ATTACHMENT 7

Environmental Assessment

1. **Date:** April 7, 2014

2. **Name of Applicant/Petitioner:** Solvay Chemicals, Inc.

3. **Address:** 3333 Richmond Avenue
Houston, Texas 77098

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, hydroxyethylidene 1,1-diphosphonic acid (HEDP) and dipicolinic acid (DPA). The FCS will be used, in food processing facilities, as an antimicrobial agent in process water that is used to wash raw and processed fruits and vegetables.

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. The maximum use-concentrations for the individual components of the FCS are as follows: hydrogen peroxide (112 ppm); PAA (73.2 ppm); acetic acid (53 ppm); HEDP (4.8 ppm) and DPA (0.09 ppm).

Mixtures containing the substances comprising the FCS have previously been cleared by FDA for the same use (antimicrobial agent for use in a fruit and vegetable wash), at higher use-concentrations (refer to FCN Nos. 1025 and 1284 and Attachment 8 of this FCN). Accordingly, the use-concentrations for the substances proposed in the FCN will below previously authorized levels.

All the components of the FCS have been authorized by other FCN's, at slightly higher use levels, for use in wash water applied to fruits and vegetables in food processing plants. The chart below compares prior authorizations or approvals for each component with the levels proposed by this FCN.

Component	Use-Level in this FCN	Current Authorization
Hydrogen Peroxide	112 ppm	117 ppm (FCN # 1025) and 120 ppm (FCN # 1284)
Peroxyacetic Acid	73.2 ppm	80 ppm (FCN #1025)
Acetic Acid	53 ppm	GRAS Substance and >53 ppm in FCN #1025

HEDP	4.8 ppm	4.8 ppm (CFR21 §173.315) and 10 ppm (FCN # 1284)
Dipicolinic acid	0.09 ppm	0.25 ppm (FCN # 1025)

The difference in the use-levels are not expected to have any effect on the overall safety of the FCS since higher levels for each of the components have previously been authorized. Therefore, the prior authorizations can be considered "worst-case" for this FCS. In addition, the efficacy of this FCS should practically be the same as FCS's covered by prior approved FCN's since the antimicrobial efficacy is related to the levels of hydrogen peroxide and peroxyacetic acid. The differences between in the use-levels of these components proposed by this FCN and previously authorized FCN's, e.g. 1025 and 1284, is insignificant.

B. Need for Action

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

C. Locations of Use/Disposal

The antimicrobial agent will be used in fruit and vegetable food-handling facilities throughout the United States. After treatment of fruits and vegetables, the process water containing the FCS is routed to the wastewater treatment system in the food-processing facility. The treated wastewater is subsequently discharged to the local municipal treatment plant or POTW.

Only negligible quantities are expected to be released to air based on the chemical/physical properties of the individual components of the FCS. Hydrogen peroxide and PAA are expected to rapidly degrade upon contact with fruits or vegetables. Any remaining residues of hydrogen peroxide and PAA that remain after contact with fruits or vegetables and residual acetic acid will then be degraded in the on-site wastewater treatment process. Consequently, environmental releases of hydrogen peroxide, PAA and acetic acid are expected to be insignificant. Due to their low use levels, environmental releases of HEDP and DPA will be minimal.

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

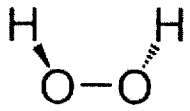
The FCS is an aqueous mixture of hydrogen peroxide, peroxyacetic acid (PAA), acetic acid, hydroxyethylidene 1,1-diphosphonic acid (HEDP) and dipicolinic acid (DPA). It is produced by blending acetic acid, hydrogen peroxide, HEDP, DPA and water. During the blending process, peroxyacetic acid is formed,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

acetic acid hydrogen peroxide peroxyacetic acid water

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:

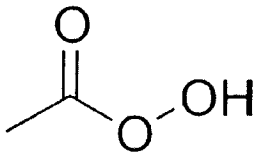
Hydrogen Peroxide

CASRN: 7722-84-1
Molecular Formula: H_2O_2
Molecular Weight: 34.01
Structure:



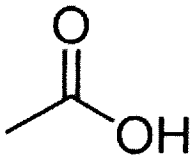
Peroxyacetic Acid

CASRN: 79-21-0
Molecular Formula: CH_3CO_3H
Molecular Weight: 76.05
Structure:



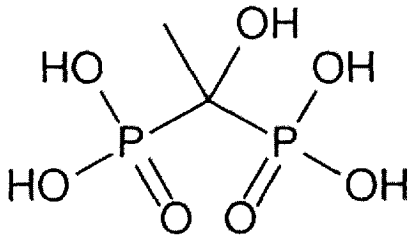
Acetic Acid

CASRN: 64-19-7
Molecular Formula: CH_3CO_2H
Molecular Weight: 60.05
Structure:



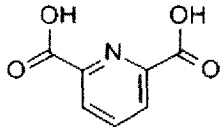
Hydroxyethylidene 1,1-diphosphonic acid

CASRN: 2809-21-4
Molecular Formula: $C_2H_8O_7P_2$
Molecular Weight: 206.02
Structure:



Dipicolinic acid.

CASRN: 499-83-2
Molecular Formula: $C_7H_5NO_4$
Molecular Weight: 167
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 plants which meet all applicable federal, state and local environment regulations.

Solvay is not aware of any extraordinary circumstances that apply to the manufacture of any of the components of the FCS (hydrogen peroxide, PAA, acetic acid, HEDP and DPA) and, therefore, information about environmental introductions resulting from the production of these substances is not included in the Environmental Assessment (EA).

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

As noted above, the substances comprising the FCS will be discharged to the plant's wastewater treatment system. The treatment process is anticipated to result in complete degradation of hydrogen peroxide, PAA and acetic acid that may remain after contact with fruits and vegetables[1]. The decomposition of hydrogen peroxide, PAA, and acetic acid has been extensively discussed in several Environmental Assessments previously submitted to FDA[2]. Therefore, these substances are not expected to be introduced into the environment to any significant extent as a result of the proposed use of the FCS. Accordingly, the remainder of this Environmental Assessment will focus on HEDP and DPA.

HEDP

The maximum at-use concentration of HEDP in the wash water of fruit and vegetable processing plants using the FCS is 4.8 ppm. Accordingly, the maximum environmental introduction concentration (EIC) for HEDP is 4.8 ppm. The actual EIC is anticipated to be much lower since the level of 4.8 ppm assumes that all the water used in the processing facility contains the antimicrobial agent and that there is no loss of HEDP during passage through the on-site waste treatment process. It should be noted there are existing authorizations for HEDP, for the same use proposed by this FCN, at levels up to 10 ppm in process water. Accordingly, no new or additional environmental introductions of HEDP are expected when this FCN becomes effective.

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[1]Environmental Protection Agency, *Peroxy Compounds Summary Document: Registration Review*, September, 2009; (available at http://www.regulations.gov); J. Howrath, Decay Kinetics of Peroxyacetic Acid (PAA) and Hydrogen Peroxide (Perasan, EPA # 63838-2) in a Variety of Water Matrices, available at http://www.envirotech.com/pdf/Perasan%20Decay.pdf; Val Beelen P. and Fleuren-Kemila, AK; Toxic Effects of Pentachlorophenol and other Pollutants on Mineralization of Acetate in Several Soils, Ecotoxicol. Environ. Safety 26: 10-17 (1993).

[2]See Environmental Assessments for Food-Contact Notifications 140, 323, 1236, 1284, 1286. Aavailable at http://www.fda.gov/Food/IngredientsPackagingLabeling/EnvironmentalDecisions/default.htm.

DPA

The maximum at-use concentration of DPA in the wash water of fruit and vegetable processing plants using the FCS is 0.09 ppm. Accordingly, the maximum environmental introduction concentration (EIC) for DPA is 0.09 ppm. The actual EIC is anticipated to be much lower since the level of 0.09 ppm assumes that all the water used in the processing facility contains the antimicrobial agent and there is no loss of DPA during passage through the on-site waste treatment process. It should be noted there is an existing authorization for DPA, for the same use proposed by this FCN, at levels up to 0.25 ppm in process water. Accordingly, no new or additional environmental introductions of DPA are expected when this FCN becomes effective.

7. Fate of Emitted Component in the Environment:

As noted above, the complete decomposition of hydrogen peroxide, PAA and acetic acid to innocuous substances is expected to occur in environments, such as fruit and vegetable washes at food processing facilities. Therefore, there is no need to discuss further the environmental behavior of these substances. The environmental fate of HEDP and DPA are discussed below.

HEDP

According to the published literature and information provided in previously submitted FCN's, the biodegradation of HEDP, under controlled conditions, ranges from minimal to moderate[3,4]. In brief, a biodegradation study based on the Zahn-Wellens test protocol showed dissolved organic carbon (DOC) removal of 33% after 28 days. In another biodegration study using the modified OECD protocol, the theoretical carbon dioxide evolution was 2% after 70 days. Although the laboratory data collected on HEDP shows relatively low levels of biodegradation, environmental data indicates significantly higher levels of degradation by phosphonate-degrading bacteria. In a low ortho-phosphate environment, breakdown of HEDP was found to be 94% in activated sludge at 28° C after 28 days[5]. Based on the environmental data, the notifier expects that HEDP will slowly degrade into carbon dioxide, water and phosphates. Moreover, HEDP is not anticipated to accumulate in the environment as a result of the proposed use of the FCS.

After use, HEDP will be discharged from a fruit and vegetable processing facility to a POTW. Treatment steps that take place at the POTW include sedimentation, filtration and biological degradation processes (aerobic and anaerobic). According to the aforementioned HERA report (refer to Footnote 3), HEDP has a very high adsorption rate coefficient in wastewater activated sludge operations and the rate of HEDP removal has been estimated at > 90% for secondary-treated wastewater. Based on this characteristic of HEDP, FDA has previously concluded that 80% of HEDP is expected to be adsorbed though sludge during sedimentation or filtration treatment[6].

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[3]Human & Environmental Risk Assessment (HERA) on Ingredients of European household cleaning products: Phosphonates (2004). Available at http://www.heraproject.com/files/30-F-04-%20HERA%20Phosphonates%20Full%20web%20wd.pdf

[4]See Environmental Assessment for Food-Contact Notification 323. Available at http://www.fda.gov/Food/IngredientsPackagingLabeling/EnvironmentalDecisions/default.htm

[5]Schowanek, D. and Verstraete, W., *Phosphonate Utilization by Bacterial Cultures and Enrichments from Environmental Samples*, Applied and Environmental Microbiology: 56(4) (1990). Available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC184318/pdf/aem00085-0075.pdf.

[6]Environmental Decision Memo for Food Contract Notification No. 140. Available at http://www.accessdata.fda.gov/scripts/fcn/fcsDetailNavigation.cfm?rtp=opaListing%id=140.

The estimated environment concentration (EEC) for HEDP can be derived by adjusting the EIC for any dilution, removal or degradation that may occur in the POTW. For the purpose of this EA, the notifier is utilizing FDA's default assumption of a 10-fold dilution factor for POTWs and a removal factor of 80% (from water to sludge. No microbial degradation is being assumed.

The EEC can then be calculated as follows:

$$EEC = (EIC)\ (1- \text{removal factor}) \div \text{Dilution Factor}$$

$$EEC = (4.8\ ppm)(1- 0.8) \div 10 = 0.096\ ppm \text{ or } 96\ ppb$$

DPA

Limited environmental fate data is available on DPA. According to the published literature, DPA is oxidized to carbon dioxide, ammonium and water. Mechanistic studies have shown that 3-hydroxydipicolinic acid is an intermediate product of DPA metabolism and is further degraded to alpha-ketoglutaric acid and oxalic acid[7]. The degradation data coupled with the low K_{ow} value of 0.57 for DPA[8] indicates that DPA will not accumulate in the environment.

The estimated EEC for DPA can be derived in the same manner as was done for HEDP. For DPA, the same 10-fold dilution factor is utilized but no removal to sludge or degradation is assumed.

Therefore,

$$EEC = (EIC)\ (1- \text{removal factor}) \div \text{Dilution Factor}$$

$$EEC = (0.09\ ppm) \div 10 = 0.009\ ppm \text{ or } 9\ ppb$$

[7]Kaiser, J.P., Y. Feno, and J.M. Bollag. Microbial Metabolism of Pyridine, Qunoline, Acridine, and Their Derivatives under Aerobic and Anaerobic Conditions. Microbiological Reviews, September, 1996 p, 483-498.

[8]Material Safety Data Sheet for Pyridine-2,6-dicarboxylic acid. Issued by Merck Chemicals, Nottingham, UK. Version 1.4, 2/23/2013.

8. Environmental Effects of Released Substances:

HEDP

The ecotoxicity of HEDP is discussed in detail in the Environmental Assessment for FCN No. 1284. HEDP is relatively non-toxic to terrestrial organisms. The no-observed effect concentration (NOEC) for soil dwelling organisms was > 1,000 mg/kg soil dry weight for red worms in soil, while the 14-day LD_{50} for birds is > 284 mg/kg body weight. It should also be noted that the application of wastewater or sludge to land will result in phosphorous concentrations (from HEDP) in soil that are a small fraction of total phosphorous concentrations currently found in the environment and used in fertilizers[9].

An extensive aquatic toxicity data base, which includes studies on freshwater fish, aquatic invertebrates and alage, has been assembled on HEDP. A summary of this data is presented in the chart below[10,11].

Test Organism	Endpoint	Result (mg/L)
Acute Studies		
Lepomis macrochirus	96-hr LC_{50}	868
Oncorhynchus mykiss	96-hr LC_{50}	360
Cyprinodon variegates	96-hr LC_{50}	2180
Ictalurus punctatus	96-hr LC_{50}	695
Leciscus idus melanatus	96-hr LC_{50}	207-350
Daphnia magna	48-hr LC_{50}	165-500
Planemonetes pugio	24-48 hr. LC_{50}	1770
Crassostrea virginica	96-hr LC_{50}	89
Selenastrum capricornutum	96-hr LC_{50}	3
Selenastrum capricornutum	96-hr LC_{50}	1.3
Algae	96-hr LC_{50}	0.74
Chorella vulgaris	48-hr LC_{50}	$\geq$100
Pseudomonas putida	30 minute NOEC	1000
Chronic Studies		
Oncorhychus mykiss	14-day NOEC	60-80
Daphnia magna	28-day NOEC	10- <12.5
Algae	14-day NOEC	13

[9]D.W. Like, Review of Phosphorous Control Measures in the United States and Their Effects on Water Quality: Water-Resources Investigations Report 99-4007; U.S. Geological Survey: Denver, Colorado (1999). Available at http://pubs.usgs.gov/wri/wri994007/.

[10]Human & Environmental Risk Assessment (HERA) on Ingredients of European household cleaning products: Phosphonates (2004). Available at http://www.heraproject.com/files/30-F-04-%20HERA%20Phosphonates%20Full%20web%20wd.pdf

[11]Jaworska, J.; Van Genderen-Takken, H.; Hanstveit, A.; van de Plassche, E.; Feiftel, T.; *Environmental Risk Assessment of Phosphonates Used in Domestic Laundry and Cleaning Agent in the Netherlands*, Chemosphere, 47, 655-665 (2002).

The results show that HEDP is relatively non-toxic, on an acute and chronic basis, to freshwater and coldwater fish. In addition, HEDP is relatively non-toxic to freshwater invertebrates both an acute and chronic basis. HEDP is moderately toxic to algae although the results of the acute and chronic studies are inconsistent.

As discussed in the Environmental Assessment for FCN No. 1286, the lowest toxicity endpoints (algae, *Daphnia magna* and *Crassostrea virginica*) are a consequence of nutrient chelation, not from the direct toxicity of HEDP. Chelation is not toxicologically relevant to the fruit and vegetable wash use since eutrophication, not nutrient depletion, has been demonstrated to be the controlling toxicological mode when evaluating wastewater discharges from food processing facilities. In this regard, FDA in its Finding of No Significant Impact (FONSI) for FCN No. 691 determined that the lowest relevant endpoint for this use pattern was 10 mg/L[12].

[12]The Environmental Review Group concluded during its review of FCN No. 691 that "excess nutrients are expected to be present in industrial wastewater as eutrophication is a well-known phenomenon seen in industrial wastewaters from food processing facilities". Memorandum re FCN No. 691 from Katrina E. White, Ph.D., Environmental Review Group, Division of Chemistry Research and Environmental Review (HFS-246), to Division of Food Contact Notifications (HFS-275) (January 18, 2007). Available at http://www.fda.gov/Food/FoodIngredientsPackaging/EnvironmentalDecisions/ucm155310.htm.

DPA

A literature search conducted by the notifier did not reveal any pertinent ecotoxicity studies that are available for DPA. Accordingly, the notifier used a computer based predictive model developed by EPA, ECOSAR, (Ecological Structure Activity Relationships)[13] to provide ecotoxicity values for DPA.

The ECOSAR results are summarized in the table below and in Attachment 1. Based on the ECOSAR output, DPA can be considered practically non-toxic to aquatic organisms. The lowest toxicity endpoint is 29 mg/l from the chronic fish estimate.

ECOSAR class	Organism	Duration	Endpoint	Predicted mg/l (ppm
Pyridine-alpha acid	Fish	96-hr	LC_{50}	322
Pyridine-alpha acid	Fish	N/A	Chronic	29
Neutral Organic SAR (Baseline toxicity)	Fish	96-hr	LC_{50}	2641
	Daphnid	48-hr	LC_{50}	1314
	Green algae	96-hr	EC_{50}	567
	Fish	N/A	Chronic	220
	Daphnid	N/A	Chronic	88
	Green algae	N/A	Chronic	110

Risk Assessment

The EPA has established a framework for evaluating whether substances pose ecotoxicity risk concerns. The framework determines a Risk Quotient (RQ) and a Level of Concern (LOC) for several types of types of environmental exposures (see Attachment 2).

The RQ is the the EEC divided by the pertinent toxicological endpoint. For HEDP, the EEC derived in Section 7 is 0.096 mg/l and the ecotoxicity endpoint is 10 mg/L. Accordingly, the RQ for HEDP is 0.096 mg/l ÷ 10 mg/l = 0.0096. This value is substantially below any LOC established by EPA's framework. For DPA, the EEC is 0.009 mg/l and the ecotoxicity endpoint is 29 mg/l. Accordingly, the RQ for DPA is 0.009 mg/l ÷ 29 mg/l = 0.0003, which is also substantially below any LOC. Consequently, the proposed use of HEDP and DPA in an antimicrobial agent used to wash fruits and vegetables does not present any ecotoxicity risks of concern.

[13]Background information on ECOSAR can be found at: http://www.epa.gov/oppt/newchems/tools/21ecosar.htm

9. Use of Resources and Energy:

The components of the FCS are commercially-manufactured substances that are produced for a wide variety of uses. Resources and energy used in the production of these components, for this FCN, are insignificant. Moreover, all the components of the FCS are currently used for the same uses as proposed by this FCN. Therefore, this FCN will not implicate any increase in the use of resource and energy.

10. Mitigation Methods:

As detailed above, no significant adverse environmental impacts are expected to result from the use and disposal of the FCS. Therefore, no mitigation measures are necessary.

11. Alternatives to the Proposed Action:

No potential adverse effects are identified herein which would necessitate alternative actions to that proposed in this Notification. If the proposed action is not approved, the result would be the continued use of equivalent antimicrobial agents, with which the subject FCS would otherwise compete. Alternatives to the proposed action do not need to be considered since no potential adverse environmental effects are anticipated to occur if this FCN becomes effective.

12. List of Preparers:

This Environmental Assessment was prepared for Solvay Chemicals Inc., by Eliot Harrison of Lewis & Harrison.

13. Certification:

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

Name: Eliot I. Harrison

Title: Agent for Solvay Chemicals

Signature: 

Date: April 7, 2014

ATTACHMENT 1

SMILES : O=C(O)c(nc(cc1)C(=O)O)c1
CHEM : 2,6-Pyridinedicarboxylic acid
CAS Num: 000499-83-2
ChemID1:
MOL FOR: C7 H5 N1 O4
MOL WT : 167.12
Log Kow: 0.567 (EPISuite Kowwin v1.68 Estimate)
Log Kow: 0.570 (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: 4800 (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: 0.570 (User Entered)
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)	Ecosar Class	Referenc
000499-83-2	Fish	96-hr	LC50	322	Pyridine alpha-acid	DUL

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	322.219
Pyridine-alpha-Acid	: Fish		ChV	29.208 !
Neutral Organic SAR (Baseline Toxicity)	: Fish	96-hr	LC50	2641.902
	: Daphnid	48-hr	LC50	1314.539
	: Green Algae	96-hr	EC50	567.257
	: Fish		ChV	220.993
	: Daphnid		ChV	88.774
	: Green Algae		ChV	110.708

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.

Class Specific LogKow Cut-Offs

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.

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

Baseline Toxicity SAR Limitations:
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Maximum LogKow: 5.0 (Fish 96-hr LC50; Daphnid LC50)
Maximum LogKow: 6.4 (Green Algae EC50)
Maximum LogKow: 8.0 (ChV)
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ATTACHMENT 2

Table II.9. Agency Risk Quotient (RQ) Metrics and Levels of Concern (LOC) Per Risk Class

RISK CLASS	RISK DESCRIPTION	RQ	LOC
Aquatic Animals (fish and invertebrates)			
Acute	Potential for effects to non-listed animals from acute exposures	Peak EEC/LC_{50}[1]	0.5
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	Peak EEC/LC_{50}[1]	0.1
Acute Listed Species	Listed species may be potentially affected by acute exposures	Peak EEC/LC_{50}[1]	0.05
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	60-day EEC/NOAEC (fish) 21-day EEC/NOAEC (invertebrates)	1
Aquatic Plants			
Non-Listed	Potential for effects to non-listed plants from exposures	Peak EEC/LC_{50}[1]	1
Listed	Potential for effects to listed plants from exposures	Peak EEC/NOAEC	1
Terrestrial Animals (mammals and birds)			
Acute	Potential for effects to non-listed animals from acute exposures	EEC[2]/LC_{50} (Dietary) EEC/LD_{50} (Dose)	0.5
Acute Restricted Use	Potential for effects to animals from acute exposures Risks may be mitigated through restricted use classification	EEC[2]/LC_{50} (Dietary) EEC/LD_{50} (Dose)	0.2
Acute Listed Species	Listed species may be potentially affected by acute exposures	EEC[2]/LC_{50} (Dietary) EEC/LD_{50} (Dose)	0.1
Chronic	Potential for effects to non-listed and listed animals from chronic exposures	EEC/NOAEC	1
Terrestrial and Semi-Aquatic Plants			
Non-Listed	Potential for effects to non-target, non-listed plants from exposures	EEC/ EC_{25}	1
Listed Plant	Potential for effects to non-target, listed plants from exposures	EEC/ NOAEC EEC/ EC_{05}	1

[1] LC_{50} or EC_{50}.
[2] Based on upper bound on feed items