UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
PHILADELPHIA, PENNSYLVANIA 19103-2852

CUI//PROPIN

VIA GO ANYWHERE
READ RECEIPT REQUESTED

Ms. Erin N. Kane, President and Chief Executive Officer
AdvanSix Resins & Chemicals, LLC
300 Kimball Drive, Suite 101
Parsippany, New Jersey 07054
Erin.Kane@AdvanSix.com

Re: Opportunity to Enter into Administrative Settlement Agreement and Order
Hopewell Plant, 905 East Randolph Road, Hopewell, Virginia
CAA Section 112(r)(7)

Dear Ms. Kane:

On May 10-11, 2022, the United States Environmental Protection Agency ("EPA") conducted an inspection at the chemical manufacturing facility located at 905 East Randolph Road in Hopewell, Virginia (the "Facility"), owned and operated by AdvanSix Resins & Chemicals, LLC ("AdvanSix"), a wholly-owned subsidiary of AdvanSix Inc., to determine whether AdvanSix was in compliance with Section 112(r)(1) and (7) of the Clean Air Act ("CAA"), 42 U.S.C. §§ 7412(r)(1) and (7), and the applicable regulations, the Chemical Accident Prevention Provisions, at 40 C.F.R. Part 68 (referred to as the "Risk Management Program Regulations" or "RMP Regulations") ("Inspection"). The Inspection occurred in the aftermath of a March 29, 2022 release of oleum/sulfur trioxide from the Facility, which resulted in a shelter-in-place for two neighboring facilities, and a March 9, 2022 release of anhydrous ammonia from the Facility.

EPA also sent an information request pursuant to CAA Section 114, 42 U.S.C. § 7414, to AdvanSix on May 10, 2022, as well as numerous follow-up emails. AdvanSix provided an extranet site for EPA to review the documents requested in the information request on June 9, 2022, and responded to EPA's follow-up emails.

Based on the information gathered during the Inspection and subsequent investigation, EPA believes that AdvanSix may not have complied with the RMP Regulations at the Facility. EPA is hereby requesting that AdvanSix enter into an Administrative Compliance Order on Consent ("ACO") to conduct work at the Facility in order to bring it into compliance with the RMP Regulations. EPA has enclosed a draft ACO for review.

AdvanSix is a chemical manufacturer using oleum, ammonia, acetaldehyde and hydrogen in its caprolactam manufacturing process. The September 5, 2017 and August 30, 2022 risk management plans for the Facility each list five regulated toxic or flammable substances present at the Facility in amounts greater than their respective threshold quantities:

Re: Notice of Potential Violations and Opportunity to Confer
CAA Section 112(r)(7)

Regulated Substance	Chemical Abstract Service Number	Threshold Quantity (lbs)	Amount Present (lbs)	Toxic/Flammable
Oleum (fuming sulfuric acid)	8014-95-7	10,000	24,400,000	Toxic
Ammonia (anhydrous)	7664-41-7	10,000	40,000,000	Toxic
Ammonia (conc 20% or greater)	7664-41-7	20,000	300,000	Toxic
Acetaldehyde	75-07-0	10,000	204,000	Flammable
Flammable mixture	00-11-11, containing: Hydrogen: 1333-74-0 Methane: 74-82-8 Ethane: 74-84-0	10,000	32,200[1]	Flammable

EPA listed these substances in accordance with CAA Section 112(r)(3), 42 U.S.C. § 7412(r)(3), in the list of regulated substances compiled at 40 C.F.R. § 68.130. Threshold quantities for toxic and flammable regulated substances are listed in 40 C.F.R § 68.130, Tables 1 and 3, respectively.

Because regulated substances in amounts in excess of threshold quantities are present in a process at the Facility, EPA has determined that AdvanSix is the owner and operator of a regulated stationary source and is required to comply with CAA Section 112(r)(7) and the RMP Regulations. As set forth in more detail below, EPA has identified the following issues that AdvanSix must address in order to be in compliance with the RMP Regulations: mechanical integrity, process hazard analysis, and process safety information.

1. Mechanical Integrity

Section 68.73(d)(2) of the RMP Regulations requires owners and operators of stationary sources to ensure that inspections and tests are performed on process equipment, including pressure vessels and piping systems, and that the inspections and tests follow recognized and generally accepted good engineering practices. 40 C.F.R. § 68.73(a)(1)-(2), (d)(2). Further, Section 68.73(e) of the RMP Regulations requires owners and operators of stationary sources to correct deficiencies in equipment that are outside acceptable limits before further use, or in a safe and timely manner when necessary means are taken to assure safe operation. 40 C.F.R. § 68.73(e).

The term "recognized and generally accepted good engineering practices" for purposes of the design and maintenance of the caprolactam manufacturing process at the Facility includes the following five industry standards:

[1] The 2017 RMP listed 32,850 lbs of flammable mixture. Otherwise, the amounts of chemicals listed in the two risk management plans were identical.

- MSS SP-58, *Pipe Hangers and Supports-Materials, Design, Manufacture, Selection, Application and Installation* (2006) (MSS SP-58);
- American Petroleum Institute 570, *Piping Inspection Code: In-service Inspection, Rating, Repair, and Alteration of Piping Systems,* 3rd ed. (November 2009) (API 570);
- American Petroleum Institute Recommended Practice 574, *Inspection Practices for Piping System Components*, 3rd ed. (November 2009) (API RP 574);
- National Association of Corrosion Engineers SP0294, *Standard Practice - Design, Fabrication, and Inspection of Storage Tank Systems for Concentrated Fresh and Process Sulfuric Acid and Oleum at Ambient Temperatures* (2006) (NACE SP0294); and
- National Association of Corrosion Engineers Publication 6G197/SSPC-TU 229, *Design, Installation, and Maintenance of Coating Systems for Concrete Used in Secondary Containment- Information Report and Technology Update* (February 1997) (NACE 6G197/SSPC-TU 229).

A. Mechanical Integrity - Piping Support Issues

The first area of concern relates to piping support issues in oleum piping associated with tanks VT-518 and VT-519, and ammonia piping associated with atmospheric tank VT-520 and Horton Spheres HST-1 and HST-2, as well as the general failure to address piping equipment deficiencies.

In the Facility's Marine Operations area, EPA inspectors observed that the piping associated with oleum tanks VT-518 and VT-519 was not properly supported in several locations. Specifically, piping was suspended from other pipes with hangers, which were carrying too much load, causing the pipes carrying the load to bend under pressure. In the Facility's Kellogg Unit around ammonia tank VT-520, EPA inspectors observed piping support brackets rising from ammonia pipes to support other ammonia pipes, wooden block piping supports, cinder block piping supports, and piping with missing insulation jackets. In the piping associated with ammonia-filled Horton Spheres HST-1 and HST-2, EPA inspectors observed piping lying atop other piping, piping on the ground, piping with missing jackets, piping supporting other pipes with cuts into insulation jackets, and piping with no insulation protective shields on the piping where hangers were located.

Support issues with the oleum and ammonia piping have existed at the Facility and were known to AdvanSix for some time. According to an AdvanSix 2016 inspection report for oleum tanks VT-518 and VT-519, inspectors observed broken pipe hangers and hangers being used inappropriately in vertical locations. The Facility's piping inspection report from 2015 for piping associated with tank VT-520 similarly describes "corroded/damaged or missing pipe supports," and improper wood block supports for pipes. The same conditions were present in 2020 for tank VT-520, with descriptions including "rope supports, "damaged hanger," "wire hanger," "loose support," "needs support," "pipe resting on ground," "pipe resting on rock/conduit," "damaged pipe support," "corroded supports," "pipe supporting other pipe," "piping not in contact with support," and "pipe supported by wood."

Industry standard API RP 574 sets forth inspection practices for piping systems. With respect to supports it states, "External visual inspections are performed to determine the external condition of

piping, insulation system, painting/coating systems, and associated hardware, and to check for signs of misalignment, vibration, and leakage." API RP 574, § 10.1. The standard goes on to specify problems to look for in piping supports during the visual inspection:

a) deterioration of protective coatings or fireproofing;
b) evidence of corrosion, especially at or near the foundation attachments;
c) distortion;
d) general physical damage;
e) movement or deterioration of concrete footings;
f) failure or loosening of foundation bolts;
g) insecure attachment of brackets and beams to the support;
h) restricted operation of pipe rollers or slide plates;
i) insecure attachment or improper adjustment of pipe hangers…;
j) broken or defective pipe anchors; and
k) restricted operation of pulleys or pivot points in counterbalanced piping systems.

API RP 574, § 10.1.4.1.

With respect to piping lying on the ground, the standard also specifies that inspection plans for piping plans should include the soil-to-air interface. API RP 574, § 7.2(g). As API 570 explains, the soil-to-air interface is an area in which external corrosion may occur on partially buried pipe, and thus the standard calls on owners/users to provide specific attention to the need for inspection of piping systems for specific types and areas of deterioration, including the soil-to-air interface. API 570, §§ 3.1.87 and 5.4.2.

Industry standard MSS SP-58 clearly states that "Pipes shall not be suspended directly from each other unless formal calculations are performed and accepted by the responsible Piping Design Engineer. If no calculations have been made, the individual hanger for each horizontal pipe in a vertical bank shall have the load transmitted directly to the rods, not the pipe above. Care shall be taken to size the rod appropriately for the total load at the support point." MSS SP-58, § 6.13. Industry standard API 570 provides that external inspections "shall include surveys for the condition of piping hangers and supports. Instances of cracked or broken hangers, "bottoming out" of spring supports, support shoes displaced from support members, or other improper restraint conditions shall be reported and corrected." API 570, § 5.5.4. For cold piping systems carrying ammonia, industry standards do not recommend wooden or concrete supports. *See* MSS SP-58, § 5.5.1 and Table A1.

Industry standard MSS SP-58 states, regarding insulated lines: "For piping systems using Type 40 protection shield for insulated piping, see Table A3 for spacing. Insulation protection shields shall be provided to protect the vapor barrier of insulation on cold lines. Under no circumstances shall hangers, supports or guides be applied directly to horizontal pipe or tubing on vapor barriered lines." MSS-SP-58, § 5.5.1. The standard further provides: "The connections to pipe attachments shall be outside the insulation so that movement of the line shall not cause damage to the insulation." MSS-SP-58, § 5.5.2.

The condition of the oleum and ammonia piping at the Facility, with its supports either improper or damaged, and with piping supporting other piping, and missing protective shields, is contrary to

acceptable limits in the standard of care, as defined in MSS SP-58. AdvanSix's inspections were deficient in not identifying the piping support deficiencies in the oleum tanks (VT-518 and VT-519), and in the ammonia tanks (VT-520, HST-1, and HST-2), in violation of the requirement that inspections and tests performed on process equipment follow recognized and generally accepted good engineering practices. 40 C.F.R. § 68.73(d)(2). Further, AdvanSix's mechanical integrity program was deficient in not addressing the piping support deficiencies at the Facility, in violation of the mechanical integrity requirements of the RMP Regulations, at 40 C.F.R. § 68.73(e).

B. Mechanical Integrity – Ammonia Piping Insulation Damage, Corrosion and Icing

EPA inspectors also observed that, in some areas, ammonia piping associated with Horton Spheres HST-1 and HST-2 was lying on the ground, not insulated, with atmospheric corrosion. EPA inspectors also observed suspended piping with missing insulation jackets, exposed piping ends, and brackets piercing insulation in the absence of protective shields to spread the load of the brackets, with resulting breached vapor barriers, icing, and corrosion. EPA inspectors also observed that insulation jackets were missing from ammonia piping associated with tank VT-520, exposing foam insulation.

Exposed insulation core allows moisture to reach the carbon steel piping, which can lead to "corrosion under insulation" or "CUI." Industry standard API RP 574 discusses the need for a thorough CUI inspection to gauge whether CUI could be occurring, stating in relevant part: "External inspection of insulated piping systems should include a review of the insulation system integrity for conditions that could lead to CUI and signs of ongoing CUI. API 570 documents requirements of a CUI inspection program. Sources of moisture can include rain, water leaks, condensation, deluge systems, and cooling towers. The two forms of CUI are localized corrosion of carbon steel and chloride [stress corrosion cracking] of authentic stainless steels. See API 571 for additional details on CUI mechanisms." API RP 574, § 7.4.4.

The standard also discusses insulated piping systems susceptible to CUI, stating as follows: "Certain areas of piping systems are potentially more susceptible to CUI, including: … e) carbon steel piping systems, ones insulated for personnel protection, operating between 10 ºF (-12 ºC) and 350 ºF (175 ºC); CUI is particularly aggressive where operating temperatures cause frequent or continuous condensation and reevaporation of atmospheric moisture. … k) piping systems with deteriorated insulation, coatings, and/or wrappings; bulges or staining of the insulation or jacketing systems or missing bands (bulges can indicate corrosion product buildup) … ." API RP 574, § 7.4.4.1. AdvanSix's representative indicated that the typical operating temperature of the Horton Spheres and associated piping is between 20 ºF and 30 ºF, indicating that the ammonia piping system is potentially more susceptible to CUI.

The companion standard, API 570, states about CUI Inspection:

> Inspection for CUI shall be considered for externally-insulated piping in areas or temperature ranges that are susceptible to CUI shown as indicated in API 574. CUI inspections may be conducted as part of the external inspection. If CUI damage is found during spot checks, the inspector should inspect other susceptible areas on the equipment.

> Although external insulation may appear to be in good condition, CUI damage may still be occurring. CUI inspection may require removal of some or all insulation. If external coverings are in good condition and there is no reason to suspect damage behind them, it is not necessary to remove them for inspection of the equipment. CUI damage is often quite insidious in that it can occur in areas where it seems unlikely.
>
> Considerations for insulation removal are not limited to but include:
>
> a) history of CUI for the specific piping system or comparable piping systems;
> b) visual condition of the external covering and insulation;
> c) evidence of fluid leakage (e.g. stains or vapors);
> d) whether the piping systems are in intermittent service;
> e) condition/age of the external coating, if known;
> f) evidence of areas with wet insulation;
> g) the type of insulation used and whether that insulation is known to absorb and hold water.

API 570, § 5.5.6.

The same piping areas associated with the Horton Spheres had been inspected by AdvanSix, as referenced in 2016 and 2021 piping inspection reports. Piping diagrams related to ammonia piping under HST-1 and HST-2 include the following observations made about this piping during an April 4, 2016 visual inspection: "missing/damaged insulation," "minor general surface corrosion throughout," "pipe & insulation observed to be wet," "exposed pipe iced over throughout," "missing insulation," and "insulation and pipe wet." The same conditions were still evident almost five years later, during the visual inspection conducted on March 23, 2021. The 2021 diagram includes the following observations for the same areas: "missing/damaged insulation," "minor general surface corrosion throughout," "exposed pipe iced over throughout," and "missing insulation/wet." The Facility's piping inspection reports from 2020 for piping associated with tank VT-520 similarly describes: "Damaged, missing, and poorly sealed insulation was noted throughout the system" and "minor to moderate corrosion was noted on all exposed piping throughout the system experiencing coating failure" and recommended "repairing/replacing insulation" and "cleaning piping of corrosion scale and coating."

Surprisingly, given these observations of problems with the condition of the piping associated with the Horton Spheres over five years and the recommendations made in 2020 for the piping associated with tank VT-520, AdvanSix apparently did not correct the problems or take steps to address the damaged insulation, icing or corrosion. In May 2022, EPA inspectors made the same observations. Even though AdvanSix's own inspections identified conditions indicating likely CUI -- including the visual condition of the external coverings and insulation, damaged insulation, areas of wet insulation, corrosion and frost/icing -- there is no indication that AdvanSix probed beneath the areas of insulation to ensure that corrosion was not occurring, in accordance with API 570. AdvanSix's failure to ensure the integrity of its ammonia piping by conducting the full piping inspection called for in API 570 is a violation of the requirement that inspections and tests performed on process equipment follow recognized and generally accepted good engineering practices. 40 C.F.R. § 68.73(d)(2). In not timely

addressing the corrosion deficiencies at its Facility, AdvanSix violated the mechanical integrity requirements to address equipment deficiencies in the RMP Regulations, at 40 C.F.R. § 68.73(e).

C. Mechanical Integrity – Condition of Oleum Containment Area

During the Inspection, EPA inspectors observed that the secondary containment area of oleum tank VT-746 was coated but that there was severe buckling, amounting to a coating failure, on the concrete floor of the containment area.

Industry standard NACE SP0294 contains a section dealing with safety and environmental concerns, specifically containment areas for oleum storage areas. NACE SP0294 states: *"*The area around sulfuric acid and oleum storage tank systems should be arranged such that any spillage goes to an *appropriate containment and neutralization system*. NACE Publication 6G197/SSPC-TU 229 contains information on coating systems for containment areas. See NFPA 30, OSHA 29 C.F.R. 1910 (j), and 40 CFR 112 Subparts A, B, and D.*"* NACE SP0294, § 6.3 (emphasis added).

The standard referred to in the above quotation, NACE Publication 6G197/SSPC-TU 229, describes maintaining good adhesion to the concrete substrate as critical to the performance of the coating performance, which depends on both the properties of the concrete substrate and the properties of the primer. NACE Publication 6G197, § 4.5. The standard also discusses thermal effects, specifically shrinkage from cure and aging: "Polymers and coatings often shrink volumetrically due to cross-linking or solvent evaporation. … When the stress and movement from shrinkage exceeds the tensile strength of the coating or adhesive strength between the coating and the concrete, the failure is usually evident as cracking in the coating and/or disbondment from the concrete. … Fillers, reinforcement, and thin coats are commonly used to reduce shrinkage and distribute shrinkage stress." NACE Publication 6G197, § 4.6.1.

The severe buckling witnessed by EPA inspectors in the concrete floor of the oleum containment area indicates either a flaw in the adhesion, perhaps due to thermal effects, or in the quality of underlying concrete. The containment structure, buckled as it was, was not an *appropriate* containment system. It is unknown how long the containment structure was in such a condition. In 2022, the AdvanSix tank inspection report notes that the dike sealant was deteriorating, with a recommendation made to repair the sealant, just as with oleum tank VT-747. By failing to timely address this evident process equipment deficiency, AdvanSix has violated the mechanical integrity requirements of the RMP Regulations to address equipment deficiencies, at 40 C.F.R. § 68.73(e).

D. Mechanical Integrity – Insufficient Inspections of Oleum Tanks

During the investigation, EPA learned that AdvanSix conducted internal inspections of tanks VT-518 and VT-519, containing oleum, but AdvanSix did not utilize linear ultrasonic thickness ("UT") scanning methods for the tanks to evaluate "bathtub ring corrosion." Industry standard NACE SP0294 provides that "Linear UT scans10 shall be used if bathtub-ring corrosion or erosion-corrosion is suspected. The results of the external visual and UT inspections in accordance with Paragraphs 5.5 and 5.6 may indicate that internal inspection should be performed sooner. Tanks experiencing leakage should be inspected internally and repaired within 3 months after leakage was first discovered and mitigated." NACE SP0294, § 5.1.3.1. The footnote explains that "Linear ultrasonic thickness scans are

much more likely to detect bathtub-ring corrosion and local erosion-corrosion than spot UT measurements. UT scans are continuous thickness measurements (B-scans) along a straight path conducted manually or with a magnetic crawler." NACE SP0294, FN 10. The footnote goes on to explain precisely how to conduct linear UT scans.

According to interviews conducted by an AdvanSix representative in April 2022, in the aftermath of the oleum release from VT-518, employees reported seeing fuming from underneath the insulation in the middle of the tank, oleum coming down the sides of the tank, and smoking from the top of the tank for months prior to the oleum release. These visual observations indicate that tank VT-518 was experiencing leakage that should have led to an internal inspection of tank VT-518 within three months of the initial observations in accordance with the industry standard.

EPA reviewed inspection reports for tank VT-518 dated June 2, 2014 (internal), March 27, 2019 (external), July 13, 2020 (internal) and March 30, 2022 (external). The 2014 inspection report contains observations and photographs consistent with bathtub-ring corrosion. The narrative of the inspection report dated June 2, 2014 identifies the following issues, among others: several instances of corrosion in the tank and "Grooving in shell beneath 2008 flush patch repair," which the report describes as "possibly the result of a weak acid attack." AdvanSix's set of photographs from the 2014 full internal inspection report includes one entitled "Grooves Below Flush Patch," which EPA has identified as "bathtub-ring corrosion." The 2014 inspection report recommended numerous repairs, including "Repair grooving in shell beneath 2008 flush patch repair" before the tank's return to service. But it is unclear that the repairs were made.

Moreover, the thickness testing done on the oleum tanks was insufficient to identify bathtub-ring corrosion. On April 16, 2013, March 27, 2019, April 14, 2020, and March 23, 2022, AdvanSix conducted UT scans on tank VT-518. The UT scans AdvanSix conducted do not appear to be linear UT scans, as NACE SP0294 indicates should be performed if bathtub-ring corrosion is suspected.

The inspection reports for tank VT-518 dated March 27, 2019 (external), July 13, 2020 (internal) and March 30, 2022 (external) indicate continued corrosion issues with tank VT-518, including an observation in 2020 of "[m]ultiple holes noted in roof towards the center of the tank at 90 and 180" and the following observation documented in 2022:

> Crystallized Product was noted on and around the first shell course manway at 180, the first shell course behind the tank insulation as well as on the support grillage and floor sections at 180. The suspected source is from the roof at 180° where epoxy type temporary repairs are present on the roof edge, an 18" roof nozzle and a ~2" nozzle near the 18" nozzle. Insulation jacketing has corroded away in an area directly beneath the temporary repairs. These repairs appear to be failing in areas around the 18" roof nozzle.

VT-518 External Visual Inspection Report, March 30, 2022.

Based on its review of these internal and external tank inspection reports, EPA believes bathtub-ring corrosion was present in tank VT-518 in 2014 and corrosion continued to manifest itself in the following years. In not conducting a linear UT scan of tank VT-518 as indicated by the tank inspection

reports and in accordance with NACE 0294, AdvanSix violated the mechanical integrity requirement in the RMP Regulations that "inspections and tests performed on process equipment follow recognized and generally accepted good engineering practices." 40 C.F.R. § 68.73(d)(2). In not timely addressing the corrosion deficiencies on tanks VT-518 at its Facility, AdvanSix violated the mechanical integrity requirement in the RMP Regulations to address equipment deficiencies, at 40 C.F.R. § 68.73(e).

EPA also reviewed inspection reports for the companion tank also containing oleum, tank VT-519, dated March 27, 2014 (external), April 17, 2017 (internal), April 20, 2017 (external), and February 28, 2020 (external). The inspection reports contain observations and photographs of corrosion, with possible bathtub-ring corrosion. The narrative of the inspection report dated April 17, 2017 for the internal inspection conducted between April 3-7, 2017, notes the following corrosion issues, among others:

- "The roof has 2 holes (temporarily patched) and severe corrosion in the vicinity of the conservation vent nozzle. In this vicinity, the roof to rim angle weld has through wall corrosion in 2 places."
- "2 areas of severe localized corrosion were observed in the upper shell course at approximately 0 degrees. (Beneath temp patch)"
- "An internal scab patch was observed on the shell beneath the RV nozzle at approximately 31' elevation. Severe localized corrosion was observed on the patch. A corner of the fillet weld had corroded through wall. A pinhole was observed in the termination of the patch longitudinal weld (patch is made of 2 sections welded vertically). Severe corrosion was observed on the shell beneath the patch, and adjacent to this area."
- "UT thickness inspection and follow up thickness scans identified areas of the lower shell course where external corrosion had resulted in material wastage to below or near shell course minimum allowable thickness."

The corrosion in tank VT-519 appears to be located around the same height, the filling height, as the corrosion present in tank VT-518. EPA also reviewed a set of photographs associated with the 2017 internal inspection of tank VT-519. EPA believes that photographs DSCN5884, DSCN5885 and IMG_1997 of tank VT-519 exhibit bathtub-ring corrosion. AdvanSix conducted UT-scans on tank VT-519 in 2017. However, the UT scans AdvanSix conducted do not appear to be linear UT scans, as NACE SP0294 indicates should be performed if bathtub-ring corrosion is suspected. The inspection reports for tank VT-519 dated March 27, 2014, April 17, 2017, April 20, 2017 and February 28, 2020 also indicate corrosion issues with tank VT-519. For example, the external inspection report from 2020 notes that, "Moisture is getting between the shell insulation and the tank due to a gap in the insulation and the shell where it meets the roof."

In its investigation findings after the oleum release, AdvanSix noted that holes in the roof of tank VT-518 were caused by intermittent breathing through the conservation vent when the vent scrubber line (SE-141) became plugged. The holes in turn allowed the infiltration of moisture. AdvanSix has previously identified holes in the tops of oleum tank VT-518 in inspections in 2019 and 2020, and in oleum tank VT-519 in 2017. In tanks containing oleum, the introduction of moisture can create dilute sulfuric acid. Internal corrosion of unlined carbon steel tanks by dilute sulfuric acid is addressed by industry code NACE SP0294. The code explains: "Dilute sulfuric acid causes rapid attack of carbon

steel. Dilute acid can be formed by absorption of moisture from the outside air, entry of rainwater, or improper cleaning. Entry of moisture from the outside should be controlled by proper venting and by minimizing air movement caused by natural convection." NACE SP0294, § 2.8.1.1. To ensure the continued integrity of its oleum tanks with conservation vents, AdvanSix must ensure that moisture is not introduced into the tanks via these roof holes by promptly identifying and addressing the cause of the holes and timely repairing the holes.

Based on its review of these tank inspection reports, EPA believes bathtub-ring corrosion was present in tank VT-519 in 2017 and continued to manifest itself in the years following. Given that the 2017 photographs of tank VT-519 indicate possible bathtub-ring corrosion, and tank VT-518, a tank in similar service to tank VT-519, also exhibited bathtub-ring corrosion, AdvanSix should have considered this hazard in managing tank VT-519.

In not conducting a linear UT scan of tank VT-519 after seeing its tank inspection reports in accordance with NACE 0294, AdvanSix violated the mechanical integrity requirement in the RMP Regulations that "inspections and tests performed on process equipment follow recognized and generally accepted good engineering practices." 40 C.F.R. § 68.73(d)(2). In not timely addressing the corrosion deficiencies on tank VT-519 at its Facility, AdvanSix violated the mechanical integrity requirement in the RMP Regulations to address equipment deficiencies, at 40 C.F.R. § 68.73(e).

2. Process Hazard Analysis

Section 68.67 of the RMP Regulations requires owners and operators to perform an initial process hazard analysis (hazard evaluation) on processes covered by the Program 3 Prevention Program (Subpart D of the RMP Regulations). The process hazard analysis shall be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved in the process. 40 C.F.R. § 68.67(a). The process hazard analysis shall address the hazards of the process, among other factors. 40 C.F.R. § 68.67(c)(1). The process hazard analysis shall be updated at least every five (5) years after the completion of the initial process hazard analysis. 40 C.F.R. § 68.67(f).

One of the industry standards AdvanSix identified as applying to the oleum tanks, VT-518 and VT-519, is NACE SP0924. This industry standard specifically identifies bathtub-ring corrosion as a possible hazard for tanks with corrosion and infiltration issues. NACE SP0924, § 5.1.3.2.[2] Based on EPA inspectors' review of the Marine Operations process hazard analysis (or "PHA") from 2017 for oleum tanks VT-518 and VT-519, the PHA did not consider the potential hazard of bathtub-ring corrosion in the oleum tanks. Specifically, the PHA did not identify bathtub-ring corrosion as a deviation, an intermediate event, or a significant process safety scenario, nor did the PHA identify any safeguards to put in place to prevent bathtub-ring corrosion or make any recommendations with regard to the risk. Moreover, the PHA conducted *after* the oleum release, the May 5, 2022 Marine Operations PHA revalidation report, also did not identify bathtub-ring corrosion as a hazard. AdvanSix's failure to consider how to prevent bathtub-ring corrosion is particularly egregious given (1) industry standard

[2] Oleum, also known as fuming sulfuric acid, is a mixture of sulfuric acid (H2SO4) and sulfur trioxide (SO3). When released or spilled, oleum gives off sulfur trioxide gas. The gas reacts with moisture in air and forms a cloud of sulfuric acid mist. The same occurs when the oleum is exposed to moisture in the air, such as when moisture infiltrates the tank through holes. The resulting sulfuric acid attacks the steel of the tank.

NACE SP0294 identifies bathtub-ring corrosion as a potential damage mechanism; and (2) the evidence of presence of bathtub-ring corrosion described in Section 1.D above. AdvanSix's failure to consider and address the hazard identified by industry standards in its PHA is a violation of the requirements for PHAs in the RMP Regulations, at 40 C.F.R. § 68.67(a) and 68.67(c)(1).

3. Process Safety Information

EPA also determined that AdvanSix's oleum tanks VT-518 and 519, acetaldehyde pressurized vessel tank HT-187 and ammonia tank VT-520 were not labeled in accordance with industry standards. Under the RMP Regulations, owners and operators of stationary sources must compile and maintain up-to-date safety information related to the regulated substances, processes, and equipment, including codes and standards used to design, build, and operate the process. *See* 40 C.F.R. § 68.48(a). Further, owners and operators must ensure that the process is designed in compliance with recognized and generally accepted good engineering practices. *See* 40 C.F.R. § 68.48(b). The relevant recognized and generally accepted good engineering practices include the following, among others:

- American Petroleum Institute Standard 650, *Welded Steel Tanks for Oil Storage*, 10th ed. (November 1998) (API 650);
- American Society of Mechanical Engineers VIII, *Boiler & Pressure Vessel Code* (2004) (ASME VIII); and
- National Fire Protection Association 400, *Hazardous Materials Code* (2010) (NFPA 400).

First, with respect to oleum tanks VT-518 and VT-519, tank drawings, inspection documentation, responsive documentation provided by AdvanSix, and field observations for oleum tanks VT-518 and VT-519 indicate the tanks are inspected to API 653 and NACE SP0924 standards, and that both tanks are constructed to API 650 standards. However, during the field inspection, EPA inspectors observed no nameplates on tanks VT-518 and VT-519. Industry Standard API 650 states: "A tank made in accordance with this standard shall be identified by a nameplate similar to that shown in Figure 8-1." API 650, § 8.1.1. Nameplates identify information such as the tank standard, diameter and height, capacity, design metal temperature, maximum operating temperature, and fabrication manufacturer. *Id.* AdvanSix's reports for the external inspections of tanks VT-518 and 519 in March 2019 and February 2020, respectively, noted as an issue that the tanks were neither marked nor labeled and recommended that a label be applied to the tanks. However, in the years since the reports were issued, AdvanSix did not address the lack of labeling on either tank.

Second, with respect to acetaldehyde tank HT-187, a pressure vessel, tank drawings, inspection documentation, and responsive documentation provided by AdvanSix indicated the tank is inspected to API 510 standards, among other standards, and built to the ASME VIII standard. Tank drawing HT-187 dated March 30, 1976, states in the notes section, "1. ASME Code Stamp Required." EPA inspectors observed during the field inspection that tank HT-187 had no nameplate. Industry standard ASME VIII states: "Nameplates shall be used on vessels except when markings are directly applied in accordance with UG-118" and "[t]he nameplate shall be attached to the vessel or to a pad, bracket, or structure which is welded, brazed, or soldered directly to the vessel. The nameplate shall be located within 30 in. (760 mm) of the vessel." ASME VIII, Div. 1, § UG-119(a), (e).

Third, with respect to ammonia tank VT-520, a concrete tank, industry standard NFPA 400 provides "Visible hazard identification sign in accordance with NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*, shall be placed … (1) On stationary aboveground tanks." NFPA 400, § 6.1.8.2.1. During the field inspection, however, EPA inspectors observed that tank VT-520 had no NFPA 704 placard.

Respondent's failure to comply with the process safety information standards set forth in industry standards API 650, ASME VIII, and NFPA 400 violates the requirements in the RMP Regulations to "ensure that the process is designed in compliance with recognized and generally accepted good engineering practices." See 40 C.F.R. § 68.48(b).

NEXT STEPS

EPA is hereby requesting that AdvanSix enter into an Administrative Compliance Order on Consent ("ACO") with EPA to conduct work at the Facility to address the conditions described above so as to bring the Facility into compliance with the RMP Regulations. As part of the ACO, AdvanSix would submit the name and resume of a proposed contractor(s) to perform the actions for EPA's approval. The work would include having the contractor conduct an assessment of the Facility to ensure AdvanSix is fully complying with the RMP Regulations. AdvanSix would submit a report of the assessment to EPA, including a list of any safety and/or release prevention improvements necessary to meet all appropriate codes, protocols and standards, with a schedule for making improvements at the Facility. EPA would review the plan and schedule and either approve it or disapprove it with comments. Finally, AdvanSix would submit a completion report within thirty (30) days after completing the work required by the approved workplan, and correct any deficiencies identified by EPA.

Please reply to EPA within **fifteen (15) days** of receipt of this letter as to whether AdvanSix is willing to enter into negotiations for an ACO and if AdvanSix would like to schedule a conference to discuss the matter. If AdvanSix does not respond to this letter, please be advised that EPA reserves the right to unilaterally pursue enforcement to address the violations described in this letter without further advance notice. If EPA pursues such an enforcement action, AdvanSix will receive instructions that describe its right to dispute EPA's claims.

Please direct your written response as well as all questions and communications in regard to any matters addressed in this letter to the attorney assigned to represent EPA: Jennifer Abramson, Senior Assistant Regional Counsel, at (215) 814-2066 or abramson.jennifer@epa.gov.

If AdvanSix has any information it would like EPA to consider in connection with this request for work, including any improvements made at the Facility since the Inspection, AdvanSix should submit the information to EPA within fifteen (15) days of receipt of this letter. AdvanSix must include as part of any submission of information or documentation to EPA pursuant to this letter the following certification, signed and dated by an authorized representative of AdvanSix:

Re: Notice of Potential Violations and Opportunity to Confer
CAA Section 112(r)(7)

> I certify under penalty of law that I have personally examined and am familiar with the information submitted in this response to the Opportunity to Confer and that, based on my inquiry of those individuals immediately responsible for obtaining or compiling the information, I believe that the submitted information is true, accurate, and complete. I recognize that there are significant penalties for submitting false and/or misleading information, including the possibility of fine and/or imprisonment.
>
> Signature: _____
>
> Printed Name: _____
>
> Title: _____
>
> Date: _____

Please be advised that submission of any additional information for consideration by EPA is **voluntary**. This Opportunity to Confer is not subject to review by the Office of Management and Budget pursuant to the Paperwork Reduction Act, 44 U.S.C. §§ 3501-3502.

Pursuant to the regulations set forth at 40 C.F.R. Part 2, Subpart B, AdvanSix is entitled to assert a business confidentiality claim covering any part of any submitted information, subject to EPA's evaluation of the information's confidential status. Unless such a confidentiality claim is asserted at the time the information is submitted, EPA may make this information available to the public without further notice to AdvanSix. Information subject to a business confidentiality claim may be made available to the public only to the extent set forth in the above-cited regulations. Any such claim for confidentiality must conform to the requirements set forth in 40 C.F.R. § 2.203(b).

EPA has made no determination as to whether or not AdvanSix is a "small business" under the Small Business Regulatory Enforcement and Fairness Act ("SBREFA"). Additional information can found in EPA's Small Business Resources Information Sheet, available here. The sheet provides information on (1) contacting the SBREFA Ombudsman to comment on federal enforcement and compliance activities and (2) compliance assistance. As noted in the *Small Business Information Sheet*, any decision to participate in such program or to seek compliance assistance does not relieve a respondent of its obligations to respond in a timely manner to an EPA information request or other enforcement action and does not create any new rights or defenses under law.

The issuance of an ACO does not preclude the commencement of administrative penalty proceedings or civil or criminal actions in the Federal courts, pursuant to Section 113 of the CAA, 42 U.S.C. § 7413, against AdvanSix for violations at the Facility. EPA retains full authority to enforce the requirements of the CAA and other federal environmental statutes and nothing in an ACO or this letter shall be construed to limit that authority.

Re: *Notice of Potential Violations and Opportunity to Confer*
CAA Section 112(r)(7)

I encourage you to give this matter your full attention. EPA looks forward to your reply.

Sincerely,

KAREN MELVIN

Digitally signed by KAREN MELVIN
Date: 2022.11.04 08:34:11 -04'00'

[*Digital Signature and Date*]
Karen Melvin, Director
Enforcement & Compliance Assurance Division

Enclosure (1)

cc: Phillip Sparks, Environmental Leader, Phillip.Sparks@AdvanSix.com
Andy Girvin, Plant Manager, Andy.Girvin@AdvanSix.com
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