October 2, 2020 Reference No. 11137347

Ms. Linda Michalets
Southeast Region Office
2300 North Martin Luther King Dr.
Milwaukee, WI 53212
Linda.Michalets@wisconsin.gov

Dear Ms. Michalets,

Re: Emerging Contaminants Evaluation
Solenis LLC, Milwaukee, Wisconsin
WDNR BRRTS 02-42-577350

This letter is being submitted in response to the August 17, 2020 Letter from the Wisconsin Department of Natural Resources (WDNR) requesting evaluation of emerging contaminants as part of the investigation work at the Solenis Facility located at 5228 North Hopkins Street in Milwaukee, Wisconsin (Site).

We have reviewed the historical operations and ongoing Kymene® operations conducted at the Site and do not believe there is a source for PFAS/PFOA compounds to be present at the Site. GHD has reviewed Interstate Technology & Regulatory Council (ITRC) and United State Environmental Protection Agency (USEPA) information regarding the sources of PFAS/PFOA compounds and prepared a Potential Manufacturing Sources of PFAS/PFOA Releases to the Environment Evaluation that is included as **Attachment A** to this Letter.

Additionally, there is not believed to be a source for 1,4-dioxane present at the Site. Per USEPA, the majority of the use for 1,4-dioxane was a stabilizer for chlorinated solvents, especially 1,1,1-trichloroethane (TCA). Site management has reported that TCA has not been used and this is supported by no detections in Site the soil and groundwater samples analyzed. 1,4-dioxane may also be a by-product present in paint strippers, dyes, greases, antifreeze and deicing fluids. As TCA is not used at the Site and none of the products in which 1,4-dioxane may be a by-product are present at the Site, we do not believe there to be a potential source of 1,4-dioxane present and therefore have no included in our investigation.

1,2,3-trichloropropane and perchlorate sources, and the production of products which would use these compounds, have not been historically present or in current use at the Facility according to Site management. These compounds do not warrant further investigation.

A review of historical analytical data collected at the Site has indicated there were no unexplained elevated detection limits in volatile organic compound (VOC) or semi-volatile organic compound (SVOC) analysis. Therefore, quantities of unknown VOC or SVOC compounds are not believed to be present.

We would request WDNR's input regarding this evaluation of emerging contaminants and concurrence that these compounds do not require investigation at the Site. GHD appreciates the opportunity to continue to support WDNR on this project.

If you have any questions, please contact me at 804-237-0300.

Sincerely,

GHD

Catherine C. Warner, P.E., BCEE
catherine.warner@GHD.com

cc: Rodger Ladewig, Solenis
Dustin Zedaker, GHD

Attachment A – Potential Manufacturing Sources of PFAS/PFOA Releases to the Environment Evaluation

Attachment A
Potential Manufacturing Sources of PFAS/PFOA Releases to the Environment Evaluation

Potential Manufacturing Sources of PFAS Releases to the Environment Evaluation

Industry/Application	Description	Commercial and Consumer Products Containing PFAS	Found at Solenis Milwaukee Facility
Paper Products	Surface coatings to repel grease and moisture.	Paper and packaging Non-food paper packaging (cardboard, carbonless forms, masking papers)\ Food-contact materials (pizza boxes, fast food wrappers, microwave popcorn bags, baking papers, pet food bags)	Yes[1] – Additional information provided below
Textiles & Leather	Factory or consumer applied coating to repel water, oil, and stains.	Clothing and carpets Outdoor textiles and sporting equipment (umbrellas, tents, sails) Coatings for oil- and water- repellent and stain release finishes	No
Metal Plating & Etching	Corrosion prevention, mechanical wear reduction, aesthetic enhancement, etc.	Mist suppression for harmful vapors, surfactants	No
Cable & Wire Manufacturing	Coating and insulation for use with weathering, soil resistance, etc.	Cables including antennae, computer networks, etc.	No
Industrial Surfactants, Resins, Molds, Plastics	Manufacture of plastics and fluoropolymers, rubber, and compression mold release coatings; plumbing fluxing agents	Composite resins, coatings, flame retardant	No
Photolithography, Semiconductor Industry	Photoresists, anti-reflective coatings, and etchants, wetting agents, etc.	Semiconductor chips, raw materials molded to handle corrosive liquids/gases	No
Aviation & Aerospace		Mechanical components (tubing, piping, seals, gaskets, et.) Hydraulic fluid additives	No
Cosmetics/Personal Care Products		Dental floss and micro powders used in creams and lotions Shampoos, nail polish, eye makeup, toothpaste, sunscreen, cosmetics	No
Automotive	Mechanical components made of fluoropolymers	Seals, bearings, gaskets, lubricants, etc. Surface treatment for carpets, leather and exterior surfaces, upholsteries, wipers	No

Industry/Application	Description	Commercial and Consumer Products Containing PFAS	Found at Solenis Milwaukee Facility
Herbicides & Pesticides	Ingredients in plant growth regulators and herbicides, enhancing ingredients in pesticides	Anti-foaming agents in solutions Ant/termite baits	No
Building & Construction	Membranes and coatings in architectural material	Fabrics, roofing membranes, metals, concrete, stone, etc. Adhesives, seals, caulks Additives in paint, varnishes, dyes, stains, sealants	No
Electronics		Speakers, cell phones, computers, transducers	No
Energy		Films to cover solar panel collectors Expansion joint materials for power plants Fuel cells	No
Firefighting/Safety		Firefighting equipment and protective clothing Coatings/materials used as water repellents Class B firefighting foam	No
Medical		Surgical patches, cardiovascular grafts X-ray film, stain- and water-repellent protective medical fabrics	No

NOTES:

1 While surface coating to repel moisture (i.e., Aquapel) were manufactured at the Solenis Milwaukee facility, the Aqualpel process did not utilized PFAS/PFOA compounds as feedstock or intermediaries. Aquapel is an alkyl ketene dimer derived from long-chain fatty acids created by Hercules Incorporated in the 1940s as a sealant for milk cartons and other wet paperboards. Aquapel is one of a group of sizing agents manufactured by Solenis to help papermakers improve the aqueous holdout of their products that improve the water resistance and oil resistance of food contact papers. The Aquapel process in Milwaukee operated from approximately 1955 to 1997, when the production ceased.

The Aquapel process involved the following general steps.

A. Batch reaction of fatty acid (animal, vegetable or wood based) via chlorination to produce fatty acid chloride and co-products of hydrochloric acid and phosphorous acid.

B. Extraction in a series of tanks of the co-product acids from the fatty acid chloride to produce a purified fatty acid chloride.

C. The purified fatty acid chloride was reacted in a second series of reactors with triethylamine (TEA) using 1,2-dichloropropane (PDC) as a solvent to produce the raw product of alkyl ketene dimer (Aquapel).

D. The raw Aquapel product was purified via a centrifuge and series of stills (multi-stage distillation columns). Once distilled, the Aquapel dimer was sent to packaging as a final product.

E. The co-product acids were purified via separation and filtration and sold as products to other companies.

F. The PDC and TEA solvent mixture was sent to solvent recovery which was a caustic soda treatment and a batch distillation process with condensers and separation equipment to recover the PDC and TEA for reuse in the process. A portion of the condensed solvent was refluxed back to the distillation columns.

Based on the Aquapel process feedstock and process, it is not believed an investigation into PFAS/PFOA compounds is warranted as there is no source of the compounds presently or historically located at the Solenis Milwaukee facility.