTION 2: Hazards identification**

2.1. **Classification of the substance or mixture**

**Classification (GHS-US)**

- Liquefied gas: H280
- Acute Tox. 3 (Inhalation): H331
- Skin Corr. 1B: H314

2.2. **Label elements**

**GHS-US labeling**

<table>
<thead>
<tr>
<th>Hazard pictograms (GHS-US)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="GHS04" /></td>
</tr>
</tbody>
</table>

**Signal word (GHS-US)**: DANGER

**Hazard statements (GHS-US)**:

- H221 - FLAMMABLE GAS
- H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
- H331 - TOXIC IF INHALED
- H314 - CAUSES SEVERE SKIN BURNS AND EYE DAMAGE
- H400 - VERY TOXIC TO AQUATIC LIFE
- CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT

**Precautionary statements (GHS-US)**:

- P202 - Do not handle until all safety precautions have been read and understood
- P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
- P260 - Do not breathe gas
- P262 - Do not get in eyes, on skin, or on clothing.
- P271+P403 - Use and store only outdoors or in a well-ventilated place.
- P273 - Avoid release to the environment.
- P280 - Wear protective gloves, protective clothing, eye protection, face protection
- P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely
- P381 - Eliminate all ignition sources if safe to do so
- P501 - Dispose of contents/container in accordance with container supplier/owner instructions
- CGA-PG05 - Use a back flow preventive device in the piping.
Ammonia, anhydrous
Safety Data Sheet P-4562
Date of issue: 01/01/1981 Revision date: 03/23/2015 Supersedes: 01/06/2015

CGA-PG20+CGA-PG10 - Use only with equipment of compatible materials of construction and rated for cylinder pressure.
CGA-PG12 - Do not open valve until connected to equipment prepared for use.
CGA-PG06 - Close valve after each use and when empty.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).

2.3. Other hazards
Other hazards not contributing to the classification: Contact with liquid may cause cold burns/frostbite.

2.4. Unknown acute toxicity (GHS US)
No data available

SECTION 3: Composition/information on ingredients

3.1. Substance

<table>
<thead>
<tr>
<th>Name</th>
<th>Product identifier</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (Main constituent)</td>
<td>(CAS No) 7664-41-7</td>
<td>100</td>
</tr>
</tbody>
</table>

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First-aid measures after skin contact: In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact: Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately. Get immediate medical attention.

First-aid measures after ingestion: Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

Treat with corticosteroid spray as soon as possible after inhalation. Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media: Carbon dioxide, Dry chemical, Water spray or fog.

5.2. Special hazards arising from the substance or mixture

Reactivity: No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

Firefighting instructions: Take care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Allow fire to burn out.

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Protection during firefighting: Compressed gas: asphyxiating. Suffocation hazard by lack of oxygen.

Special protective equipment for fire fighters: Wear gas tight chemically protective clothing in combination with self contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.
SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures:
Heat of fire can build pressure in cylinder and cause it to rupture. No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). Cylinders are equipped with a pressure-relief device. (Exceptions may exist where authorized by DOT, in this case where cylinders contain less than 165 pounds of product.) If leaking or spilled product catches fire, do not extinguish flames. Flammable and toxic vapors may spread from leak and could explode if rekindled. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device. Reverse flow into cylinder may cause rupture. To protect persons from cylinder fragments and toxic fumes if a rupture occurs, totally evacuate the area if the fire cannot be brought under immediate control.

6.1.1. For non-emergency personnel
No additional information available

6.1.2. For emergency responders
No additional information available

6.2. Environmental precautions
Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up
No additional information available

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Precautions for safe handling:
Do not breathe gas/vapor. Avoid all contact with skin, eyes, or clothing. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.
7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a cool, well-ventilated place. Store and use with adequate ventilation. Store only where temperature will not exceed 125°F (52°C). Firmly secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

<table>
<thead>
<tr>
<th>ACGIH, anhydrous (7664-41-7)</th>
<th>ACGIH TLV-TWA (ppm)</th>
<th>25 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACGIH</td>
<td>ACGIH TLV-TEL (ppm)</td>
<td>35 ppm</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>35 mg/m³</td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (ppm)</td>
<td>50 ppm</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls: Use a local exhaust system, if necessary, to prevent oxygen deficiency and to keep hazardous fumes and gases below all applicable limits in the worker's breathing zone. MECHANICAL ENGINEERING CONTROLS: Not recommended as a primary ventilation system to control worker's exposure. USE ONLY IN A CLOSED SYSTEM. An explosion-proof, corrosion-resistant, forced-draft fume hood is preferred.

Personal protective equipment: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves (e.g. neoprene, nitrile, etc.) during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Eye protection: Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection: Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves (e.g. neoprene, nitrile, etc.) during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

Thermal hazard protection: Wear cold insulating gloves when transferring or breaking transfer connections.

Environmental exposure controls: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

Other information: Keep suitable chemically resistant protective clothing readily available for emergency use. Wear leather safety gloves and safety shoes when handling cylinders.
Ammonia, anhydrous
Safety Data Sheet P-4562
Date of issue: 01/01/1981  Revision date: 03/23/2015  Supersedes: 01/06/2015

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Gas</td>
</tr>
<tr>
<td>Appearance</td>
<td>Colorless. Liquid under pressure.</td>
</tr>
<tr>
<td>Molecular mass</td>
<td>17 g/mol</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless.</td>
</tr>
<tr>
<td>Odor</td>
<td>Ammoniacal.</td>
</tr>
<tr>
<td>Odor threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Relative evaporation rate (butyl acetate=1)</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative evaporation rate (ether=1)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Melting point</td>
<td>-77.7 °C</td>
</tr>
<tr>
<td>Freezing point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point</td>
<td>-33 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>No data available</td>
</tr>
<tr>
<td>Critical temperature</td>
<td>132 °C</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>650 °C</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>≥ 16 vol % 25</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>860 kPa</td>
</tr>
<tr>
<td>Critical pressure</td>
<td>11350 kPa</td>
</tr>
<tr>
<td>Relative vapor density at 20 °C</td>
<td>No data available</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.7</td>
</tr>
<tr>
<td>Density</td>
<td>0.682 g/cm³ (at -33 °C)</td>
</tr>
<tr>
<td>Relative gas density</td>
<td>0.6</td>
</tr>
<tr>
<td>Solubility</td>
<td>Water: 517000 mg/l</td>
</tr>
<tr>
<td>Log Pow</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Log Kow</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Viscosity, dynamic</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>None.</td>
</tr>
<tr>
<td>Explosion limits</td>
<td>No data available</td>
</tr>
</tbody>
</table>

9.2. Other information

Gas group: Liquefied gas
Additional information: None.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions may occur on contact with certain chemicals. (Refer to the list of incompatible materials section 10: "Stability-Reactivity").

10.4. Conditions to avoid

Avoid moisture in installation systems.
10.5. Incompatible materials

Gold, silver, mercury. Oxidizing agents, Halogens, Halogenated compounds, Acids, Copper, Zinc, Copper/Zinc alloys (Brass), Chlorates.

10.6. Hazardous decomposition products

The normal products of combustion are nitrogen and water. Hydrogen may be formed at temperatures above 1,544°F (840°C).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (7664-41-7)</td>
<td>Inhalation</td>
<td>TOXIC IF INHALED.</td>
</tr>
</tbody>
</table>

LC50 inhalation rat (ppm) | 7338 ppm/1h
ATE US (gases) | 700.000 ppmV/4h
ATE US (vapors) | 3.000 mg/l/4h
ATE US (dust, mist) | 0.500 mg/l/4h

Skin corrosion/irritation

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Serious eye damage/irritation

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (7664-41-7)</td>
<td>pH</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (7664-41-7)</td>
<td>pH</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Respiratory or skin sensitization

Not classified

Germ cell mutagenicity

Not classified

Carcinogenicity

Not classified

Reproductive toxicity

Not classified

Specific target organ toxicity (single exposure)

Not classified

Specific target organ toxicity (repeated exposure)

Not classified

Aspiration hazard

Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonia, anhydrous (7664-41-7)</td>
<td></td>
<td>VERY TOXIC TO AQUATIC LIFE. No ecological damage caused by this product.</td>
</tr>
</tbody>
</table>

LC50 fish 1 | 0.44 mg/l (Exposure time: 96 h - Species: Cyprinus carpio) |
EC50 Daphnia 1 | 25.4 mg/l (Exposure time: 48 h - Species: Daphnia magna) |
LC50 fish 2 | 0.26 - 4.6 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus) |

12.2. Persistence and degradability

Ammonia, anhydrous (7664-41-7)

Persistence and degradability
The substance is biodegradable. Unlikely to persist.

12.3. Bioaccumulative potential

Ammonia, anhydrous (7664-41-7)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Pow</td>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>Log Kow</td>
<td>Not applicable.</td>
<td></td>
</tr>
<tr>
<td>Bioaccumulative potential</td>
<td>Not expected to bioaccumulate due to the low log Kow (log Kow &lt; 4). Refer to section 9.</td>
<td></td>
</tr>
</tbody>
</table>

12.4. Mobility in soil

Ammonia, anhydrous (7664-41-7)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility in soil</td>
<td>No data available.</td>
<td></td>
</tr>
<tr>
<td>Ecology - soil</td>
<td>Because of its high volatility, the product is unlikely to cause ground or water pollution.</td>
<td></td>
</tr>
</tbody>
</table>
12.5. Other adverse effects

Other adverse effects: May cause pH changes in aqueous ecological systems.
Effect on ozone layer: None.
Effect on the global warming: No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations: Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT
Transport document description: UN1005 Ammonia, anhydrous, 2.2
UN-No.(DOT): UN1005
Proper Shipping Name (DOT): Ammonia, anhydrous
Department of Transportation (DOT) Hazard Classes: 2.2 - Class 2.2 - Non-flammable compressed gas 49 CFR 173.115
Hazard labels (DOT): 2.2 - Non-flammable gas

DOT Symbols: D - Proper shipping name for domestic use only, or to and from Canada
DOT Special Provisions (49 CFR 172.102): 13 - The words Inhalation Hazard shall be entered on each shipping paper in association with the shipping description, shall be marked on each non-bulk package in association with the proper shipping name and identification number, and shall be marked on two opposing sides of each bulk package. Size of marking on bulk package must conform to 172.302(b) of this subchapter. The requirements of 172.203(m) and 172.505 of this subchapter do not apply.
T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.

Marine pollutant: Yes

Additional information

Emergency Response Guide (ERG) Number: 125 (UN1005); 154 (UN2672)
Other information: No supplementary information available.
Special transport precautions: Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
- Ensure there is adequate ventilation.
- Ensure that containers are firmly secured.
- Ensure cylinder valve is closed and not leaking.
- Ensure valve outlet cap nut or plug (where provided) is correctly fitted.
- Ensure valve protection device (where provided) is correctly fitted.

Transport by sea
UN-No. (IMDG): 1005
Proper Shipping Name (IMDG): AMMONIA, ANHYDROUS
Class (IMDG): 2 - Gases
MFAG-No: 125
Air transport
UN-No.(IATA) : 1005
Proper Shipping Name (IATA) : Ammonia, anhydrous
Class (IATA) : 2
Civil Aeronautics Law : Gases under pressure/Gases toxic under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations

Ammonia, anhydrous (7664-41-7)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Listed on the United States SARA Section 302
Listed on United States SARA Section 313
SARA Section 302 Threshold Planning Quantity (TPQ) : 500
SARA Section 311/312 Hazard Classes
- Immediate (acute) health hazard
- Delayed (chronic) health hazard
- Sudden release of pressure hazard
- Fire hazard
SARA Section 313 - Emission Reporting
- 1.0 % (includes anhydrous Ammonia and aqueous Ammonia from water dissociable Ammonium salts and other sources, 10% of total aqueous Ammonia is reportable under this listing)

Ammonia, anhydrous
CAS No 7664-41-7
100%

15.2. International regulations

CANADA

Ammonia, anhydrous (7664-41-7)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

Ammonia, anhydrous (7664-41-7)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

Ammonia, anhydrous (7664-41-7)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Poisonous and Deleterious Substances Control Law
Listed on the Canadian IDL (Ingredient Disclosure List)

15.3. US State regulations

Ammonia, anhydrous(7664-41-7)
U.S. - California - Proposition 65 - Carcinogens List : No
U.S. - California - Proposition 65 - Developmental Toxicity : No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female : No
Ammonia, anhydrous

Safety Data Sheet P-4562


Date of issue: 01/01/1981    Revision date: 03/23/2015    Supersedes: 01/06/2015

<table>
<thead>
<tr>
<th>Ammonia, anhydrous(7664-41-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</td>
</tr>
</tbody>
</table>
| State or local regulations | U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List |

California Proposition 65 - This product contains, or may contain, trace quantities of a substance(s) known to the state of California to cause cancer and/or reproductive toxicity

SECTION 16: Other information

<table>
<thead>
<tr>
<th>Revision date</th>
<th>3/23/2015 12:00:00 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other information</td>
<td>When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product. Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information. The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product. Praxair SDSs are furnished on sale or delivery by Praxair or the independent distributors and suppliers who package and sell our products. To obtain current SDSs for these products, contact your Praxair sales representative, local distributor, or supplier, or download from <a href="http://www.praxair.com">www.praxair.com</a>. If you have questions regarding Praxair SDSs, would like the document number and date of the latest SDS, or would like the names of the Praxair suppliers in your area, phone or write the Praxair Call Center (Phone: 1-800-PRAXAIR/1-800-772-9247; Address: Praxair Call Center, Praxair, Inc., P.O. Box 44, Tonawanda, NY 14151-0044).</td>
</tr>
</tbody>
</table>

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NFPA health hazard : 3 - Short exposure could cause serious temporary or residual injury even though prompt medical attention was given.
NFPA fire hazard : 1 - Must be preheated before ignition can occur.
NFPA reactivity : 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.

HMIS III Rating

Health : 3 Serious Hazard - Major injury likely unless prompt action is taken and medical treatment is given
Flammability : 1 Slight Hazard
Physical : 2 Moderate Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

EN (English US) SDS ID: P-4562 9/9

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Ammonia, anhydrous

Flammable gas - Contains gas under pressure; may explode if heated - Causes severe skin burns and eye damage - Very toxic to aquatic life

Do not handle until all safety precautions have been read and understood. - Keep away from heat/sparks/open flames/hot surfaces. - No smoking. - Do not breathe dust/fume/gas/mist/vapours/spray. - Do not get in eyes, on skin, or on clothing. - Use only outdoors or in a well-ventilated area. - Avoid release to the environment. - Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - Eliminate all ignition sources if safe to do so. - Dispose of contents/container in accordance with container supplier/owner instructions.

Please refer to the original SDS for more information