

# ATTACHMENT 8

## ENVIRONMENTAL ASSESSMENT

1. **Date:** February 10, 2016
  
2. **Name of Applicant/Petitioner:** Solvay Chemicals, Inc.
  
3. **Address:** 3333 Richmond Avenue  
Houston, Texas 77098  
  
Lewis & Harrison LLC (Agent)  
122 C Street NW Suite 505  
Washington DC 20001

4. **Description of Proposed Action:**

- A. **Requested Action**

This Food Contact Notification (FCN) requests the clearance of a food-contact substance (FCS) that is an aqueous solution containing peroxyacetic acid (PAA), hydrogen peroxide, acetic acid (AA), hydroxyethylidene 1,1-diphosphonic acid (HEDP), dipicolinic acid (DPA) and sodium hydroxide (NaOH). The FCS will be used in food processing facilities as an antimicrobial agent used in:

- 1) process water (processing aid) and ice used in the production and preparation of poultry products such as post-main chiller (air or water) secondary processing of whole birds, carcasses, parts and pieces, skin on or off and organs, in the washing, rinsing, cooling and processing of poultry products; and pre-air chiller dip tanks and post-main water chiller systems as finishing chillers; in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs; and,
- 2) Process water, ice, or brine used for washing, rinsing, or cooling of processed and pre-formed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34).

The components of the FCS mixture will not exceed:

- 1) 2000 ppm peroxyacetic acid (PAA), 933 ppm hydrogen peroxide (HP), 120 ppm 1-hydroxyethylidene-1,1-diphosphonic acid (HEDP) and 0.5 ppm dipicolinic acid (DPA) in spray, wash, rinse, dip, chiller water, low-temperature (e.g., less than 40°F) immersion baths, or scald water for whole or cut poultry carcasses, parts, trim, and organs; and,
- 2) 230 ppm PAA, 107 ppm HP, 14 ppm HEDP, and 0.1 ppm dipicolinic acid in process water, ice, or brine used for washing, rinsing, or cooling of processed and pre-formed meat as defined in 21 CFR 170.3(n)(29) and poultry as defined in 21 CFR 170.3(n)(34).

Hydrogen peroxide and PAA function as the antimicrobial components of the FCS. HEDP and DPA are present are stabilizers for hydrogen peroxide and PAA. As discussed below, acetic acid is a beginning material used to produce PAA in an equilibrium reaction. Sodium hydroxide functions as a processing aid in the initial manufacture.

#### B. Need for Action

The intended technical effect of the antimicrobial agent is to control spoilage as well as pathogenic and non-pathogenic microorganisms that may be present in both process water and on poultry. Use of the FCS should contribute to decreasing overall microbial risks associated with the consumption of these food items and augmenting their shelf-life.

The USDA has imposed additional testing for the poultry industry for *Campylobacter* spp.<sup>1</sup> For many processing plants, it has been found that an additional treatment using higher concentrations of peroxyacetic acid ( 400-2000 PPM) for a short period of time (seconds) can result in satisfactory reduction of this new species of pathogen that is now part of routine testing. The USDA is also looking to expand testing to more areas of processing, to other meats, and also to newer species of bacteria, such as Shiga Toxin-Producing *Escherichia coli* (STEC). In addition, the Food Safety Modernization Act will create pressure for more effective antimicrobial treatments for FDA inspected facilities as well.

The action requested addresses current and future needs for processors and governmental agencies by responding to increased pressure to improve food safety. The use of peroxyacetic acid at higher concentrations for relatively short periods of time, and in smaller total volumes, enhances the capacity of the food industry to improve techniques (i.e., more flexibility in terms of time, concentrations, spray vs immersion, etc.) to better control food pathogens.

#### C. Locations of Use and/or Disposal

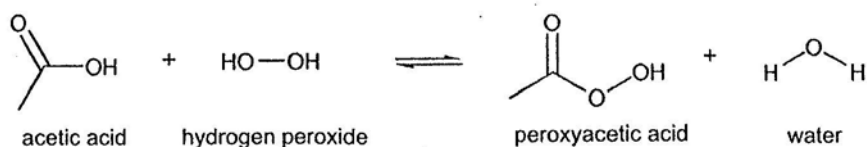
The antimicrobial agent is intended for use in poultry and meat processing plants throughout the United States. All waste process water containing the FCS at these plants is expected to enter the wastewater treatment unit at the plants. For the purposes of this Environmental Assessment, it is assumed that treated wastewater will be discharged directly to surface waters in accordance with the plants' National Pollutant Discharge Elimination System (NPDES) permit. This assumption can be considered a "worst-case" scenario since it does not take into account any further treatment that may occur at a POTW. It is further assumed that very minor or negligible quantities of the FCS are lost via evaporation.

### 5. Identification of Substances that are the Subject of the Proposed Action:

The FCS is an aqueous mixture of hydrogen peroxide, peroxyacetic acid (PAA), acetic acid, hydroxyethylidene 1,1-diphosphonic acid (HEDP) and dipicolinic acid (DPA). It is produced by blending acetic acid, hydrogen peroxide, HEDP, DPA and water. During the blending process, peroxyacetic acid is formed, *in situ*, as a result of an equilibrium reaction between hydrogen peroxide and acetic acid. Sodium hydroxide functions to solubilize DPA.

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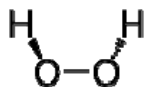
<sup>1</sup> See USDA FSIS Federal Register Notice, "New Performance Standards for Salmonella and Campylobacter in Young Chicken and Turkey Slaughter Establishments: Response to Comments and Announcement of Implementation Schedule," 76 Fed. Reg. 15282; see also FSIS Notice 54-12, "New Performance Standards for Salmonella and Campylobacter in Chilled Carcasses at Young Chicken and Turkey Slaughter Establishments," dated 9/11/12, available at <http://www.fsis.usda.gov/wps/wcm/connect/ebf83112-4c3b-4650-8396-24cc8d38bf6c/10250.1.pdf?MOD=AJPERES> 76 FR 15282-15290, available at <http://www.gpo.gov/fdsys/pkg/FR-2011-03-21/pdf/2011-6585.pdf>



The aqueous mixture is provided to users as a concentrate which is then diluted, prior to use, on-site. The chemical structures for the components of the FCS and associated chemical identification information is provided below:

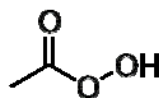
Hydrogen Peroxide

CASRN: 7722-84-1  
Molecular Formula: H<sub>2</sub>O<sub>2</sub>  
Molecular Weight: 34.01  
Structure:



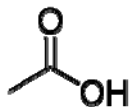
Peroxyacetic Acid

CASRN: 79-21-0  
Molecular Formula: CH<sub>3</sub>CO<sub>3</sub>H  
Molecular Weight: 76.05  
Structure:



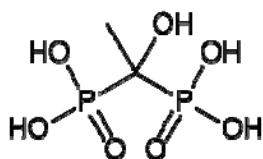
Acetic Acid

CASRN: 64-19-7  
Molecular Formula: CH<sub>3</sub>CO<sub>2</sub>H  
Molecular Weight: 60.05  
Structure:



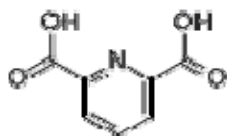
Hydroxyethylidene 1,1-diphosphonic acid

CASRN: 2809-21-4  
Molecular Formula: C<sub>2</sub>H<sub>8</sub>O<sub>7</sub>P<sub>2</sub>  
Molecular Weight: 206.02  
Structure:



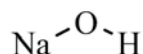
Dipicolinic acid.

CASRN: 499-83-2  
Molecular Formula: C<sub>7</sub>H<sub>5</sub>NO<sub>4</sub>  
Molecular Weight: 167  
Structure



Sodium Hydroxide

CASRN: 1310-73-2  
Molecular Formula: NaOH  
Molecular Weight: 39.997  
Structure



**6. Introduction of the Substances into the Environment:**

A. Introduction of Ingredient Substances into the Environment as a Result of Manufacture:

The FCS is currently manufactured in the following EPA registered pesticide production facilities, and no unusual or factual threat to the environment exists:

Est Number	Est Name	Est Site Address
084464-CHE-001	SOLVAY (SCHWEIZ) AG	ZUERCHERSTRASSE 42, 5330 BAD ZURZACH, CHE
068660-DEU-001	SOLVAY ELECTROLYSE SPECIALITATEN-GMBH	XANTENER STRASSE 237 RHEINBERG 47495, DEU
068732-DEU-001	SOLVAY FLUORIDES, LLC	HANS-BOCKLER-ALLEE 20 HANNOVER, DEU
068732-DEU-002	SOLVAY FLUOR BADWIMPFEN PLT	CARL ULRICH STRASSE 34 BADWIMPFEN AN 74206, DEU
068660-FRA-001	SOLVAY ELECTROLYSE FRANCE - USINE DE TAVAUX	1, AVE DE LA REPUBLIQUE TAVAUX 39501, FRA
068660-NLD-001	SOLVAY CHEMIE BV	SCHEPERSWEG 1, 6049 CV HERTEN, HERTEN, NLD
068660-TX -001	SOLVAY CHEMICALS, INC.	1130 BATTLEGROUNDRD DEER PARK, TX 775361000
068660-WA -001	SOLVAY CHEMICALS, INC	3500 INDUSTRIAL WAY LONGVIEW, WA 986329482

The Notifier is responsible for all effluent, solid, and airborne discharges from these secure facilities and these facilities are currently in compliance with emissions requirements. Liquid production wastes are regulated under local, state, and federal permit numbers. There will be no solid byproducts or airborne discharges from production of the product.

There are no unique emission circumstances that have not already been addressed by general or specific emission requirements (including occupational) imposed by Federal, State and local environmental agencies. Since the manufacturing conditions of the FCS comply with all Federal,

State and local requirements, there are no emissions from the production process that would cause harm to the environment

The manufacture of the FCS does not violate any Federal, State or local environmental laws or requirements. The manufacture of the FCS will not adversely affect a species or the critical habitat of a species determined under the Endangered Species Act or the Convention on International Trade in Endangered Species of Wild Fauna and Flora to be endangered or threatened, or wild fauna or flora that are entitled to special protection under some other Federal law.

In light of the points outlined above, no extraordinary circumstances apply to the manufacture of the FCS.

**B. Introduction of substances into the environment as a result of use/disposal:**

The FCS mixture is provided as a concentrate that is diluted on site. When diluted for use, the target levels of PAA in the process water will vary depending on the application. The resulting maximum concentration of PAA, hydrogen peroxide, HEDP, and DPA for each application will be as follows:

Use	PAA	H2O2	HEDP	DPA
Whole or cut poultry, carcasses, parts, trim, and organs	2000 ppm	933 ppm	120 ppm	0.5 ppm
Processed and pre-formed meat and poultry products	230 ppm	107 ppm	14 ppm	0.1 ppm

Treatment of the process water at an on-site waste water treatment facility is expected to result in complete degradation of peroxyacetic acid, hydrogen peroxide, and acetic acid. Specifically, the peroxyacetic acid will breakdown into oxygen and acetic acid, while hydrogen peroxide will breakdown into oxygen and water.<sup>2</sup> All three compounds are rapidly degraded on contact with organic matter, transition metals, and upon exposure to sunlight. As cited in the Joint Assessment of Commodity Chemicals report on PAA<sup>3</sup> Mucke suggested that hydrolysis of PAA occurs almost exclusively by hydrolytic cleavage. He showed hydrolysis half-lives at 20°C for a 2% PAA solution of about 1 week at pH 4.4 and less than 1 day at pH 7. As cited in the Joint Assessment of Commodity Chemicals report on hydrogen peroxide<sup>4</sup>, the half-life of hydrogen peroxide in natural river water ranged from 2.5 days when initial concentrations were 10,000 ppm, and increased to 15.2 days when the concentration decreased to 250 ppm. In biodegradation studies of acetic acid, 99% degraded in 7 days under anaerobic conditions.<sup>5</sup> Acetic acid it is not expected to concentrate in the wastewater discharged to the POTW. Therefore, peroxyacetic acid, hydrogen peroxide, and acetic acid are not expected to be introduced into the environment to any significant extent as a result of the proposed use of the FCS.

<sup>2</sup> Environmental Protection Agency, Reregistration Eligibility Decision: Peroxy Compounds (December 1993), p.18.  
[http://www3.epa.gov/pesticides/chem\\_search/reg\\_actions/reregistration/red\\_G-67\\_1-Dec-93.pdf](http://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_G-67_1-Dec-93.pdf)

<sup>3</sup> European Centre for Ecotoxicology and Toxicology of Chemicals, January 2001. Peracetic Acid (CAS No. 79-21-0) and its Equilibrium Solutions. JACC No. 40. <http://members.ecetoc.org/Documents/Document/JACC%20040.pdf>

<sup>4</sup> European Centre for Toxicology and Toxicology of Chemicals, January, 1993 Joint Assessment of Commodity Chemicals No. 22. Hydrogen Peroxide. CAS No. 7722-84-1 <http://members.ecetoc.org/Documents/Document/JACC%20022.pdf>.

<sup>5</sup> U.S. High Production (HPV) Chemical Challenge Program: Assessment Plan for Acetic Acid and Salts Category. Acetic Acid and Salts Panel, American Chemistry Council, June 28, 2001  
[http://iaspub.epa.gov/opthpv/document\\_api.download?FILE=c13102tp.pdf#\\_ga=1.33870884.425726753.1445002626](http://iaspub.epa.gov/opthpv/document_api.download?FILE=c13102tp.pdf#_ga=1.33870884.425726753.1445002626)

The emissions of sodium hydroxide mainly apply to wastewater.<sup>6</sup> At the low concentrations ( $\leq 0.5$  ppm) sodium hydroxide enters wastewater (and assuming that wastewater is relatively neutral), all sodium hydroxide should be dissociated into sodium ( $\text{Na}^+$ ) and hydroxyl ( $\text{OH}^-$ ) ions. The concentration of sodium and hydroxyl ions that could potentially enter the environment from the use of the FCS are substantially lower than the amounts naturally found in the environment. Therefore, no environmental impact is expected from the use of sodium hydroxide.

The remainder of this section will therefore consider only the environmental introduction of HEDP and DPA.

### 1) Poultry Processing Facilities

In poultry processing facilities, the defeathered, eviscerated carcasses are generally sprayed before being chilled via submersion in baths. The carcass is carried on a conveyor through a spray cabinet and then submerged in the chiller baths. Parts and organs may also be chilled by submersion in baths containing the antimicrobial agent. Chiller baths typically include a "main chiller" bath, as well as a "finishing chiller" bath, both containing the FCS. The majority of the solution containing the antimicrobial agent drains from the poultry carcasses and enters the plant's wastewater processing treatment facilities.

For poultry processing facilities, the EIC's for HEDP and DPA are derived by using worst-case assumptions. These assumptions are as follows: 1) all of the water used in the poultry facility is treated with the FCS; 2) there is no degradation or dilution of HEDP or DPA during the wastewater treatment process. These assumptions result in worst-case EIC's of 120 ppm for HEDP and 0.5 ppm for DPA. Since HEDP is expected to partition between water and sludge, the EIC for HEDP needs to be refined. Based on information from a report issued by the Human and Environmental Risk Assessment (HERA) project, we expect HEDP will significantly partition to sewage sludge. According to the HERA report, the treatment steps at an onsite treatment facility will remove or decompose at least a portion of any HEDP that remains.<sup>7</sup> The HERA report cites 80% adsorption of HEDP to sewage treatment sludge. Therefore, the EIC for HEDP has been adjusted by applying the 20:80 partition factor from the HERA report to estimate the concentrations in water and sewage sludge, as shown below.

$$\text{EIC}_{\text{water}} = 120 \text{ ppm} \times 20\% = 24 \text{ ppm}$$

$$\text{EIC}_{\text{sludge}} = 120 \text{ ppm} \times 80\% = 96 \text{ ppm}$$

No refinement was necessary for DPA since, as discussed below, this substance is anticipated to remain solely with water and not partition into sludge.

### 2) Processed Meat and Preformed Meat and Poultry Facilities

For these facilities, the EIC for HEDP and DPA are derived by using worst-case assumptions. These assumptions are as follows: 1) all of the water used in a processed and pre-formed meat and poultry plant is treated with the FCS; 2) there is no degradation or dilution of HEDP or DPA during the wastewater treatment process. Based on these assumptions, the EIC's will be 14 ppm for HEDP and 0.1 ppm for DPA. As large-scale facilities do not typically process more than one type of food, we will use the EIC for poultry processing of 120 ppm (as adjusted for water and sludge) for HEDP and 0.5 ppm for DPA as the worst-case concentration for all processing

<sup>6</sup> Institute of Health and Consumer Protection (IHCP), European Union Risk Assessment Report - SODIUM HYDROXIDE, CAS No: 1310-73-2, EINECS No: 215-185-5: TARGETED RISK ASSESSMENT  
<http://echa.europa.eu/documents/10162/0ded9c53-4082-405b-b09a-e16e57e158af>

<sup>7</sup> HERA - Human & Environmental Risk Assessment on Ingredients of European Household Cleaning Products: Phosphonates. 06/09/2004. [www.heraproject.com-Phosphonates](http://www.heraproject.com-Phosphonates)

facilities using the FCS in the intended applications. Therefore, the discussion of impacts in Items 7 and 8 will focus on poultry processing facilities.

## 7. Fate of Emitted Component in the Environment:

As previously mentioned, PAA, HP, and AA are not expected to survive treatment at the primary wastewater treatment facilities; therefore, Expected Environmental Concentrations (EEC's) have not been calculated for these substances. The EEC for sodium hydroxide has also not been calculated since, as noted above, no environmental impact is expected for this substance.

The EECs for HEDP and DPA in surface water has been calculated by applying a 10-fold dilution factor to the estimated EIC<sup>8</sup>. This dilution factor accounts for the expected dilution in surface waters of effluent from an onsite treatment facility as supported by data reported by Rapaport.<sup>9</sup> Finally, we note that the EEC for sludge is a maximum for terrestrial impacts as any sludge used as a soil amendment will likely be significantly diluted by soil or sludge from other sources.

Table 1: EICs and EECs for HEDP and DPA

Use	HEDP EIC (max use)	HEDP EIC <sub>water</sub> *	HEDP EEC <sub>sludge</sub> *	HEDP EEC <sub>water</sub> *	DPA EIC (max use)	DPA EEC <sub>water</sub> *
Whole or cut poultry, carcasses, parts, trim, and organs	120 ppm	24 ppm	96 ppm	2.4 ppm	0.5 ppm	0.05 ppm

\* Calculations:

$$\text{HEDP-EIC}_{\text{water}} = \text{max. use} \times \text{water partition} = 120 \text{ ppm} \times 20\% = 24 \text{ ppm}$$

$$\text{HEDP-EIC}_{\text{sludge}} = \text{max. use} \times \text{sludge partition} = 120 \text{ ppm} \times 80\% = 96 \text{ ppm}$$

$$\text{HEDP-EEC}_{\text{sludge}} = 96 \text{ ppm (assume that the EIC = EEC since there is no dilution)}$$

$$\text{HEDP-EEC}_{\text{water}} = \text{EIC}_{\text{water}} \div \text{dilution in aqueous receiving body} = 24 \text{ ppm} \div 10 = 2.4 \text{ ppm}$$

$$\text{DPA-EEC}_{\text{water}} = \text{EIC}_{\text{water}} \div \text{dilution in aqueous receiving body} = 0.5 \text{ ppm} \div 10 = 0.05 \text{ ppm}$$

No further adjustment of the calculated EEC is appropriate for HEDP since this substance is relatively stable in the environment. According to the published literature, decomposition of HEDP occurs at a moderately slow pace in water; 33% in 28 days.<sup>10</sup> Regarding soil biodegradation, the HERA report estimates a half-life in soil of 373 days. Therefore, any aquatic or soil biodegradation of HEDP is not expected to significantly lower the estimated EECs for HEDP provided in Table 1.

Studies concerning the environmental fate of DPA were not available from the published literature or proprietary sources. In the absence of environmental fate studies, a USEPA model (EPI Suite) was used to provide information on the environmental fate of DPA. The EPI Suite model uses the chemical structure of a substance to estimate chemical/physical properties and environmental fate characteristics.

The EPI Suite (v 4.11) results for DPA are shown in Attachment 1 and the key findings are summarized below.

<sup>8</sup> Rapaport, Robert A., 1988. Prediction of consumer product chemical concentrations as a function of publically owned treatment works treatment type and riverine dilution. Environmental Toxicology and Chemistry 7(2), 107-115. Found online at: <http://onlinelibrary.wiley.com/doi/10.1002/etc.5620070204/abstract>

<sup>9</sup> Ibid

<sup>10</sup> HERA, Human & Environmental Risk Assessment on Ingredients of European Household Cleaning Products, Phosphonates (CAS 6419-19-8; 2809-21-4; 15827-60-8), Draft 06/09/2004, Table 7, p. 16, available at: <http://www.heraproject.com/files/30-f-04-%20hera%20phosphonates%20full%20web%20wd.pdf>

- DPA is soluble in water, with the estimated water solubility ranging from 990 mg/L to 20,790 mg/L. The partition coefficient (Log  $K_{ow}$ ) is estimated to be 0.57.
- The biodegradation of DPA was evaluated using seven different Quantitative Structure Activity Relationship (QSAR) methods. The methods that are relevant to the expected environmental pathway of DPA (discharge to POTW's) are the MITI linear and nonlinear methods. Both of these methods, predict that DPA is readily biodegradable.

Based on EPI Suite estimates for DPA, it is reasonable to conclude that DPA will substantially remain with water and not be absorbed to sludge and that DPA will be readily biodegraded in POTW's. Since this Environmental Assessment assumes direct discharge of treated wastewater (containing the FCS) to surface waters, the expected biodegradation of DPA is not being considered.

## 8. Environmental Effects of Released Substances:

### A. Terrestrial Toxicity:

The No-Observable Effect Concentration (NOEC) for HEDP toxicity to terrestrial organisms is greater than 1000 mg/kg soil dry weight for *Eisenia foetida*.<sup>11</sup> The maximum estimated concentration in sludge (96 ppm) is approximately 10-fold lower than the NOEC level and the maximum concentration in soil when used as a soil amendment should have an even larger margin of safety with respect to the NOEC level. Therefore, HEDP is not expected to have any terrestrial environmental toxicity concerns at levels at which it is expected to be present in sludge. Moreover, the much smaller level of HEDP present in the surface water is not expected to have any adverse environmental impact with respect to sedimentation based on the terrestrial toxicity endpoints available for plants, earthworms, and birds.<sup>12</sup> When the wastewater encounters the land, any increase in phosphates in soil will be only a minimal amount of the total phosphorus concentrations that already exist in the environment.<sup>13</sup>

As noted above in Section 7, DPA is soluble in water and very little, if any, DPA is expected to partition to sludge. Accordingly, terrestrial releases of DPA from the intended uses of the FCS are anticipated to be negligible and no toxicity concerns are expected.

### B. Aquatic Toxicity

#### HEDP

An extensive database has been compiled on the toxicity of HEDP to aquatic organisms. Studies have been conducted on the toxicity of HEDP to freshwater and marine organisms and algae. The test results from the studies is shown in the following table:

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<sup>11</sup> HERA- Human & Environmental Risk Assessment on Ingredients of European Household Cleaning Products: Phosphonates. 06/09/2004. [www.heraproject.com](http://www.heraproject.com)- Phosphonates

<sup>12</sup> Ibid

<sup>13</sup> OECD, Current Approaches in the Statistical Analysis of Ecotoxicity Data: A guideline to Application, OECD Environmental Health and Safety Publications, Series on Testing and Assessment, No. 54 Environmental Directorate, Paris, 2006.

<http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=env/jm/mono%282006%2918&doclanguage=en>



**Aquatic Toxicity Data for HEDP**

Species	Endpoint	(mg/l)=ppm
Short Term		
<i>Lepomis macrochirus</i> <sup>A</sup>	96h LC50	868
<i>Oncorhynchus mykiss</i> <sup>A</sup>	96h LC50	360
<i>Cyprinodon variegatus</i> <sup>A</sup>	96h LC50	2180
<i>Ictalurus punctatus</i> <sup>A</sup>	96h LC50	695
<i>Leuciscus idus melonatus</i> <sup>A</sup>	48h LC50	207-350
<i>Daphnia magna</i> <sup>A</sup>	24 - 48h EC50	165-500
<i>Palaemonetes pugio</i> <sup>A</sup>	96 h EC50	1770
<i>Crassostrea virginica</i> <sup>A</sup>	96h EC50	89
<i>Selenastrum capricornutum</i> <sup>B</sup>	96h LC50	3
<i>Selenastrum capricornutum</i> <sup>B</sup>	96h NOEC	1.3
Algae <sup>B</sup>	96h NOEC	0.74
<i>Chiarella vulgaris</i> <sup>A</sup>	48h NOEC	>100
<i>Pseudomonas putida</i> <sup>A</sup>	30 minute NOEC	1000
Long Term		
<i>Oncorhynchus mykiss</i> <sup>A</sup>	14 d NOEC	60-180
<i>Daphnia magna</i> <sup>A</sup>	28 d NOEC	10 - <12.5
Algae <sup>B</sup>	14 day NOEC	13

A Jaworska, J.; Van Genderen-Takken, H.; Hanstveit, A.; van de Plassche, E.; Feijtel, T. Environmental risk assessment of phosphonates, used in domestic industry and cleaning agents in the Netherlands. *Chemosphere* 2002, 47, 655-665

B HERA – Human & Environment Risk Assessment on Ingredients of European Household Cleaning Products: Phosphonates. 06/09/2004. [www.heraproject.com](http://www.heraproject.com) – Phosphonates

The aquatic toxicity data on HEDP needs to be assessed in the context of the known chelation effects of HEDP. Work by Jaworska *et. al.* showed that the primary adverse effects of HEDP result from chelation of nutrients rather than direct toxicity of HEDP.<sup>15</sup> Chelation is not toxicologically relevant to wastewater discharges containing HEDP from food processing plants since eutrophication, not nutrient depletion, has been demonstrated to be the controlling toxicological mode for this type of wastewater discharge. The lowest short-term or acute LC50 values published for algae (*Selenastrum capricornutum* - 3 ppm), freshwater invertebrate (*Daphnia magna* -165 ppm), and mollusks *Crassostrea virginica* (89 ppm) are acute toxicity endpoints considered to result from this chelation effect. These values are not relevant when excess nutrients are present as expected in food processing wastewaters.

The lowest relevant endpoint for food processing uses was determined to be the chronic NOEC of 10 ppm for *Daphnia magna*.<sup>16</sup> Although FDA has previously noted that uncertainties intrinsic to its derivation make the usefulness of the NOEC/NOEL debatable, the agency has previously indicated that a NOEC for *Daphnia magna* is an appropriate benchmark for environmental toxicology.<sup>17</sup> The EEC of 2.4 ppm is approximately 4-fold lower than the 10 ppm chronic NOEC for *Daphnia magna*.

<sup>15</sup> Jaworska, J.; Van Genderen-Takken, H.; Hanstveit, A.; van de Plassche, E.; Feijtel, T. Environmental risk assessment of phosphonates, used in domestic industry and cleaning agents in the Netherlands. *Chemosphere* 2002, 47, 655-665.

<sup>16</sup> HERA – Human & Environment Risk Assessment on Ingredients of European Household Cleaning Products: Phosphonates. 06/09/2004. [www.heraproject.com](http://www.heraproject.com) – Phosphonates

<sup>17</sup> See e.g. Food and Drug Administration, 2014, Environmental Decision Memo for FCN 1379 and 1419.

## DPA

No test data concerning the aquatic toxicity of DPA was found in the published literature. An alternative approach is to use a well-established Quantitative Structure Activity Relationship or “QSAR” model to predict the aquatic toxicity of DPA. For this Environmental Assessment, USEPA’s ECOSAR model was used to provide estimates of the aquatic toxicity of DPA. ECOSAR (Ecological Structure Activity Relationships) is a computerized predictive system that estimates the aquatic toxicity of untested compounds using structure-activity relationships (SARs). The toxicity data used to build the SARs are collected from publically available experimental studies and confidential submissions provided to the EPA New Chemicals Program. The ECOSAR estimates for DPA are shown in Attachment 2. The estimates show that DPA is practically non-toxic to fish (LC50 = 322 mg/l), freshwater invertebrates (LC50 = 89 mg/l for the Daphnid) and algae (EC50 = 111 mg/l for green algae).

The EEC for DPA is 0.05 ppm. This value is >1000-fold lower than the predicted toxicity values for DPA. Therefore, the aquatic risks for the intended uses of DPA are expected to be negligible.

## NaOH

The available aquatic toxicity data on sodium hydroxide confirms that the sodium hydroxide is not anticipated to have any adverse environmental effects. According to a document issued by the European Chemicals Agency (ECHA) (see chart below)<sup>18</sup>, the Toxicity Threshold Concentration to Daphnia is greater than 40 mg/l, which is much higher than the level resulting from the use of this substance.

**Acute toxicity of NaOH to aquatic organisms (OECD, 2002)<sup>19</sup>**

Species	Toxicological endpoint	Result (mg/l)	CoR 1	Remark	Reference
<b>Freshwater fish</b>					
<i>Leuciscus idus melanotus</i> (golden orfe)	48-hour LC50	189	4		Juhnke and Lüdemann (1978)
<b>Freshwater invertebrates</b>					
<i>Daphnia magna</i> (water flea)	Toxicity threshold concentration	40 – 240	4		McKee and Wolf (1963)
<i>Ceriodaphnia dubia</i> (water flea)	48-hour LC50	40	2		Warne and Schifko (1999)

Code of Reliability (CoR):

- 1 = valid without restrictions,
- 2 = valid with restrictions,
- 3 = invalid,
- 4 = not assignable

<sup>18</sup> Institute of Health and Consumer Protection (IHCP), European Union Risk Assessment Report - SODIUM HYDROXIDE, CAS No: 1310-73-2, EINECS No: 215-185-5: TARGETED RISK ASSESSMENT pp 29-35  
<http://echa.europa.eu/documents/10162/0ded9c53-4082-405b-b09a-e16e57e158af>

<sup>19</sup> Ibid

**9. Use of Resources and Energy:**

No net increase in the use of energy and resources is expected from the use of this FCS since it is expected to substitute for other products (e.g. the FCS identified in FCN Nos. 140, 1501 and 1522) that are currently being utilized for the same uses as proposed in this FCN and contain the same components as this FCS at the same maximum concentrations.

In addition, the manufacture of the FCS will consume comparable amounts of energy and resources as similar products, and the raw materials used in the product of the FCS are commercially manufactured materials that are produced for use in a variety of chemical reactions and processes. Energy used specifically for the production of the FCS is not significant.

**10. Mitigation Measures:**

As discussed above, no significant adverse environmental impacts are expected to result from the use and disposal of the dilute FCS mixture. Thus, the use of the solution is not reasonably expected to result in any new environmental problems requiring mitigation measures of any kind.

**11. Alternatives to the Proposed Action:**

There are no potential adverse environmental effects identified that would necessitate alternative actions to that proposed in this FCN. The alternate of not approving this FCN would simply result in the continued use of nearly identical products by the poultry and preformed meat and poultry processing industries; such action would therefore have no environmental impact. The addition of the concentrated FCS mixture to the options that are currently available to meat processors is not expected to greatly increase the use of peroxyacetic acid products.

**12. List of Preparers:**

This Environmental Assessment was prepared on behalf of Solvay Chemicals Inc., by Wendy A. McCombie of Lewis & Harrison, LLC. Ms. McCombie has a B.S. in Biology with 23 years of experience providing consulting services for chemical regulations.

**13. Certification:**

The undersigned official certifies that the information provided herein is true, accurate, and complete to the best of his knowledge.

Name: Wendy A. McCombie, Lewis & Harrison LLC

Title: Agent for Solvay Chemicals

Signature: 

Date: February 10, 2016

#### **14. List of References:**

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Hydrogen Peroxide. JACC No. 22. European Centre for Toxicology and Toxicology of Chemicals, January, 1993 <http://members.ecetoc.org/Documents/Document/JACC%20022.pdf> pp. 26-35

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**15. List of Attachments:**

Attachment 1: ECOSAR

# **ATTACHMENT 1**

## **ECOSAR**

ECOSAR Version 1.11 Results Page

SMILES : c1cc(nc(c1)C(=O)O)C(=O)O  
CHEM :  
CAS Num:  
ChemID1:  
MOL FOR: C7 H5 N1 O4  
MOL WT : 167.12  
Log Kow: 0.567 (EPISuite Kowwin v1.68 Estimate)  
Log Kow: (User Entered)  
Log Kow: (PhysProp DB exp value - for comparison only)  
Melt Pt: (User Entered for Wat Sol estimate)  
Melt Pt: 249.00 (deg C, PhysProp DB exp value for Wat Sol est, 249 dec)  
Wat Sol: 4829 (mg/L, EPISuite WSKowwin v1.43 Estimate)  
Wat Sol: (User Entered)  
Wat Sol: 5000 (mg/L, PhysProp DB exp value)

-----  
Values used to Generate ECOSAR Profile  
-----

Log Kow: 0.567 (EPISuite Kowwin v1.68 Estimate)  
Wat Sol: 5000 (mg/L, PhysProp DB exp value)

-----  
Available Measured Data from ECOSAR Training Set  
-----

CAS No	Organism	Duration	End Pt	Measured mg/L (ppm)	Ecobar Class	Reference
000499-83-2	Fish	96-hr	LC50	322	Pyridine alpha-acid	DUL

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ECOSAR v1.1 Class-specific Estimations  
-----

Pyridine-alpha-Acid

ECOSAR Class	Organism	Duration	End Pt	Predicted mg/L (ppm)
Pyridine-alpha-Acid	: Fish	96-hr	LC50	323.608
Pyridine-alpha-Acid	: Fish		ChV	29.342 !
Neutral Organic SAR (Baseline Toxicity)	: Fish	96-hr	LC50	2656.694
	: Daphnid	48-hr	LC50	1321.570
	: Green Algae	96-hr	EC50	569.703
	: Fish		ChV	222.165
	: Daphnid		ChV	89.187
	: Green Algae		ChV	111.124

Note: \* = asterisk designates: Chemical may not be soluble enough to measure this predicted effect. If the effect level exceeds the water solubility by 10X, typically no effects at saturation (NES) are reported.

NOTE: ! = exclamation designates: The toxicity value was estimated through application of acute-to-chronic ratios per methods outlined in the ECOSAR Methodology Document provided in the ECOSAR Help Menu.

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Class Specific LogKow Cut-Offs  
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If the log Kow of the chemical is greater than the endpoint specific cut-offs presented below, then no effects at saturation are expected for those endpoints.

Pyridine-alpha-Acid :

-----  
Maximum LogKow: 5.0 (LC50)  
Maximum LogKow: 6.4 (EC50)  
Maximum LogKow: 8.0 (ChV)

Baseline Toxicity SAR Limitations:

-----  
Maximum LogKow: 5.0 (Fish 96-hr LC50; Daphnid LC50)  
Maximum LogKow: 6.4 (Green Algae EC50)  
Maximum LogKow: 8.0 (ChV)