



| SECTION 1            |  | PRODUCT AND COMPANY INFORMATION   |  |   |                      |
|----------------------|--|---|--|---|----------------------|
| TRADE NAME:          |  | MicroEssentials S10   |  |   |                      |
| CHEMICAL NAME:       |  | Monoammonium Phosphate with Sulfur  |  |   |                      |
| CAS NUMBER:          |  | MAP: 7722-76-1<br>Sulfur: various   |  |   |                      |
| CHEMICAL FAMILY:     |  | Ammonium Phosphates- Inorganic Salts  |  |   |                      |
| SYNONYMS:            |  | Monoammonium Phosphate + Sulfur<br>Monobasic Ammonium Phosphate + Sulfur<br>Ammonium Dihydrogen Phosphate + Sulfur<br>MES10<br>MAP + S<br>Ammonium dihydrogen orthophosphate  |  |   |                      |
| PRIMARY USE:         |  | Crop nutrient to be applied as intact granule   |  |   |                      |
| COMPANY INFORMATION: |  | <p><b>The Mosaic Company</b><br/> Atria Corporate Center<br/> 3033 Campus Drive, Suite E490<br/> Plymouth, MN 55441USA<br/> <a href="http://www.mosaicco.com">www.mosaicco.com</a><br/> For non-emergency questions, phone hours are 8 AM to 5 PM Central Time US<br/> 800.918.8270 (toll free)<br/> 763.577.2700 (phone)</p> |  |   |                      |
| EMERGENCY TELEPHONE: |  | <p><b>EMERGENCY OVERVIEW</b><br/> <b>24 Hour Emergency Telephone Number</b><br/> <b>For Chemical Emergencies:</b><br/> <b>Spill, Leak, Fire or Accident</b><br/> <b>Call CHEMTREC</b><br/> <b>North America: (800) 424-9300</b><br/> <b>Others: (703) 527-3887 (collect)</b></p>  |  |   |                      |
| SECTION 2            |  | HAZARD IDENTIFICATION   |  |   |                      |
| EMERGENCY OVERVIEW : |  | Health Hazards:   |  | Avoid contact with eyes, skin and clothing. Avoid ingestion. Wash thoroughly after handling. Also refer to Sections 11, and 15. |                      |
|                      |  | Physical Hazards:   |  | Slippery when wet.  |                      |
|                      |  | Physical Form:  |  | Solid   |                      |
|                      |  | Appearance:   |  | Grey, tan, brown, or black granules   |                      |
|                      |  | Odor:   |  | Slight ammonia odor   |                      |
|                      |  | Toxicity:   |  | Non-toxic   |                      |
|                      |  | <b>NFPA HAZARD CLASS</b>  |  | <b>HMIS HAZARD CLASS</b>  |                      |
|                      |  | Health: 2   |  | Health: 2   |                      |
|                      |  | Flammability: 0   |  | Flammability: 0   |                      |
|                      |  | Instability: 0  |  | Physical Hazard: 0  |                      |
|                      |  | Special Hazard: None  |  | PPE: Section 8  |                      |
|                      |  |   |  | <b>WHMIS HAZARD CLASS</b>   |                      |
|                      |  |   |  | Symbol  | N/A                  |
|                      |  |   |  | Classification  | Not WHMIS controlled |
|                      |  |   |  | Sub Class (N/A)   |                      |

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|                                  |  |   |
|----------------------------------|--|---|
| POTENTIAL HEALTH EFFECTS:        | <b>Eye:</b>  | Contact may cause eye irritation including stinging, watering and redness.  |
|                                  | <b>Skin:</b>   | Contact may cause mild irritation including redness and a burning sensation. No harmful effects from skin absorption have been reported.  |
|                                  | <b>Inhalation (Breathing):</b>   | Effects of overexposure to dusts can include irritation of the eyes and respiratory tract, pneumoconiosis (dust congested lungs) pneumonitis (lung inflammation), coughing, vomiting, diarrhea, abdominal pain. Contact with particulate matter may cause irritation of the nose and throat, coughing and shortness of breath including a burning sensation.  |
|                                  | <b>Ingestion (Swallowing)</b>  | Moderate degree of toxicity by ingestion, however ingestion is NOT an intended use.   |
|                                  | <b>Signs and Symptoms:</b>   | Effects of overexposure may include irritation of the nose, throat and digestive tract, nausea, vomiting, diarrhea, headache, runny nose, coughing, shortness of breath, abdominal cramping and chest pain.   |
|                                  | <b>Cancer:</b>   | Data not available.   |
|                                  | <b>Target Organs:</b>  | Data not available.   |
|                                  | <b>Developmental:</b>  | Inadequate data available.  |
|                                  | <b>Other Comments:</b>   | <p>These comments relate to minor ingredients or impurities that are present and bound within finished product granules. Overexposure to these minor components during proper handling and use are not expected.</p> <p>Allergic skin responses after repeated contact with sulfur, a component, have been reported but are not common.</p> <p>Prolonged or repeated overexposure to fluoride compounds may cause fluorosis. Fluorosis is characterized by skeletal changes, consisting of osteosclerosis (hardening or abnormal density of bone) and osteomalacia (softening of bones) and by mottled discoloration of the enamel of teeth (if exposure occurs during enamel formation). Symptoms may include bone and joint pain and limited range of motion.</p> |
|                                  | <b>Pre-Existing Medical Conditions:</b>  | Skin and Respiratory (asthma-like) disorders.   |
| POTENTIAL ENVIRONMENTAL EFFECTS: | <p>MicroEssentials S10 is considered biodegradable and is taken up as a nutrient by vegetation. Large spills can harm or kill vegetation or organisms. Introduction into fresh or near coastal waters may release ammonium ions that are toxic to fresh water fish, and/or may release phosphates which can result in algae growth, increased turbidity and depleted oxygen.</p> |   |



| SECTION 3                      |  | COMPOSITION<br>INFORMATION ON INGREDIENTS  |          |
|--------------------------------|--|--|----------|
| COMPOSITION:                   | Phosphate as P <sub>2</sub> O <sub>5</sub>   | Primary nutrient ingredient  | 40%      |
|                                | Nitrogen as N  | Primary nutrient ingredient  | 12%      |
|                                | Water  | Trace as moisture  | 0.5 – 2% |
|                                | Sulfur as S  | Secondary nutrient ingredient  | 5%       |
|                                | Sulfate as S   | Secondary nutrient ingredient  | 5%       |
|                                | Fluorides as F   | Impurity   | 2-4%     |
| SECTION 4                      |  | FIRST AID MEASURES   |          |
| FIRST AID<br>PROCEDURES:       | Eyes:  | Move victim away from exposure and into fresh air. Flush eyes with plenty of clean water for at least 15 minutes. If symptoms persist, seek medical attention.   |          |
|                                | Skin:  | Wash contaminated area thoroughly with mild soap and water. If chemical or solution soaks through clothing, remove clothing and wash contaminated skin. If irritation develops and persists after washing, seek medical attention. |          |
|                                | Inhaled:   | If respiratory symptoms develop (see Signs and Symptoms, Section 2), move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention.   |          |
|                                | Ingestion:   | If exposed individual is conscious, immediately give water or milk. Do not induce vomiting. Seek medical attention. If person is unconscious, do not give anything by mouth.   |          |
| NOTE TO PHYSICIAN:             | If individual has been exposed to concentrated decomposition products (see Section 10), treat symptomatically and watch for delayed symptoms of pulmonary edema.   |  |          |
| SECTION 5                      |  | FIRE FIGHTING MEASURES   |          |
| FLAMMABLE<br>PROPERTIES:       | Flash Point:   | Not applicable   |          |
|                                | OSHA Flammability Class:   | Not applicable   |          |
|                                | LEL/UEL:   | LEL: Not explosible (at product concentration)<br>UEL: Not explosible (at product concentration)   |          |
|                                | Auto-Ignition Temperature:   | Not applicable   |          |
| EXTINGUISHING<br>MEDIA:        | Use extinguishing agent suitable for type of surrounding fire. Avoid use of excessive quantities of water to minimize runoff to environment (see Section 2).<br><u>Small fires</u> : water spray, foam, dry chemical or CO <sub>2</sub> – collect or direct water to containment<br><u>Large fires</u> : water spray, fog or foam – collect or direct water to containment |  |          |
| PROTECTION OF<br>FIREFIGHTERS: | Positive pressure, Self-Contained Breathing Apparatus (SCBA) is required for all fire-fighting activities involving hazardous materials. Section 10 notes decomposition products that may evolve.  |  |          |



| SECTION 6                            |   | ACCIDENTAL RELEASE MEASURES  |
|--------------------------------------|---|--|
| RESPONSE TECHNIQUES:                 | Stay upwind and away from product spill that may generate a dust hazard. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). Prevent spilled material from entering sewers, storm drains, other drainage systems, and natural waterways. Notify appropriate federal, state/provincial and local agencies as may be required (see Section 15.) Sweep up and package appropriately for use as intended or disposal; minimize dust generation during cleanup.  |  |
| RELEASE NOTES :                      | If spill could potentially enter any waterway, including intermittent dry creeks, contact the local authorities. If in the United States, contact the US COAST GUARD NATIONAL RESPONSE CENTER toll-free number 800-424-8802. In case of accident or road/rail spill notify: CHEMTREC in North America at 800-424-9300 and from other countries (collect) at 0-703-527-3887. (See Section 1)   |  |
| SECTION 7                            |   | HANDLING AND STORAGE   |
| HANDLING:                            | <p>This product is intended for use intact - as produced and shipped by Mosaic.</p> <p>The use of appropriate respiratory protection is advised when airborne concentrations exceed any established exposure limits (see Section 8). Avoid contact with eyes, mouth, nose, hands/skin, and clothing. Wash thoroughly after handling. Wash contaminated clothing or shoes. Use good personal hygiene practices.</p> <p>Avoid systems that would tend to segregate dust or any components of this product. Avoid accumulation of fugitive dust, as high concentrations of sulfur dust may present an explosion hazard. Follow standard safe-work practices, including hot-work procedures when working around this product.</p> |  |
| STORAGE:                             | Use and store this material in cool, dry, well-ventilated areas. Store only in approved containers. Keep container(s) tightly closed. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Material may absorb moisture from the air.   |  |
| SECTION 8                            |   | EXPOSURE CONTROLS / PERSONAL PROTECTION  |
| ENGINEERING CONTROLS:                | Use process enclosure, general dilution ventilation or local exhaust systems where necessary to maintain airborne dust concentration below the OSHA standards (see Section 8) or in accordance with applicable regulations.   |  |
| PERSONAL PROTECTIVE EQUIPMENT (PPE): | Eye/Face:   | Approved eye/face protection to safeguard against potential eye contact, irritation or injury is advised. Eye protection that provides a seal to the skin around the eye is advised.                 |
|                                      | Skin:   | The use of cloth or leather work gloves is advised to prevent skin contact and irritation.   |
|                                      | Respiratory:  | Use a dust mask or other appropriate respiratory protection where engineering controls are not feasible or during operations that generate airborne concentrations exceeding the relevant standards. |
|                                      | Other:  | A source of clean water should be available in the work area for flushing eyes and skin.   |
| GENERAL HYGIENE CONSIDERATIONS:      | Use in adequate ventilation.<br>Wash thoroughly after handling.   |  |



|  |   |   |
|--|---|---|
| EXPOSURE GUIDELINES:   | OSHA Permissible Exposure Limits (PEL):   | Particulates Not Otherwise Specified (nos):<br>5 mg/m <sup>3</sup> TWA (respirable)<br>15 mg/m <sup>3</sup> TWA (total)<br>Ammonia:<br>50 ppm (35 mg/m <sup>3</sup> ) TWA<br>Fluorides, as F :<br>2.5 mg/m <sup>3</sup> TWA |
|  | ACGIH Threshold Limit Value (TLV):  | Particulates Not Otherwise Specified (nos):<br>3 mg/m <sup>3</sup> TWA (respirable)<br>10 mg/m <sup>3</sup> TWA (total)<br>Ammonia:<br>25 ppm (18 mg/m <sup>3</sup> ) TWA<br>35 ppm (27 mg/m <sup>3</sup> ) STEL            |
| <b>SECTION 9</b>   |   | <b>PHYSICAL AND CHEMICAL PROPERTIES</b>   |
| Note: Unless otherwise stated, values in this section are determined at 20°C (68°F) and 760 mm Hg (1 atm). |   |   |
| Flash Point:   | Not applicable  |   |
| Flammability/ Explosive Limits (%):  | LEL: Not explosive (at product concentration)<br>UEL: Not explosive (at product concentration)  |   |
| Auto-Ignition Temperature:   | Not applicable  |   |
| Appearance:  | Grey, tan, brown, or black granules   |   |
| Physical State:  | Solid   |   |
| Odor:  | Slight ammonia odor   |   |
| pH:  | 4.2-5.0 in a 1% solution.   |   |
| Vapor Pressure (mm Hg):  | Not applicable  |   |
| Vapor Density (air=1):   | Not applicable  |   |
| Boiling Point:   | Not applicable  |   |
| Freezing/Melting Point:  | Decomposes at 374°F (190 °C) before melting.  |   |
| Solubility in Water:   | 80% - 90% 328 g/L at 20°C   |   |
| Specific Gravity:  | Not applicable  |   |
| Volatility:  | Not applicable  |   |
| Bulk Density:  | 56 - 66 lbs./ft <sup>3</sup> (Packed); 54 – 61 lbs./ft <sup>3</sup> (Loose)   |   |
| <b>SECTION 10</b>  |   | <b>STABILITY AND REACTIVITY</b>   |
| Chemical Stability:  | Stable under normal conditions of storage and handling. Decomposes at 374°F (190°C).  |   |
| Conditions to Avoid:   | Extreme temperatures  |   |
| Incompatible Materials:  | Avoid contact with alkaline materials   |   |
| Hazardous Decomposition Products:  | If heated to the point of decomposition, oxides of phosphorus, nitrogen and/or sulfur (e.g., SO <sub>2</sub> ) may be released, as well may ammonia and fluoride vapor. |   |
| Corrosiveness:   | May be corrosive to iron and mild steels, aluminum, and copper.   |   |
| Hazardous Polymerization:  | Will not occur.   |   |



| SECTION 11                | TOXICOLOGICAL INFORMATION  |
|---------------------------|--|
| Acute Oral Toxicity       | Monoammonium Phosphate – LD50(rat) 5750 mg/kg bw<br>Ammonium Sulfate – LD50(rat) = 3000 to 4250 mg/kg bw<br>LD50(mouse) = 3040 mg/kg bw  |
| Acute Inhalation Toxicity | Data not available for mixture or components   |
| Acute Dermal Toxicity     | Monoammonium Phosphate – LD50(rabbit) >7940 mg/kg bw<br>Ammonium Sulfate – LD50(rat and mouse) >2000 mg/kg bw  |
| Mutagenesis               | Data not available for mixture or major component  |
| Target Organ              | Data not available for mixture or major component  |
| Developmental Toxicity    | Data not available for mixture. The available data for components are inadequate.  |
| Carcinogenicity           | The ingredient(s) of this product is (are) not classified as carcinogenic by NTP (National Toxicology Program), IARC, or OSHA  |
| SECTION 12                | ECOLOGICAL INFORMATION   |
| ECOTOXICOLOGY:            | This product is a concentrated source of nutrients that have been indicated (see Section 2) to impact vegetation and aquatic systems (particularly fresh). May release ammonium ions that are toxic to fish. Un-ionized ammonia concentrations above 0.02 mg/l are considered toxic (USA) in fresh water. May release phosphates which will result in algae growth, increased turbidity, and depleted oxygen. At extremely high concentrations, this may be hazardous to fish or other marine organisms. Release to watercourses may cause effects downstream. |
| SECTION 13                | DISPOSAL CONSIDERATIONS  |
|                           | It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. Consult federal state/provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.   |
| SECTION 14                | TRANSPORTATION INFORMATION   |
| Regulatory Status         | Not regulated  |
| Proper Shipping Name      | Not applicable   |
| Hazard Class              | Not listed in the hazardous materials shipping regulations (49 CFR, Table 172.101) by the U.S. Department of Transportation, or in the Transport of Dangerous Goods (TDG) Regulations Canada.  |
| Packing Group             | Not applicable   |
| Identification Number     | HTS (Harmonized Tariff Schedule) Code 3105.40.0050   |
| Guide Number              | Not applicable   |



|   |   |
|---|---|
| MARPOL  | <p>Based on the United Nations Globally Harmonized System for Classification and Labeling of Chemicals (UN GHS) this product is not harmful to the marine environment (non-HME) based on not exceeding the parameters or criteria below<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>• Acute Aquatic Toxicity Category 1; and/or</li> <li>• Chronic Aquatic Toxicity Category 1 or 2; and/or</li> <li>• Carcinogenicity<sup>2</sup> Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or</li> <li>• Mutagenicity<sup>2</sup> Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or</li> <li>• Reproductive Toxicity<sup>2</sup> Category 1A or 1B combined with not being rapidly degradable and having high bioaccumulation; and/or</li> <li>• Specific Target Organ Toxicity Repeated Exposure<sup>2</sup> Category 1 combined with not being rapidly degradable and having high bioaccumulation; and/or</li> <li>• Solid bulk cargoes containing or consisting of synthetic polymers, rubber, plastics, or plastic feedstock pellets (this includes materials that are shredded, milled, chopped or macerated or similar materials).</li> </ul> <p>Notes:<br/>           1) The criteria are based on UN GHS, fourth revised edition (2011). For specific products (e.g. metals and inorganic metal compounds) guidance available in UN GHS, annexes 9 and 10 are essential for proper interpretation of the criteria and classification and should be followed.<br/>           2) Products that are classified for Carcinogenicity, Mutagenicity, reproductive toxicity or Specific Target Organ Toxicity Repeated Exposure for oral and dermal hazards or without specification of the exposure route in the hazard statement.</p> |
| <b>SECTION 15</b>   | <b>REGULATORY INFORMATION</b>   |
| FDA:  | Phosphate compounds are Generally Recognized As Safe (GRAS) by the U.S. Food and Drug Administration (21 CFR 582.1141; Bhat and Ramaswamy 1993) which allows them to be used as food and color additives.   |
| CERCLA:   | Product is not listed with an RQ (reportable quantity)  |
| RCRA 261.33:  | Discarded commercial chemical products, off-specification species, container residues, and spill residues thereof are not listed as hazardous waste   |
| SARA TITLE III:<br>(Exemptions at 40 CFR, Part 370 may apply for agricultural use, or for quantities of less than 10,000 pounds on-site.) | SARA – 311/312: Solid; Immediate (acute): Yes (MAP); Chronic: No; Fire: No; Pressure: No; Reactivity: No  |
|   | SARA – 313: Not Listed  |
|   | SARA – 302/304:   |
| NTP, IARC, OSHA:  | This material has not been identified as a carcinogen by NTP, IARC, or OSHA.  |
| Canada DSL and NDSL:  | DSL: Yes<br>NDSL: Not listed  |
| TSCA:   | Components are listed or exempt from being listed on the TSCA inventory.  |
| CA Proposition 65:<br>(Health & Safety Code Section 25249.5)  | Warning: This product contains substances that are known to the State of California to cause cancer and/or reproductive harm.   |
| WHMIS:  | Not controlled  |
| CBSA:   | Canadian Border Services Agency- This product does not contain any bovine, ruminant or other animal by-products.  |





| SECTION 16                    | OTHER INFORMATION   |
|-------------------------------|---|
| Disclaimer:                   | <p>The information in this document is believed to be correct as of the date issued. Nothing herein contained shall be deemed to be a representation or warranty with respect to the product described herein. <b>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 THIS INFORMATION, 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, AND ALL SUCH REPRESENTATIONS AND WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED BY MOSAIC.</b> This information and product are furnished on the condition that the person receiving them shall make their own determination as to suitability of the product for their particular purpose and on the condition that they assume the risk of their use thereof. The conditions and use of this product are beyond the control of Mosaic, and Mosaic disclaims any liability for loss or damage incurred in connection with the use or misuse of this substance.</p> |
| Preparation:                  | The preparation of this MSDS was in accordance with ANSI Z400.1-2010.   |
| References:                   | FCI Chemical Engineers Fertilizer Technical Data Book, 1994; revised MARPOL Annex V; TOXNET   |
| Note to ____ (if applicable): | Not applicable  |