

WATERBURY GENERATION, LLC
Petition for a Declaratory
Ruling No Certificate of
Environmental Compatibility
and Public Need is Required
for Construction of an Elec-
tric Generating Facility and
Associated Line Tap located
@ 725 Bank Street, Waterbury,
Connecticut.

PETITION NO. 831

RECEIVED
JAN 28 2008

CONNECTICUT
SITING COUNCIL
January 28, 2008

INTERVENORS' REQUEST FOR
MARKING OF EXHIBITS FOR
IDENTIFICATION; AND USE
@ PROCEEDINGS, TO BE
HELD, FEBRUARY 1, 2008.

In accordance with the procedures of the Connecticut Siting Council, the Waterbury "Neighborhood Groups" previously granted Intervenor status in these proceedings, as appears of record, do by and through their counsel of record hereby request that the following items be accepted and marked as EXHIBITS for IDENTIFICATION; to wit:

- (a) Copy of EPA 745-R-00-005, entitled: "EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW SECTION 313, Guidance for Reporting Aqueous Ammonia", seventeen (17) pages in length;
- (b) Copy of Journal of Chemical Education, Vol. 80 No. 1, Jan. 2003: CLIP, Chemical Laboratory Information Profile, Ammonia, aqueous, one (1) page in length;
- (c) Copy of FireRescue 1 News, date of article Oct. 5, 2007, caption: "Calif. fire department simulates aqueous ammonia spill at power plant", one (1) page in length.

The Intervenors request the marking of these tiems as EXHIBITS FOR IDENTIFICATION because their legal counsel of record intends to employ such exhibits in the course of his "cross-examination" of the applicant with respect to its answers provided to: "Pre-Hearing Interrogatories-Set Two, dated January 16, 2008, questions #26, 27, as well as, 17 and 36.

Wherefore, an original and twenty (20) copies of these items are now filed with the Connecticut Siting Council and copies are being mailed to all legal counsel of parties and intervenors, as well as, those intervenors unrepresented by legal counsel.

Dated at Waterbury, Connecticut this 28th day of January, 2008.

The Waterbury Neighborhood
Groups, Intervenors
By: *Dennis M. Buckley*
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Juris No. 007045

CERTIFICATION:

This is to certify that a copy of the foregoing Request and its attached EXHIBITS MARKED FOR IDENTIFICATION was mailed, first class delivery, postage prepaid, to all parties and intervenors in this proceeding.

Dated at Waterbury, Connecticut this 28th day of January, 2008.

Dennis M. Buckley
Dennis M. Buckley
Commissioner of the Sup. CT.
Juris No. 007045

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January 29, 2008

Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

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Re: Petition #831 - WATGEN Declaratory Proceeding

Ladies & Gentlemen:

I am enclosing for the Council an Original and 20 copies of EPA 745-R-00-005, which I yesterday requested be marked as an EXHIBIT for IDENTIFICATION.

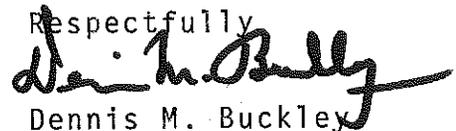
Due to a copying error at Staples only the odd-numbered pages were earlier provided.

These copies are complete.

Correct copies have also been delivered to counsel of record.

Please accept my apology for not having caught this error prior to supplying the previous copies.

Respectfully


Dennis M. Buckley

DMB/dmb.
enc.

ORIGINAL

United States
Environmental Protection
Agency

Office of Environmental
Information
Washington, DC 20460

Revised December 2000
EPA 745-R-00-005



EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW SECTION 313

Guidance for Reporting Aqueous Ammonia

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Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) requires certain facilities manufacturing, processing, or otherwise using listed toxic chemicals to report their environmental releases of such chemicals annually. Beginning with the 1991 reporting year, such facilities also must report pollution prevention and recycling data for such chemicals, pursuant to section 6607 of the Pollution Prevention Act, 42 U.S.C. 13106. When enacted, EPCRA section 313 established an initial list of toxic chemicals that was comprised of more than 300 chemicals and 20 chemical categories. EPCRA section 313(d) authorizes EPA to add chemicals to or delete chemicals from the list, and sets forth criteria for these actions.

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FOREWORD

This document is an updated version of the previous document, EPA 745-R-95-012. This version has the following updates:

- Under Section 1.4. *de minimis* concentrations on page 4, the second sentence is modified to clarify *de minimis* concentration for aqueous ammonia; and
- References to *List of Toxic Chemicals within the Water Dissociable Nitrate Compounds Category and Guidance for Reporting* (EPA #745-R-00-006, Revised December, 2000) are added in the last sentence on page 8, in the example 6 on page 9, and in the example 7 on page 10.

Section 1. Introduction

On June 30, 1995 EPA finalized four actions in response to a petition received in 1989 to delete ammonium sulfate (solution) from the list of toxic chemicals subject to reporting under section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), 42 U.S.C. 11001. The four actions taken are summarized as follows: (1) deleted ammonium sulfate (solution) from the EPCRA section 313 list of toxic chemicals, (2) required that threshold and release determinations for aqueous ammonia be based on 10 percent of the total aqueous ammonia present in aqueous solutions of ammonia, (3) modified the ammonia listing by adding the following qualifier: ammonia (includes anhydrous ammonia and aqueous ammonia from water dissociable ammonium salts and other sources; 10 percent of total aqueous ammonia is reportable under this listing), and (4) deleted ammonium nitrate (solution) as a separately listed chemical on the EPCRA section 313 list of toxic chemicals. All actions are effective for the 1994 reporting year for reports due July 1, 1995, with the exception of the deletion of ammonium nitrate (solution) as a separately listed chemical, which is effective for the 1995 reporting year for reports due July 1, 1996. At the time that these actions were finalized, EPA indicated that the Agency would develop, as appropriate, interpretations and guidance that the Agency determines are necessary to facilitate accurate reporting for aqueous ammonia. This document constitutes such guidance for reporting under the ammonia listing.

Section 1.1 Who Must Report

A facility is subject to the provisions of EPCRA section 313, if it meets all three of the following criteria:

- It is included in Standard Industrial Classification (SIC) Code 10 (except SIC Codes 1011, 1081, and 1094); SIC Code 12 (except SIC Code 1241); SIC Codes 20 through 39; SIC Code 4911 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce); SIC Code 4931 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce); SIC Code 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce); SIC Code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C, 42 U.S.C. Section 6921 *et seq.*); SIC Code 5169; SIC Code 5171; and SIC Code 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); and
- It has 10 or more full-time employees (or the equivalent 20,000 hours per year); and
- It manufactures, imports, processes, or otherwise uses any of the toxic chemicals listed on the EPCRA section 313 list in amounts greater than the "threshold" quantities specified in Section 1.2.

Section 1.2 Thresholds

Thresholds are specified amounts of toxic chemicals used during the calendar year that trigger reporting requirements.

If a facility *manufactures or imports* any of the listed toxic chemicals, the threshold quantity will be:

- ! 25,000 pounds per toxic chemical or category during the calendar year.

If a facility *processes* any of the listed toxic chemicals, the threshold quantity will be:

- 25,000 pounds per toxic chemical or category during the calendar year.

If a facility *otherwise uses* any of the listed toxic chemicals (without incorporating it into any product or producing it at the facility), the threshold quantity is:

- 10,000 pounds per toxic chemical or category during the calendar year.

Section 1.3 Chemical Sources of Aqueous Ammonia

If a facility manufactures, processes, or otherwise uses anhydrous ammonia or aqueous ammonia, they must report under the ammonia listing. EPA is providing a table of Chemical Abstract Service (CAS) numbers and chemical names to aid the regulated community in determining whether they need to report under the ammonia listing for aqueous ammonia. This table includes a list of water dissociable ammonium salts which, when placed in water, are a source of aqueous ammonia. The table contains only commonly used ammonium salts and therefore is not exhaustive. If a facility manufactures, processes, or otherwise uses aqueous ammonia, regardless of its source, it must report under the ammonia listing, even if the source of the aqueous ammonia is not listed in the table provided in this document.

Section 1.4 *De Minimis* Concentrations

The ammonia listing is subject to the one percent *de minimis* concentration. Thus, mixtures containing total aqueous ammonia at concentrations equal to or in excess of *one percent* should be factored into threshold and release determinations.

Section 2. Guidance for Reporting Aqueous Ammonia

Note: for the purposes of reporting under the ammonia listing for aqueous ammonia, water dissociable ammonium salts means that the ammonium ion dissociates from its counterion when in solution.

Section 2.1 Determining Threshold and Release Quantities for Ammonia

If a facility manufactures, processes, or otherwise uses *anhydrous ammonia*, the quantity applied towards threshold determinations for the ammonia listing is the total quantity of the anhydrous ammonia manufactured, processed, or otherwise used. The quantity reported when calculating the amount of ammonia that is released, transferred, or otherwise managed is the total quantity of *anhydrous ammonia* released or transferred.

If the facility manufactures, processes, or otherwise uses *anhydrous ammonia* in quantities that exceed the appropriate threshold and subsequently dissolves some or all of the *anhydrous ammonia* in water, then the following applies: 1) threshold determinations are based on 100 percent of the *anhydrous ammonia*; 2) release, transfer, and other waste management quantities for the *aqueous ammonia* are calculated as 10 percent of total ammonia; and 3) release, transfer, and other waste management quantities for the *anhydrous ammonia* are calculated as 100 percent of the *anhydrous ammonia*.

If a facility manufactures, processes, or otherwise uses *aqueous ammonia*, the quantity applied toward threshold determinations for the ammonia listing is 10 percent of the total quantity of the *aqueous ammonia* manufactured, processed, or otherwise used. The quantity reported when calculating the amount of ammonia that is released, transferred, or otherwise managed is 10 percent of the total quantity of *aqueous ammonia* released or transferred.

If a facility dissolves a water dissociable ammonium salt in water that facility has manufactured *aqueous ammonia* and 10 percent of the total *aqueous ammonia* manufactured from these salts is to be included in manufacturing threshold determinations under the ammonia listing.

If *aqueous ammonia* from water dissociable ammonium salts is processed or otherwise used, then 10 percent of the total *aqueous ammonia* is to be included in all processing and otherwise use threshold determinations under the ammonia listing.

Example 1: In a calendar year, a facility places 25,000 lbs of anhydrous ammonia in water for processing and processes 25,000 lbs of aqueous ammonia from an ammonium salt. The facility must include all of the 25,000 lbs of anhydrous ammonia in the determination of the processing threshold, but only 10 percent (or 2,500 lbs) of the aqueous ammonia from the ammonium salt in the processing threshold determination.

Total aqueous ammonia is the sum of the two forms of ammonia (un-ionized, NH_3 , and ionized, NH_4^+) present in aqueous solutions. A precise calculation of the weight of total aqueous ammonia would require determining the ratio of the two forms of ammonia present using the pH and temperature of the solution. The weight of total aqueous ammonia can be more easily calculated by assuming that aqueous ammonia is comprised entirely of the NH_4^+ form or the NH_3 form. For the purpose of determining threshold and release quantities under EPCRA section 313, EPA recommends that total aqueous ammonia be calculated in terms of NH_3 equivalents (i.e., for determining weights, assume total ammonia is comprised entirely of the NH_3 form). This method is simpler than using pH and temperature data to determine the ratio of the two forms present and is consistent with the presentation of total ammonia toxicity in a separate EPA document, *Ambient Water Quality Criteria for Ammonia* (EPA document #440/5-85-001, January 1985).

Section 2.2 Chemical Sources of Aqueous Ammonia

Aqueous ammonia may be generated in solution from a variety of sources that include the release of anhydrous ammonia to water and the dissociation of ammonium salts in water. Water dissociable ammonium salts are not reportable in their entirety under the ammonia listing; these salts are reportable to the extent that they dissociate in water, and only 10 percent of the total aqueous ammonia that results when these salts dissociate is reportable. If these salts are not placed in water, they are not reportable.

If ammonium salts are purchased neat or as solids by a facility, then placed in water by that facility, the facility is *manufacturing* aqueous ammonia.

Section 2.2.1 Reporting Aqueous Ammonia Generated from Anhydrous Ammonia in Water

If the source of aqueous ammonia is anhydrous ammonia in water, total aqueous ammonia (calculated in terms of NH_3 equivalents) is equal to the quantity of anhydrous ammonia manufactured, processed, or otherwise used. A hypothetical scenario demonstrating the calculations involved in reporting aqueous ammonia generated from anhydrous ammonia in water is given in Example 2.

Example 2: In a calendar year, a facility uses 30,000 pounds of anhydrous ammonia to neutralize acids in a waste water stream. The neutralized waste stream (containing aqueous ammonia from dissociated ammonium salts) is then transferred to a POTW. The quantity to be applied toward threshold determinations is the total quantity of anhydrous ammonia used in the waste stream neutralization, or 30,000 pounds. The quantity of ammonia reported as transferred is 10 percent of the total quantity of aqueous ammonia transferred, or 3,000 pounds.

Section 2.2.2 Reporting Aqueous Ammonia Generated from the Dissociation of Ammonium Salts (Other Than Ammonium Nitrate)

If the source of aqueous ammonia is the dissociation of ammonium salts in water, total aqueous ammonia (calculated in terms of NH_3 equivalents) is calculated from the weight percent (wt%) of the NH_3 equivalents of the ammonium salt. The NH_3 equivalent wt% of an ammonium salt is calculated using the following equation:

$$\text{NH}_3 \text{ equivalent wt\%} = (\text{NH}_3 \text{ equivalent weight}) / (\text{MW ammonium salt}) \times 100.$$

If the source of aqueous ammonia is a monovalent compound (such as ammonium chloride, NH_4Cl , ammonium nitrate, NH_4NO_3 , or ammonium bicarbonate, NH_4HCO_3), the NH_3 equivalent weight is equal to the MW of NH_3 (17.03 kg/kmol). If divalent compounds are involved (such as ammonium carbonate, $(\text{NH}_4)_2\text{CO}_3$), then the NH_3 equivalent weight is equal to the MW of NH_3 multiplied by two. Similarly, if trivalent compounds are involved, then the NH_3 equivalent weight is equal to the MW of NH_3 multiplied by three.

Example 3:

The NH_3 equivalent wt% of ammonium chloride is calculated as follows:

$$\text{NH}_3 \text{ equivalent wt\%} = (\text{NH}_3 \text{ equivalent weight}) / (\text{MW ammonium chloride}) \times 100$$

$$\text{NH}_3 \text{ equivalent wt\%} = (17.03) / (53.49) \times 100$$

$$\text{NH}_3 \text{ equivalent wt\%} = 31.84\%$$

The NH_3 equivalent wt% of ammonium carbonate is calculated as follows:

$$\text{NH}_3 \text{ equivalent wt\%} = 2 \times (\text{NH}_3 \text{ equivalent weight}) / (\text{MW ammonium carbonate}) \times 100$$

$$\text{NH}_3 \text{ equivalent wt\%} = 2 \times (17.03) / (96.09) \times 100$$

$$\text{NH}_3 \text{ equivalent wt\%} = 35.45\%$$

To aid the regulated community in reporting under the ammonia listing for aqueous ammonia, the table of chemical sources of aqueous ammonium provided in Section 3 of this document includes, in addition to CAS number, chemical name, and molecular weight, the NH_3 equivalent wt% of the commonly used, water dissociable ammonium salts listed in Table 1.

Example 4: In a calendar year, a facility uses 100,000 pounds of ammonium chloride, NH_4Cl , in aqueous solution which is released to waste water streams, then transferred to a POTW. The NH_3 equivalent wt% of ammonium chloride is 31.84% (taken from Table 1 in section 3 below or calculated as in Example 3 above). The total quantity of aqueous ammonia present in solution is 31.84% of the 100,000 pounds of ammonia chloride used, or 31,840 pounds. The quantity applied towards threshold determinations for the ammonia listing is 10 percent of the total quantity of aqueous ammonia present in solution, or 3,184 pounds. The quantity of ammonia reported as released or transferred is 10 percent of the total quantity of aqueous ammonia released or transferred, or 3,184 pounds.

Example 5: In a calendar year, a facility uses 500,000 pounds of ammonium carbonate, $(\text{NH}_4)_2\text{CO}_3$, and 400,000 pounds of ammonium bicarbonate, NH_4HCO_3 , in aqueous solution which is released to waste water streams, then transferred to a POTW. The NH_3 equivalent wt% of ammonium carbonate is 35.45%, and the NH_3 equivalent wt% of ammonium bicarbonate is 21.54% (taken from Table 1 in Section 3 below or calculated as in Example 3 above). The quantity of aqueous ammonia present in solution from ammonium carbonate is 35.45% of the 500,000 pounds of ammonia carbonate used, or 177,250 pounds. The quantity of aqueous ammonia present in solution from ammonium bicarbonate is 21.54% of the 400,000 pounds of ammonia bicarbonate used, or 86,160 pounds. The total quantity of aqueous ammonia present in solution is 263,410 pounds. The quantity applied towards threshold determinations for the ammonia listing is 10 percent of the total quantity of aqueous ammonia present in solution, or 26,341 pounds. The quantity of ammonia reported as released or transferred is 10 percent of the total quantity of aqueous ammonia released or transferred, or 26,341 pounds.

Section 2.2.3 Reporting Aqueous Ammonia Generated from the Dissociation of Ammonium Nitrate

Some sources of aqueous ammonia may be reportable under other EPCRA section 313 category listings. Ammonium nitrate (solution) is relevant to reporting under the ammonia listing to the extent that 10 percent of the total aqueous ammonia that results when ammonium nitrate dissociates is reported when determining thresholds and calculating releases. However, under the nitrate compounds category listing, ammonium nitrate (and other mixed salts containing ammonium and nitrate) must be reported in its entirety. When reporting ammonium nitrate under this category listing, the total nitrate compound, including both the nitrate ion portion and the ammonium counterion, is included when

determining threshold quantities. However, only the nitrate ion portion is included when determining the amount of ammonium nitrate that is released, transferred, or otherwise managed in wastes. The calculations involved in determining threshold and release quantities for reporting under the nitrate compounds category listing are described in a separate directive, *List of Toxic Chemicals within the Water Dissociable Nitrate Compounds Category and Guidance for Reporting* (EPA #745-R-00-006, Revised December, 2000). Note: reporting ammonium nitrate under the ammonia listing and the nitrate compounds category listing is effective for the 1995 reporting year for reports due July 1, 1996.

Example 6: In a calendar year, a facility uses 1,250,000 pounds of ammonium nitrate, NH_4NO_3 , in aqueous solution which is released to waste water streams, then transferred to a POTW. The NH_3 equivalent wt% of ammonium nitrate is 21.28% (taken from Table 1 in Section 3 below or calculated as in Example 3 above). The total quantity of aqueous ammonia present in solution is 21.28% of the 1,250,000 pounds of ammonia chloride used, or 266,000 pounds. The quantity applied towards threshold determinations for the ammonia listing is 10 percent of the total quantity of aqueous ammonia present in solution, or 26,600 pounds. The quantity of ammonia reported as released or transferred is 10 percent of the total quantity of aqueous ammonia released or transferred, or 26,600 pounds. For determining thresholds and calculating releases under the nitrate compounds category listing, see the separate directive, *List of Toxic Chemicals within the Water Dissociable Nitrate Compounds Category and Guidance for Reporting* (EPA #745-R-00-006, Revised December, 2000).

Example 7: In a calendar year, a facility transfers 100,000 pounds of nitric acid (HNO_3) to an on-site treatment facility. The nitric acid is neutralized with anhydrous ammonia, and treatment efficiency is 95 percent (the nitrate compound formed as a result of the treatment is ammonium nitrate, NH_4NO_3). The neutralized waste stream (containing aqueous ammonia from dissociated ammonium nitrate) is then transferred to a POTW. The quantity of nitric acid neutralized is 95 percent of 100,000 pounds or 95,000 pounds. The quantity of nitric acid neutralized is converted first to kilograms then to kilomoles using the following equations:

$$\text{Kilograms HNO}_3 \text{ neutralized} = (\text{lbs HNO}_3 \text{ neutralized}) \times (0.4536 \text{ kg/lb})$$

$$\text{Kilomoles HNO}_3 \text{ neutralized} = (\text{kg HNO}_3) \div (\text{MW of HNO}_3 \text{ in kg/kmol})$$

Substituting the appropriate values into the above equations yields:

$$\begin{aligned} \text{Kilograms HNO}_3 \text{ neutralized} &= 95,000 \text{ lbs} \times 0.4536 \text{ kg/lb} \\ &= 43,092 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{Kilomoles HNO}_3 \text{ neutralized} &= 43,092 \text{ kg} \div 63.01 \text{ kg/kmol} \\ &= 683.9 \text{ kmol} \end{aligned}$$

(Example 7 is continued below)

(Example 7, continued)

The quantity of anhydrous ammonia used in kilomoles in the acid neutralization and the quantity of ammonium nitrate generated in kilomoles from the neutralization are equal to the quantity of nitric acid neutralized (683.9 kmol). The quantity of anhydrous ammonia used in kilograms and pounds in the acid neutralization is calculated as follows:

$$\text{Kilograms NH}_3 \text{ used} = (\text{kmol NH}_3) \times (\text{MW of NH}_3 \text{ in kg/kmol}).$$

$$\text{Pounds NH}_3 \text{ used} = (\text{kg NH}_3) \times (2.205 \text{ lbs/kg}).$$

Substituting the appropriate values into the above equations yields:

$$\text{Kilograms NH}_3 \text{ used} = (683.9 \text{ kmol}) \times (17.03 \text{ kg/kmol}).$$

$$= 11,647 \text{ kmol}.$$

$$\text{Pounds NH}_3 \text{ used} = (11,647 \text{ NH}_3) \times (2.205 \text{ lbs/kg}).$$

$$= 25,682 \text{ pounds}.$$

The quantity reported applied towards threshold determinations for the ammonia listing is the total quantity of anhydrous ammonia used in the acid neutralization, or 25,682 pounds. The quantity of ammonia reported as released or transferred is 10 percent of the total quantity of aqueous ammonia released or transferred, or 2,568 pounds. For determining thresholds and calculating releases under the nitrate compounds category listing, see the separate directive, *List of Toxic Chemicals within the Water Dissociable Nitrate Compounds Category and Guidance for Reporting* (EPA #745-R-00-006, Revised December, 2000).

Section 3. CAS Number List of Some Chemical Sources of Aqueous Ammonia

EPA is providing the following table of CAS numbers and chemical names to aid the regulated community in determining whether they need to report under the ammonia listing for aqueous ammonia. If a facility manufactures, processes, or otherwise uses, *in aqueous solution*, a chemical which is listed below, they must report 10 percent of the total aqueous ammonia that is the result of the dissociation of this chemical. However, this list is not exhaustive. If a facility manufactures, processes, or otherwise uses, *in aqueous solution*, a water dissociable ammonium compound, they must report 10 percent of the total aqueous ammonia that is the result of the dissociation of the compound, even if the compound does not appear in the following table.

Table 1. Listing by CAS Number and Molecular Weight of Some Chemical Sources of Aqueous Ammonia			
Chemical Name	Molecular Weight*	NH ₃ Equivalent Wt%	CAS Number
Ammonium acetate	77.08	22.09	631-61-8
Ammonium aluminum sulfate (Ammonium aluminum disulfate)	237.14	7.181	7784-25-0
Ammonium antimony fluoride (Diammonium pentafluoroantimonate)	252.82	13.47	32516-50-0
Ammonium arsenate (Ammonium arsenate, hydrogen) (Ammonium arsenate, dihydrogen)	158.97	10.71	13462-93-6
Ammonium arsenate (Diammonium arsenate) (Diammonium arsenate, hydrogen) (Diammonium arsenate, monohydrogen)	176.00	19.35	7784-44-3
Ammonium arsenite	124.96	13.63	13462-94-7
Ammonium azide	60.06	28.35	12164-94-2
Ammonium benzenesulfonate	175.20	9.720	19402-64-3
Ammonium benzoate	139.15	12.24	1863-63-4
Ammonium bromate	145.94	11.67	13843-59-9
Ammonium bromide	97.94	17.39	12124-97-9
Ammonium cadmium chloride (Ammonium cadmium trichloride)	236.81	7.191	18532-52-0
Ammonium carbamate	78.07	21.81	1111-78-0
Ammonium carbonate carbamate	157.13	21.68	8000-73-5
Ammonium carbonate (Diammonium carbonate)	96.09	35.45	506-87-6

Ammonium carbonate, hydrogen (Ammonium bicarbonate)	79.06	21.54	1066-33-7
Ammonium cerium nitrate (Ammonium hexanitratocerate) (Ammonium hexanitratocerate (IV)) (Diammonium cerium hexanitate)	548.23	6.213	16774-21-3
Ammonium cerous nitrate (Ammonium cerous nitrate, tetrahydrate)	486.22	7.005	13083-04-0
Ammonium chlorate	101.49	16.78	10192-29-7
Ammonium perchlorate	117.49	14.49	7790-98-9
Ammonium chloride	53.49	31.84	12125-02-9
Ammonium chromate (Ammonium chromate (VI)) (Diammonium chromate)	152.07	22.40	7788-98-9
Ammonium chromate (Ammonium dichromate) (Ammonium dichromate (VI)) (Ammonium bichromate) (Diammonium dichromate)	252.06	13.51	7789-09-5
Ammonium chromium sulfate (Ammonium chromic sulfate)	265.17	6.422	13548-43-1
Ammonium citrate (Ammonium citrate, monohydrogen) (Ammonium citrate, dibasic) (Diammonium citrate) (Diammonium citrate, hydrogen)	226.19	15.06	3012-65-5
Ammonium citrate (Ammonium citrate, tribasic) (Triammonium citrate)	243.22	21.01	3458-72-8
Ammonium cobalt sulfate (Ammonium cobaltous sulfate)	289.14	11.78	13596-46-8
Ammonium cupric chloride (Ammonium chlorocuprate (II)) (Diammonium copper tetrachloride) (Diammonium tetrachlorocuprate)	241.43	14.11	15610-76-1
Ammonium cyanate (Ammonium isocyanate)	60.06	28.35	22981-32-4
Ammonium cyanide	44.06	38.65	12211-52-8
Ammonium cyanoaurate, monohydrate (Ammonium tetracyanoaurate, monohydrate)	319.07	5.337	14323-26-3

Ammonium cyanoaurate (Ammonium dicyanoaurate)	267.04	6.377	31096-40-9
Ammonium ferricyanide (Ammonium hexacyanoferrate (III)) (Triammonium hexacyanoferrate)	266.07	19.20	14221-48-8
Ammonium ferrocyanide (Ammonium hexacyanoferrate (II)) (Tetraammonium ferrocyanide) (Tetraammonium hexacyanoferrate)	284.11	23.98	14481-29-9
Ammonium fluoride	37.04	45.98	12125-01-8
Ammonium fluoride (Ammonium difluoride) (Ammonium bifluoride) (Ammonium fluoride, hydrogen) (Ammonium difluoride, hydrogen) (Ammonium bifluoride, hydrogen)	57.04	29.86	1341-49-7
Ammonium fluoroborate (Ammonium tetrafluoroborate)	104.84	16.24	13826-83-0
Ammonium fluorogermanate (IV) (Ammonium hexafluorogermanate (IV)) (Diammonium hexafluorogermanate)	222.66	15.30	16962-47-3
Ammonium fluorophosphate (Ammonium hexafluorophosphate)	163.00	10.45	16941-11-0
Ammonium fluorosulfate (Ammonium fluorosulfonate)	117.10	14.54	13446-08-7
Ammonium formate	63.06	27.01	540-69-2
Ammonium gallium sulfate	282.90	6.020	15335-98-5
Ammonium hydroxide	35.05	48.59	1336-21-6
Ammonium iodide	144.94	11.75	12027-06-4
Ammonium iridium chloride (Ammonium chloroiridate (III)) (Ammonium hexachloroiridate) (Triammonium hexachloroiridate)	459.05	11.13	15752-05-3
Ammonium iron sulfate (Ammonium ferric sulfate) (Ammonium iron disulfate)	269.02	6.330	10138-04-2
Ammonium iron sulfate (Ammonium ferrous sulfate) (Diammonium iron disulfate) (Diammonium ferrous disulfate)	286.05	11.91	10045-89-3

Ammonium lactate (Ammonium 2-hydroxypropionate)	107.11	15.90	515-98-0
Ammonium laurate (Ammonium dodecanoate)	217.35	7.835	2437-23-2
Ammonium magnesium sulfate	252.50	13.49	14727-95-8
Ammonium malate	168.15	20.26	6283-27-8
Ammonium malate, hydrogen (Ammonium bimalate)	151.12	11.27	5972-71-4
Ammonium molybdate (Diammonium molybdate)	196.01	17.38	13106-76-8
Ammonium molybdate (Ammonium heptamolybdate) (Ammonium molybdate, hydrate) (Ammonium molybdate, tetrahydrate) (Ammonium <i>paramolybdate</i> , tetrahydrate)	1163.8	8.780	12054-85-2
Ammonium nickel chloride, hexahydrate	183.09	9.301	16122-03-5
Ammonium nickel sulfate (Ammonium nickel sulfate, hexahydrate) (Ammonium nickel disulfate, hexahydrate) (Diammonium nickel disulfate, hexahydrate)	286.88	11.87	7785-20-8
Ammonium nitrate	80.04	21.28	6484-52-2
Ammonium nitrate sulfate	212.18	24.08	12436-94-1
Ammonium nitrite	64.04	26.59	13446-48-5
Ammonium oleate	299.50	5.686	544-60-5
Ammonium oxalate	124.10	27.45	1113-38-8
Ammonium palladium chloride (Ammonium chloropalladate (II)) (Ammonium tetrachloropalladate (II)) (Diammonium tetrachloropalladate)	284.31	11.98	13820-40-1
Ammonium phosphate (Ammonium orthophosphate)	149.09	34.27	10124-31-9
Ammonium phosphate (Ammonium biphosphate) (Ammonium phosphate, hydrogen) (Ammonium phosphate, dihydrogen) (Ammonium orthophosphate, dihydrogen) (Ammonium phosphate, monobasic)	115.03	14.80	7722-76-1

Ammonium phosphate (Ammonium phosphate, hydrogen) (Ammonium orthophosphate, monohydrogen) (Ammonium phosphate, dibasic) (Ammonium orthophosphate, dibasic) (Diammonium phosphate) (Diammonium orthophosphate) (Diammonium phosphate, hydrogen) (Diammonium phosphate, monohydrogen) (Diammonium orthophosphate, hydrogen)	132.06	25.79	7783-28-0
Ammonium phosphinate (Ammonium hypophosphite)	83.03	20.51	7803-65-8
Ammonium phosphite (Ammonium biphosphite) (Ammonium phosphite, dihydrogen)	99.03	17.20	13446-12-3
Ammonium picramate	216.15	7.879	1134-85-6
Ammonium propionate	91.11	18.69	17496-08-1
Ammonium rhodium chloride (Ammonium chlororhodate (III)) (Ammonium hexachlororhodate (III)) (Triammonium rhodium hexachloride) (Triammonium hexachlororhodate)	369.74	13.82	15336-18-2
Ammonium salicylate (Ammonium 2-hydroxybenzoate)	155.15	10.98	528-94-9
Ammonium selenide	115.04	29.61	66455-76-3
Ammonium silicon fluoride (Ammonium fluorosilicate) (Ammonium hexafluorosilicate) (Diammonium silicon hexafluoride) (Diammonium fluorosilicate) (Diammonium hexafluorosilicate)	178.15	19.12	16919-19-0
Ammonium stearate (Ammonium octadecanoate)	301.51	5.648	1002-89-7
Ammonium succinate (Diammonium succinate)	152.15	22.39	2226-88-2
Ammonium sulfamate (Ammonium amidosulfate) (Ammonium amidosulfonate)	114.12	14.92	7773-06-0
Ammonium sulfate (Diammonium sulfate)	132.13	25.78	7783-20-2

Ammonium sulfate (Ammonium bisulfate) (Ammonium sulfate, hydrogen) (Ammonium sulfate, monohydrogen)	115.10	14.80	7803-63-6
Ammonium persulfate (Ammonium peroxydisulfate) (Ammonium peroxydisulfate) (Diammonium persulfate) (Diammonium peroxydisulfate)	228.19	14.93	7727-54-0
Ammonium sulfide (Ammonium bisulfide) (Ammonium sulfide, hydrogen)	51.11	33.32	12124-99-1
Ammonium sulfide (Ammonium monosulfide) (Diammonium sulfide)	68.14	49.99	12135-76-1
Ammonium sulfide (Diammonium pentasulfide)	196.39	17.34	12135-77-2
Ammonium sulfite, monohydrate (Diammonium sulfite, monohydrate)	116.13	29.33	7783-11-1
Ammonium sulfite (Ammonium bisulfite) (Ammonium sulfite, hydrogen)	99.10	17.18	10192-30-0
Ammonium tetrachloroaurate (III), hydrate	356.82	4.772	13874-04-9
Ammonium thiocarbamate	94.13	18.09	16687-42-6
Ammonium thiocarbonate (Diammonium trithiocarbonate)	144.27	23.61	13453-08-2
Ammonium thiocyanate (Ammonium isothiocyanate) (Ammonium sulfocyanate) (Ammonium rhodanate) (Rhodanid)	76.12	22.37	1762-95-4
Ammonium dithionate	196.19	17.36	60816-52-6
Ammonium thiosulfate (Ammonium hyposulfite) (Diammonium thiosulfate)	148.20	22.98	7783-18-8
Ammonium tin bromide (Ammonium bromostannate (IV)) (Ammonium hexabromostannate (IV)) (Diammonium hexabromostannate)	634.19	5.371	16925-34-1

Ammonium tin chloride (Ammonium chlorostannate (IV)) (Ammonium hexachlorostannate (IV)) (Diammonium tin hexachloride) (Diammonium hexachlorostannate)	367.48	9.269	16960-53-5
Ammonium titanium fluoride (Ammonium fluorotitanate (IV)) (Ammonium hexafluorotitanate (IV)) (Diammonium titanium hexafluoride) (Diammonium hexafluorotitanate)	197.95	17.21	16962-40-6
Ammonium titanium oxalate, monohydrate (Diammonium dioxalatooxotitanate, monohydrate)	276.00	12.34	10580-03-7
Ammonium tungstate (Ammonium tungstate (VI)) (Ammonium <i>paratungstate</i>) (Hexaammonium tungstate)	1779.2	5.743	12028-06-7
Ammonium tungstate (Ammonium tungstate (VI)) (Ammonium <i>paratungstate</i>) (Decaammonium tungstate)	3058.6	5.568	11120-25-5
Ammonium valerate (Ammonium pentanoate)	119.16	14.29	42739-38-8
Ammonium zinc chloride (Ammonium chlorozincate) (Ammonium tetrachlorozincate) (Diammonium tetrachlorozincate)	243.27	14.00	14639-97-5

* For hydrated compounds, e.g. ammonium sulfite, monohydrate, the molecular weight excludes the weight of the hydrate portion.

CLIP, Chemical Laboratory Information Profile

"Only when you know the hazards, can you take the necessary precautionary measures."

Ammonia, aqueous



CAS No.: 1336-21-6

(approximately 30% NH_3)

Synonyms: Aqua ammonia, ammonia water, Spirit of Hartshorn, ammonium hydroxide

Physical Properties		Exposure Limits
A colorless alkaline liquid with a pungent odor.		Limits pertain to the vapor, CAS No. 7664-41-7, not the liquid:
Vapor pressure at 20 °C:	118 torr	OSHA PEL: 50 ppm
Melting point:	-77 °C	ACGIH TLV: 25 ppm
Boiling point:	36 °C	STEL: 35 ppm

Hazardous Characteristics

Overall toxicity	Flammability	Destructive to skin/eye	Absorbed through skin	Sensitizer?	Self-reactive?	Incompatible with:
3	1	3	0	No	No	Acids, halogens and other oxidizing agents; aluminum, zinc, mercury, and other metals; silver oxide, hypochlorite solution.

0: None (or very low); 1: Slight; 2: Moderate; 3: High; 4: Severe.

*Reactivity Hazards

Although generally considered a weak base, aqueous ammonia reacts violently with most acids. It forms explosive compounds with mercury, silver oxide, and other compounds of silver. It corrodes many metals, notably those in Groups IIA, IIB, IIIA, and IIIB. With the halogens it forms the shock-sensitive, explosive nitrogen trihalides. With household bleach (sodium hypochlorite solution) it forms toxic and explosively unstable chloramines. The concentration of ammonia in the air above solutions of aqueous ammonia can be within the explosive limits for ammonia (15–28%). See Bretherick's *Handbook of Reactive Chemical Hazards* for details and for other incompatibilities.

Cited as known to be or reasonably anticipated to be carcinogenic in NTP-9? No Identified as a reproductive toxin in Frazier and Hage, *Reproductive Hazards of the Workplace*? No

Typical symptoms of acute exposures:

Irritation of skin and eyes, which can be severe. Sore throat, abdominal pain, nausea if ingested. Coughing, labored breathing if inhaled; inhalation can result in lung edema but the symptoms often are delayed up to a few hours. Physical exertion during this period can aggravate the symptoms when they do appear. Rest and hospitalization are essential.

Principal target organ(s) or system(s):

Respiratory system, eyes, skin.

Storage Requirements

Store separately, away from acids and oxidizing agents, in a cool, dry, well-ventilated location.

Additional Remarks

In a warm environment, high pressures can develop within a closed container. The aqueous ammonia solutions sold for household uses typically contain approximately 14% ammonia along with a little soap or detergent and perfume. The formula, NH_4OH , sometimes used for aqueous ammonia solutions, is incorrect; the molecular species, NH_3 , does not exist.

Notes

ReadMe

This Chemical Laboratory Information Profile is *not* a Material Safety Data Sheet. It is a brief summary for teachers and their students that describes some of the hazards of this chemical as it is typically used in laboratories. On the basis of your knowledge of these hazards and before using or handling this chemical, *you need to select the precautions and first-aid procedures to be followed*. For that information as well as for other useful information, refer to Material Safety Data Sheets, container labels, and references in the scientific literature that pertain to this chemical.

Reproductive Toxins

Some substances that in fact are reproductive toxins are not yet recognized as such. For the best readily available and up-to-date information, refer to "DART/ETIC". See the TOXNET home page at www.sis.nlm.nih.gov and click on "Toxicology search". *Note that some of the data in DART/ETIC have not been peer-reviewed*. See also Linda M. Frazier and Marvin L. Hage, *Reproductive Hazards of the Workplace*; Wiley, 1998; and T. H. Shepard, *Catalog of Teratogenic Agents*, 9th ed.; Johns Hopkins University Press, 1998.

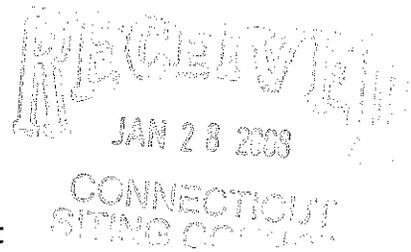
Abbreviations

ACGIH TLV—American Conference of Governmental Industrial Hygienists—Threshold Limit Value. C—Ceiling. CAS—Chemical Abstracts Service. mg/m^3 —milligrams per cubic meter. NA—Not applicable. NE—Not established. NI—No information. NTP-9—National Toxicology Program, Ninth Annual Report on Carcinogens. OSHA PEL—Occupational Safety and Health Administration—Permissible Exposure Limit. ppm—parts per million. STEL/C—Short-term exposure limit and ceiling.

Prepared by: Jay A. Young

Date of preparation: October 10, 2002

FireRescue1 News



10/05/2007

Calif. fire department simulates aqueous ammonia spill at power plant

By Tatiana Prophet
Daily Press

VICTORVILLE, Calif. — The best way to deal with a hazardous materials emergency is to stage one ahead of time.

On Wednesday, the Victorville Fire Department teamed up with Tenaska Energy, owner of the High Desert Power Project at Southern California Logistics Airport, to simulate an aqueous ammonia spill.

The scenario goes something like this: After delivery of the chemical, the valve was not closed properly and the ammonia spilled into a sump designed to catch it.

One employee who entered the area was supposed to have been injured, said Jon Boyer, senior environmental scientist with the Omaha-based Tenaska. The firefighters were being trained to clean up the spill and aid victims.

"This is good training for the guys because they actually have the tanker there," said Fire Chief John Becker. "The chemical company let us use the vehicle."

Aqueous ammonia is used to reduce nitrous-oxide emissions at the plant. It generally reduces those emissions by about 90 percent, Boyer said.

Ammonia vapor is highly irritating to the eyes and upper respiratory tract. Upper airway obstruction, bronchospasm and noncardiogenic pulmonary edema may occur.

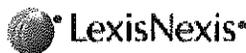
If skin contact is prolonged (more than a few minutes), ammonia causes severe burning pain and corrosive injury.

The High Desert Power Project has a capacity of 830 megawatts and generates power through a combined-cycle natural gas process.

Tenaska bought the plant in 2006 from Baltimore-based Constellation Energy.

Right now the cooling towers use untreated water from the California Aqueduct, and there are plans to possibly use reclaimed water there in the future.

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