

SCREENING-LEVEL HAZARD CHARACTERIZATION
AMPS® Category

SPONSORED CHEMICALS

2-Acrylamido-2-methylpropanesulfonic acid CASRN 15214-89-8

2-Acrylamido-2-methylpropanesulfonic acid, sodium salt CASRN 5165-97-9

SUPPORTING CHEMICAL

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt CASRN 58374-69-9

The High Production Volume (HPV) Challenge Program¹ was conceived as a voluntary initiative aimed at developing and making publicly available screening-level health and environmental effects information on chemicals manufactured in or imported into the United States in quantities greater than one million pounds per year. In the Challenge Program, producers and importers of HPV chemicals voluntarily sponsored chemicals; sponsorship entailed the identification and initial assessment of the adequacy of existing toxicity data/information, conducting new testing if adequate data did not exist, and making both new and existing data and information available to the public. Each complete data submission contains data on 18 internationally agreed to “SIDS” (Screening Information Data Set^{1,2}) endpoints that are screening-level indicators of potential hazards (toxicity) for humans or the environment.

The Environmental Protection Agency’s Office of Pollution Prevention and Toxics (OPPT) is evaluating the data submitted in the HPV Challenge Program on approximately 1400 sponsored chemicals by developing hazard characterizations (HCs). These HCs consist of an evaluation of the quality and completeness of the data set provided in the Challenge Program submissions. They are not intended to be definitive statements regarding the possibility of unreasonable risk of injury to health or the environment.

The evaluation is performed according to established EPA guidance^{2,3} and is based primarily on hazard data provided by sponsors; however, in preparing the hazard characterization, EPA considered its own comments and public comments on the original submission as well as the sponsor’s responses to comments and revisions made to the submission. In order to determine whether any new hazard information was developed since the time of the HPV submission, a search of the following databases was made from one year prior to the date of the HPV Challenge submission to the present: (ChemID to locate available data sources including Medline/PubMed, Toxline, HSDB, IRIS, NTP, ATSDR, IARC, EXTOXNET, EPA SRS, etc.), STN/CAS online databases (Registry file for locators, ChemAbs for toxicology data, RTECS, Merck, etc.) and Science Direct. OPPT’s focus on these specific sources is based on their being of high quality, highly relevant to hazard characterization, and publicly available.

¹ U.S. EPA. High Production Volume (HPV) Challenge Program; <http://www.epa.gov/chemrtk/index.htm>.

² U.S. EPA. HPV Challenge Program – Information Sources; <http://www.epa.gov/chemrtk/pubs/general/guidocs.htm>.

³ U.S. EPA. Risk Assessment Guidelines; <http://cfpub.epa.gov/ncea/raf/rafguid.cfm>.

OPPT does not develop HCs for those HPV chemicals which have already been assessed internationally through the HPV program of the Organization for Economic Cooperation and Development (OECD) and for which Screening Initial Data Set (SIDS) Initial Assessment Reports (SIAR) and SIDS Initial Assessment Profiles (SIAP) are available. These documents are presented in an international forum that involves review and endorsement by governmental authorities around the world. OPPT is an active participant in these meetings and accepts these documents as reliable screening-level hazard assessments.

These hazard characterizations are technical documents intended to inform subsequent decisions and actions by OPPT. Accordingly, the documents are not written with the goal of informing the general public. However, they do provide a vehicle for public access to a concise assessment of the raw technical data on HPV chemicals and provide information previously not readily available to the public.

<p>Chemical Abstract Service Registry Number (CASRN)</p>	<p><u>Sponsored Chemicals</u></p> <p>CASRN 15214-89-8 CASRN 5165-97-9</p> <p><u>Supporting Chemical</u></p> <p>CASRN 58374-69-9</p>
<p>Chemical Abstract Index Name</p>	<p><u>Sponsored Chemicals</u></p> <p>1-Propanesulfonic acid, 2-methyl-2-[(1-oxo-2-propen-1-yl) amino]-</p> <p>1-Propanesulfonic acid, 2-methyl-2-[(1-oxo-2-propen-1-yl) amino]-, sodium salt (1:1)</p> <p><u>Supporting Chemical</u></p> <p>1-Propanesulfonic acid, 2-methyl-2-[(1-oxo-2-propen-1-yl) amino]-, ammonium salt (1:1)</p>
<p>Structural Formula</p>	<p>See Section 1</p>
<p style="text-align: center;">Summary</p> <p>AMPS® category members, 2-acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8) and 2-acrylamido-2-methylpropanesulfonic acid, sodium salt (CASRN 5165-97-9) are solids with high water solubility and negligible vapor pressure. They are expected to have high mobility in soil. Volatilization of CASRN 15214-89-8 is considered low because this compound exists as an anion under environmental conditions. Volatilization of CASRN 5165-97-9 is considered low because it is a salt. The rates of hydrolysis are considered negligible. The rates of atmospheric photooxidation are considered moderate. Both compounds are expected to have high persistence (P3) and low bioaccumulation potential (B1).</p> <p>Acute oral toxicity in rats and acute dermal toxicity in rabbits is low for members of this category. An oral repeated-dose toxicity study with CASRN 58374-69-9 (supporting chemical) showed no effects in rats; the NOAEL for systemic toxicity was 1000 mg/kg/day (highest dose tested). In a combined reproductive/developmental toxicity screening test, CASRN 58374-69-9 showed no evidence of systemic, reproductive, maternal, or developmental toxicity following oral exposure in rats; the NOAEL was 1000 mg/kg-bw/day (highest dose tested). The sponsored chemical, CASRN 15214-89-8 did not induce gene mutations <i>in vitro</i> or chromosomal aberrations <i>in vivo</i>.</p> <p>The measured 96-hour LC₅₀ for the AMPS® category members for fish ranged from 170 – 1400 mg/L, the measured 48-hour EC₅₀ for aquatic invertebrates ranged from 340 – 1200 mg/L, and the measured 72-hour EC₅₀ for aquatic was > 2000 mg/L (endpoint not specified).</p>	

No data gaps were identified under the HPV Challenge Program.

The sponsor, The Lubrizol Corporation, submitted a Test Plan and Robust Summaries to EPA for the AMPS® Category, which was dated August 14, 2000. EPA posted the submission on the ChemRTK website on September 5, 2000 (<http://www.epa.gov/oppt/chemrtk/pubs/summaries/amps/c12958tc.htm>). EPA comments on the original submissions were posted to the website on January 3, 2001. The sponsor submitted updated/revised documents on February 14, 2001, which were posted to the ChemRTK website on November 13, 2002.

Category Justification

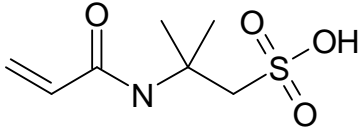
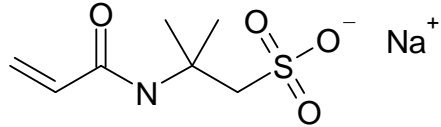
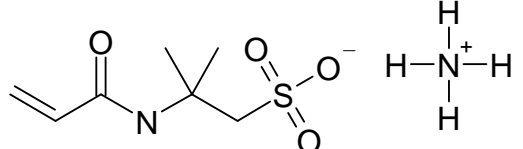
The sponsored category chemicals, 2-acrylamido-2-methylpropanesulfonic acid and its sodium salt (CASRN 15214-89-8 and 5165-97-9), are structurally similar differing only in the counter ion associated with the sulfonate anion. The ammonium salt of 2-acrylamido-2-methylpropanesulfonic acid (CASRN 58374-69-9) is included as a supporting chemical in this category based on its similar structure. EPA considered this grouping acceptable for the purposes of the HPV Challenge Program.

1 Chemical Identity

1.1 Identification and Purity

The following description is taken from the 2000 Test Plan and 2001 Robust Summaries:

Chemicals in the AMPS® category are prepared by reacting acrylonitrile, isobutylene, and oleum in the presence of water. The sodium AMPS® and ammonium AMPS® salts are subsequently formed by neutralization of AMPS® acid with sodium hydroxide or ammonium hydroxide, respectively. The AMPS® monomer (parent structure) is a propanesulfonic acid substituted at the C2 position with a methyl group and an acrylamido moiety. Reactive sites on the molecule include the unsaturated vinyl group and the terminal sulfonic acid. Test substance purity was noted in the Robust Summaries as being either a 50% or 58.4% aqueous solution, or purity of 99.85%. The chemical structures of the AMPS® category sponsored and supporting chemicals are depicted in Table 1.

Table 1. AMPS Category Chemical Structures		
Sponsored Chemicals	CASRN	Chemical Structure
2-Acrylamido-2-methylpropanesulfonic acid	15214-89-8	
2-Acrylamido-2-methylpropanesulfonic acid, sodium salt	5165-97-9	
Supporting Chemical		
2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt	58374-69-9	

1.2 Physical-Chemical Properties

AMPS® category sponsored members CASRN 15214-89-8 and 5165-97-9 are solids with high water solubility and negligible vapor pressure. The physical-chemical properties of AMPS® category sponsored members, and the supporting chemical, CASRN 58374-69-9, are summarized in Table 2.

	2-Acrylamido-2-methylpropanesulfonic acid	2-Acrylamido-2-methylpropanesulfonic acid, sodium salt	2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (Supporting chemical)
CASRN	15214-89-8	5165-97-9	58374-69-9
Molecular Weight	207.25	229.23	224.28
Physical State	Solid	Solid	Solid
Melting Point	185°C decomposes (measured) ² 192°C (measured) ³ 184-186°C (measured) ⁴	260.35°C (estimated)	191°C (measured)
Boiling Point	Not applicable ⁵	Not applicable ⁵	Decomposes above 228°C; Not applicable ⁵
Vapor Pressure	6.75×10 ⁻⁹ mm Hg at 25°C (estimated)	1.72×10 ⁻¹³ mm Hg at 25°C (estimated)	5.55×10 ⁻¹¹ mm Hg at 25°C (extrapolated)
Water Solubility	1×10 ⁶ mg/L at 25°C (estimated) ⁶	1×10 ⁶ mg/L at 25°C (estimated)	761,000 mg/L at 20°C (measured)
Dissociation Constant (pK _a)	0.36 (estimated) ⁷	Not applicable	Not applicable
Henry's Law Constant	5.18×10 ⁻¹⁵ atm·m ³ /mole (estimated)	5.2×10 ⁻¹⁵ atm·m ³ /mole (estimated)	2.15×10 ⁻¹⁷ atm·m ³ /mole (estimated)
Log K _{ow}	-2.19 (estimated)	-4.34 (estimated)	-3.41 at 22°C (measured)

¹The Lubrizol Corporation. February 14, 2001. Revised Robust Summary for AMPS® Category.

<http://www.epa.gov/chemrtk/pubs/summaries/amps/c12958tc.htm>.

²Viniti Organics Limited Product Information sheet at <http://www.indianindustry.com/cgi-local/profile.cgi?ss=15214-89-8&supp=in&cid=3KoGm5%2Fc&tradeinfo=yes&modid=IIND&country=India&noofemp=&from=search&city=Mumbai&comp=Vinati%20Organics%20Limited&compid=3KoGm5%2Fc&cidx=3KoGm5%2Fc&companyx=Vinati%20Organics%20Limited,%20Mumbai>

³Ricks-Laskoski, Holly L.; Journal of the American Chemical Society 2006 V128(38) P12402-12403

⁴Miller, Leonard Edward; US 3506707 1970

⁵The submitter indicates in its revised test plan that "the AMPS® monomer decomposes at, or slightly above, its melting point temperature. As a result, boiling point determinations are not applicable."

⁶U.S. EPA. 2008. Estimation Programs Interface Suite™ for Microsoft® Windows, v 3.20. United States Environmental Protection Agency, Washington, DC, USA.

<http://www.epa.gov/opptintr/exposure/pubs/episuite.htm>.

⁷SPARC. 2008. Online pK_a and Property Calculator v. 4.2.1405-s4.2.1408. Accessed November 7, 2008. <http://ibmlc2.chem.uga.edu/sparc/index.cfm?CFID=32727&CFTOKEN=65477992>

2 General Information on Exposure

2.1 Production Volume and Use Pattern

Each of the two AMPS® category chemicals (CASRN 15214-89-8 and 5165-97-9) had an aggregated production and/or import volume in the United States between 10 million and 50 millions pounds in calendar year 2005.

Non-confidential information in the IUR indicated that the industrial processing and uses of these chemicals include processing as a reactant in resin and synthetic rubber manufacturing. Non-confidential information in the IUR indicated that the commercial and consumer products containing the chemical include “other”. The HPV submission for the AMPS[®] category chemicals contains description of some uses and applications of AMPS[®] chemicals and their polymers. The eHPV submission for the AMPS[®] category chemicals contains additional details on the uses and states that these chemicals are used predominantly in the production of water-soluble polymers and that the only known application of non-polymerized AMPS[®] categories is the use of the sodium salt (CASRN 5165-97-9) in a derivatized form as a surfactant in fire-fighting foams.

2.2 Environmental Exposure and Fate

No quantitative information is available on releases of the chemicals in this category to the environment.

The environmental fate properties are provided in Table 3. AMPS[®] category members, CASRNs 15214-89-8 and 5165-97-9, are expected to have high mobility in soil. In separate Modified SCAS tests, CASRNs 15214-89-8 and 5165-97-9 were less than 10% degraded after 44 days. In a Modified Sturm test, supporting chemical CASRN 58374-69-9 was not shown to be readily biodegradable with only 3.3% degradation after 28 days. The rate of volatilization of CASRN 15214-89-8 from water and moist soil is considered low because it will dissociate to its anionic form under environmental conditions and anions do not volatilize. The rate of volatilization from water and moist soil of CASRN 5165-97-9 is considered low because it is a salt. The rates of hydrolysis are considered negligible. CASRNs 15214-89-8 and 5165-97-9 are expected to have high persistence (P3) and low bioaccumulation potential (B1).

Property	Value		
	2-Acrylamido-2-methylpropanesulfonic acid	2-Acrylamido-2-methylpropanesulfonic acid, sodium salt	2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (supporting chemical)
CASRN	15214-89-8	5165-97-9	58374-69-9
Photodegradation Half-life	0.655 days (estimated)	0.661 days ²	0.661 days ²
Hydrolysis Half-life	6% in 7 days at 50°C (measured); 5 days at 80°C (measured)	Negligible at 50°C (measured); 7 days at 80°C (measured)	–
Biodegradation	<10% in 44 days (measured)	<10% in 44 days (measured)	3.3% in 28 days (not readily biodegradable) (measured)
Bioconcentration	3.162 (estimated) ²	3.162 (estimated) ²	3.162 (estimated) ²
Log K _{oc}	1.0 (estimated) ²	1.0 (estimated) ²	2.097 (estimated) ²
Fugacity (Level III Model)	Air = 5.13×10 ⁻⁷ % Water = 46.5% Soil = 53.5% Sediment = 0.0892%	Air = 0.00179% Water = 46.5% Soil = 53.4% Sediment = 0.0892%	Air = 1.12×10 ⁻⁷ % Water = 46.5% Soil = 53.5% Sediment = 0.0892%
Persistence ³	P3(high)	P3(high)	P3(high)
Bioaccumulation ³	B1 (low)	B1 (low)	B1 (low)

¹The Lubrizol Corporation. February 14, 2001. Revised Robust Summary for AMPS® Category.

<http://www.epa.gov/chemrtk/pubs/summaries/amps/c12958tc.htm>.

²U.S. EPA. 2008. Estimation Programs Interface Suite™ for Microsoft® Windows, v 3.20. United States Environmental Protection Agency, Washington, DC, USA.

<http://www.epa.gov/opptintr/exposure/pubs/episuite.htm>.

³Federal Register. 1999. Category for Persistent, Bioaccumulative, and Toxic New Chemical Substances. *Federal Register* 64, Number 213 (November 4, 1999) pp. 60194–60204.

3 Human Health Hazard

A summary of health effects data submitted for SIDS endpoints is provided in Table 4. The table also indicates where data for tested category members are read-across (RA) to untested members of the category.

Acute Oral Toxicity

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

Sherman-Wistar rats (5 males/dose) were administered 2-acrylamido-2-methylpropanesulfonic acid via gavage at 500, 1000, 2000, 4000 and 8000 mg/kg-bw and observed for 14 days. Mortality occurred at 1000 mg/kg-bw and above (100% at 8000 mg/kg-bw).

LD₅₀ = 1830 mg/kg-bw

2-Acrylamido-2-methylpropanesulfonic acid, sodium salt (CASRN 5165-97-9)

Sprague-Dawley rats (5 males/dose) were administered 2-acrylamido-2-methylpropanesulfonic acid, sodium salt via gavage at 1000, 2000, 4000, 8000 and 16000 mg/kg-bw and observed for

14 days. No mortality was seen.

LD₅₀ > 16000 mg/kg-bw

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

Sprague-Dawley rats (5/sex) were administered 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt via gavage at 5000 mg/kg-bw. No mortality was seen.

LD₅₀ > 5000 mg/kg-bw

Acute Dermal Toxicity

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

New Zealand albino rabbits (5/sex) were administered 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt dermally at 2000 mg/kg-bw under semi-occluded conditions for 24 hours and were observed for 14 days. Slight erythema was seen in all animals. Edema and desquamation was observed in three rabbits. All dermal irritation completely subsided by day 11 or earlier. There were no unscheduled deaths during the study.

LD₅₀ > 2000 mg/kg-bw

Repeated-Dose Toxicity

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

Sprague-Dawley rats (10/sex/dose) were administered 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt via gavage at 0, 50, 150, 400, or 1000 mg/kg-bw/day 7 days/week for 28 days. Animals were observed for 2 weeks following exposure. No mortalities were reported. Food consumption, mean body weights and body weight gains were slightly lower in males at 1000 mg/kg-bw/day during week one only, but this difference was not statistically significant. There were no treatment-related effects reported for hematology values, clinical chemistry indices, urinalysis parameters, organ weights, or for any macroscopic and microscopic examinations.

NOAEL = 1000 mg/kg-bw/day (based on no effects at the highest dose tested)

Reproductive /Developmental Toxicity

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9) (Supporting chemical)

In a combined reproductive/developmental toxicity screening test, Sprague-Dawley rats (12/sex/dose) were administered 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt via gavage at 0, 100, 500, or 1000 mg/kg-bw/day. The F0 males were dosed for approximately seven weeks, including the two weeks prior to mating, during mating and through post-mating periods. The F0 females were dosed throughout the study, including the two weeks prior to mating, during mating, during gestation, and following parturition. There were no effects on F0 survival or clinical signs of toxicity. There were no differences in copulation or fertility indices among the groups. No statistically significant differences were observed in group mean precoital

intervals or gestation lengths. Gross necropsy findings were generally unremarkable. When anomalies were observed, they were of low incidence, randomly distributed among the groups, and were not considered to be treatment-related. There were no statistically significant or toxicologically meaningful differences in absolute or relative testes and epididymides weights between the control and treatment groups. Histopathological examination of the testes, ovaries and epididymides from control and high-dose rats did not reveal any test substance-related microscopic changes. There were no statistically significant or toxicologically meaningful differences between control and treatment groups with respect to corpora lutea counts, implantation scar counts, mean number of live pups, or pre- or post-implantation loss. There were no toxicologically meaningful differences with respect to F1 pup viability, number of litter in each group with live offspring, mean live litter size or pup sex ratios. F1 pup observations during lactation were generally unremarkable. There were no statistically significant or toxicologically meaningful differences in F1 pup body weights during lactation. The incidence of dead pups on lactation day 0 was slightly higher (statistically significant) in the 500 mg/kg-bw/day dose group, but was not observed in the 1000 mg/kg-bw/day dose group; therefore the increased pup deaths were not considered to be treatment-related. Among the F1 pups found dead or euthanized as scheduled on lactation day 4, gross necropsy did not reveal any findings which indicate relationship to treatment with the test material. There were no indications of treatment-related developmental effects.

NOAEL (systemic toxicity F0) = 1000 mg/kg-bw/day (based on no effects at the highest dose tested)

NOAEL (systemic toxicity F1) = 1000 mg/kg-bw/day (based on no effects at the highest dose tested)

NOAEL (reproductive toxicity) = 1000 mg/kg-bw/day (based on no effects at the highest dose tested)

NOAEL (developmental toxicity) = 1000 mg/kg-bw/day (based on no effects at the highest dose tested)

Genetic Toxicity – Gene Mutation

In vitro

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

(1) *Salmonella typhimurium* strains TA98, TA100, TA135, TA1537 and TA1538 were exposed to 2-acrylamido-2-methylpropanesulfonic acid at 0, 30, 100, 300, 1000 and 3000 µg/plate in the presence and absence of metabolic activation. Cytotoxicity was seen at 3000 µg/plate. No mutagenic response was seen for strains TA98, TA100, TA1535 or TA1537 either in the presence or absence of metabolic activation (results for TA1538 are not included in the robust summary). Positive controls responded appropriately.

2-Acrylamido-2-methylpropanesulfonic acid was not mutagenic in this assay.

(2) *Salmonella typhimurium* strains TA98, TA100, TA135, TA1537, TA1538 and *E. coli* WP2 were exposed to 2-acrylamido-2-methylpropanesulfonic acid at 0, 15, 50, 150, 500, 1500 and 5000 µg/plate in the presence and absence of metabolic activation. The test substance was slightly toxic to all *Salmonella* strains at 5000 µg/plate with and without metabolic activation. For all bacterial strains tested, there was no significant increase in the number of revertants at any dose of test material compared to the corresponding negative solvent control. The entire

assay was repeated and the results seen in the first experiment were confirmed. The positive and controls responded appropriately.

2-Acrylamido-2-methylpropanesulfonic acid was not mutagenic in this assay.

(3) Chinese hamster ovary (CHO) cells were exposed to 2-acrylamido-2-methylpropanesulfonic acid at concentrations ranging from 130 to 4000 µg/mL without metabolic activation. Cytotoxicity was seen at 2000 µg/mL. The test substance did not increase the frequency of mutant cells when compared to the negative vehicle control. There was no statistically significant difference between the mutation frequencies at any dose of test material and the values obtained from the vehicle control (i.e., water). The positive and negative controls responded appropriately.

2-Acrylamido-2-methylpropanesulfonic acid was not mutagenic in this assay.

(4) Chinese hamster ovary cells were exposed to acrylamido-2-methylpropanesulfonic acid at concentrations ranging from 10 to 5000 µg/mL, with and without metabolic activation. The test substance was non-mutagenic in CHO cells under the conditions of the assay. The responses of the positive and negative controls were appropriate.

2-Acrylamido-2-methylpropanesulfonic acid was not mutagenic in this assay.

Genetic Toxicity – Chromosomal Aberrations

In vitro

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

Chinese hamster ovary cells were exposed to 2-acrylamido-2-methylpropanesulfonic acid at concentrations ranging from 0 to approximately 6000 µg/mL with and without metabolic activation. The test substance was clastogenic in the presence of metabolic activation. However, this finding is confounded by the absence of a dose-response effect, lack of a time-response effect, lack of reproducibility between repeat experiments and the presence of extensive cytotoxic damage concurrent with observed chromosomal damage for one scored time point. Therefore, no definitive conclusions could be drawn from this study.

2-Acrylamido-2-methylpropanesulfonic acid was inconclusive for chromosomal aberrations in this assay.

In vivo

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

Sprague-Dawley rats (5/sex/dose) were exposed to 2-acrylamido-2-methylpropanesulfonic acid at concentrations of 150, 500 and 1500 mg/kg-bw. Bone marrow cells were evaluated at 6, 18 and 24 hours. The results of the test indicate that the test material did not induce clastogenicity in rat bone marrow cells under the conditions of the test.

2-Acrylamido-2-methylpropanesulfonic acid did not induce chromosomal aberrations in this assay.

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9)
(Supporting Chemical)

CrI:CD-1 (ICR)BR mice (5/sex/dose) were administered 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt through an intraperitoneal injection at concentrations 175, 875 and 1750 mg/kg-bw. Bone marrow cells were evaluated at 24, 48 and 72 hours for micronuclei. The test material did not induce micronuclei under the conditions of this assay.

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt did not induce chromosomal aberrations in this assay.

Conclusion: Acute oral toxicity in rats and acute dermal toxicity in rabbits is low for members of this category. An oral repeated-dose toxicity study with CASRN 58374-69-9 (supporting chemical) showed no effects in rats; the NOAEL for systemic toxicity was 1000 mg/kg/day (highest dose tested). In a combined reproductive/developmental toxicity screening test, CASRN 58374-69-9 showed no evidence of systemic, reproductive, maternal, or developmental toxicity following oral exposure in rats; the NOAEL was 1000 mg/kg-bw/day (highest dose tested). The sponsored chemical, CASRN 15214-89-8 did not induce gene mutations *in vitro* or chromosomal aberrations *in vivo*.

Table 4. Summary Table of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program: Summary of Human Health Data			
Endpoints	2-Acrylamido-2-methylpropanesulfonic acid (15214-89-8)	2-Acrylamido-2-methylpropanesulfonic acid, sodium salt (5165-97-9)	2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (58374-69-9) (Supporting chemical)
Acute Oral Toxicity LD ₅₀ (mg/kg-bw)	1830	> 16000	> 5000
Acute Dermal Toxicity LD ₅₀ (mg/kg-bw)	No data > 2000 (RA)	No data > 2000 (RA)	> 2000
Repeated-Dose Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day)	No data NOAEL = 1000 (RA)	No data NOAEL = 1000 (RA)	NOAEL = 1000 (hdt)
Reproductive Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day) Systemic Toxicity	No data NOAEL = 1000 (RA)	No data NOAEL = 1000 (RA)	NOAEL = 1000 (hdt)
Reproductive Toxicity	No data NOAEL = 1000 (RA)	No data NOAEL = 1000 (RA)	NOAEL = 1000 (hdt)
Developmental Toxicity NOAEL/LOAEL Oral (mg/kg-bw/day) Maternal Toxicity	No data NOAEL = 1000 (RA) No data NOAEL = 1000 (RA)	No data NOAEL = 1000 (RA) No data NOAEL = 1000 (RA)	NOAEL = 1000
Developmental Toxicity	No data NOAEL = 1000 (RA)	No data NOAEL = 1000 (RA)	NOAEL = 1000
Genetic Toxicity – Gene Mutation <i>In vitro</i>	Negative	No data Negative (RA)	—
Genetic Toxicity – Chromosomal Aberrations <i>In vitro</i>	Inconclusive	No data Inconclusive (RA)	—
Genetic Toxicity – Chromosomal aberrations <i>In vivo</i>	Negative	No data Negative (RA)	Negative

Measured data in bold text; — indicates that endpoint was not addressed for this chemical; (RA) = Read Across; hdt = highest dose tested

4 Hazards to the Environment

A summary of aquatic toxicity data submitted for SIDS endpoints is provided in Table 5. The table also indicates where data for tested category members are read-across (RA) to untested members of the category.

Acute Toxicity to Fish

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

Bluegill (*Lepomis macrochirus*; 10/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid at nominal concentrations of 130, 220, 360, 600 and 1000 mg/L under static conditions for 96 hours. Sub-lethal effects including loss of equilibrium and rapid respiration were seen at 0 hours at 600 and 1000 mg/L.

96-h LC₅₀ = 170 mg/L

2-Acrylamido-2-methylpropanesulfonic acid, sodium salt (CASRN 5165-97-9)

Bluegill (*Lepomis macrochirus*; 10/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid, sodium salt at nominal concentrations of 130, 220, 360, 600 and 1000 mg/L under static conditions for 96 hours. No mortality or sub-lethal effects were seen at the highest test concentration.

96-h LC₅₀ > 1000 mg/L

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

Fathead minnow (*Pimephales promelas*; 10/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt at concentrations of 200, 360, 640, 1120 and 2000 mg/L. Sub-lethal effects including loss of equilibrium were seen at 96 hours at 1120 mg/L test concentration and after 3 hours at 2000 mg/L test concentration.

96-h LC₅₀ = 1400 mg/L

Acute Toxicity to Aquatic Invertebrates

2-Acrylamido-2-methylpropanesulfonic acid (CASRN 15214-89-8)

Cladoceran (*Daphnia magna*; 15/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid at nominal concentrations of 0, 78, 130, 220, 360, 600 and 1000 mg/L under static conditions for 48 hours. No other information on mortality or sub-lethal effects was reported.

48-h EC₅₀ = 340 mg/L

2-Acrylamido-2-methylpropanesulfonic acid, sodium salt (CASRN 5165-97-9)

Cladoceran (*Daphnia magna*; 15/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid, sodium salt at concentrations of 0, 130, 220, 360, 600 and 1000 mg/L under static conditions for 48 hours. No mortality or sub-lethal effects were seen at the highest test concentration of 1000 mg/L.

48-h EC₅₀ > 1000 mg/L

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

Cladoceran (*Daphnia magna*; 10/concentration) were exposed to 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt at measured concentrations of 0, 36, 64, 112, 200, 360, 640, 1120, 2000 and 3600 mg/L under static conditions for 48 hours. No mortality or sub-lethal effects were observed.

48-h EC₅₀ = 1200 mg/L

Toxicity to Aquatic Plants

2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (CASRN 58374-69-9, Supporting Chemical)

Freshwater algae (*Pseudokirchneriella subcapitata*) were exposed to 2-acrylamido-2-methylpropanesulfonic acid, ammonium salt at a measured concentration of 2000 mg/L under static conditions for 96 hours. No effects on algae growth or biomass were seen at 2000 mg/L.

EC₅₀ ≥ 2000 mg/L

Conclusion: The measured 96-hour LC₅₀ for the AMPS[®] category members for fish ranged from 170 – 1400 mg/L, the measured 48-hour EC₅₀ for aquatic invertebrates ranged from 340 – 1200 mg/L, and the measured 72-hour EC₅₀ for aquatic was > 2000 mg/L (endpoint not specified).

Table 5. Summary Table of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program: Summary of Environmental Effects – Aquatic Toxicity Data			
Endpoints	2-Acrylamido-2-methylpropanesulfonic acid (15214-89-8)	2-Acrylamido-2-methylpropanesulfonic acid, sodium salt (5165-97-9)	2-Acrylamido-2-methylpropanesulfonic acid, ammonium salt (58374-69-9) (Supporting chemical)
Fish 96-h LC₅₀ (mg/L)	170 (m)	> 1000 (m)	1400 (m)
Invertebrate 48-h EC₅₀ (mg/L)	340 (m)	> 1000(m)	1200 (m)
Alga 96-h EC₅₀ (mg/L)	No data > 2000 (RA)	No data > 2000 (RA)	> 2000 (m)

(m) = measured data (i.e., derived from testing); (RA) = Read Across