Safety Data Sheet

Ammonium Perchlorate

Section 1. Identification

GHS product identifier : Ammonium Perchlorate

Product use : Industrial applications: Oxidizing agent.

Restrictions on use : None known.

In case of emergency - Chemical

Hours of operation : 24 hours a day, 7 days a week

CHEMTREC Customer Number : CCN721187

Telephone number : +1 703 741 5970 (International)
+1 800 424 9300 (US & Canada)

Manufacturer / Supplier

American Pacific
10622 West 6400 North
Cedar City, UT 84721

Telephone: +1 (435) 865-5000
Fax: +1 (435) 865-5005

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : OXIDIZING SOLIDS - Category 1
ACUTE TOXICITY (oral) - Category 4
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

Hazard statements : May cause fire or explosion; strong oxidizer.
Harmful if swallowed.
Causes serious eye irritation.
May cause damage to organs through prolonged or repeated exposure. (thyroid)

Precautionary statements

Prevention : Wear fire resistant or flame retardant clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep away from clothing, incompatible materials and combustible materials. Do not breathe dust/ fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling. Do not touch eyes. Wear protective gloves, protective clothing, eye protection, face protection, or hearing protection.

Section 2. Hazards identification

Response : In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. IF SWALLOWED: Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Get medical help. If eye irritation persists: Get medical help. Get medical help if you feel unwell.

Storage : Store in a well-ventilated place. Store separately.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Other hazards which do not result in classification : May cause endocrine disruption in the environment.
Risk of explosion if heated under confinement.

Hazards identified when used : Based on known or expected use, no additional hazards are expected.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Synonyms : Not available.

Ingredient name	Identifiers	Conc. (% w/w)	GHS Classification
Ammonium perchlorate	CAS: 7790-98-9 EC: 232-235-1	100	OXIDIZING SOLIDS - Category 1 ACUTE TOXICITY (oral) - Category 4 SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2

Any concentration shown as a range is to protect confidentiality or is due to batch variation. If specific chemical identify is withheld, it is to protect confidentiality.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention following exposure or if feeling unwell. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Rinse immediately contaminated clothing and skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention following exposure or if feeling unwell. Wash clothing before reuse. Clean shoes thoroughly before reuse. Continue to rinse for at least 15 minutes.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious

Section 4. First aid measures

person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Airborne concentrations of ammonium perchlorate can aggravate pre-existing respiratory problems. Chronic exposure may interfere with the uptake of iodine by the thyroid which may cause hypothyroidism.

Skin contact : No specific data.

Ingestion : Ingestion of large quantities has been reported to cause staggering in small mammals. Chronic ingestion of sufficient quantities may interfere with uptake of iodine by the thyroid which may cause hypothyroidism.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Section 5. Fire-fighting measures

Extinguishing media : Water - other extinguishing materials are ineffective.

Specific hazards arising from the chemical : This substance is an oxidizing agent and may cause rapid combustion or explosions if mixed with fuels, including organic materials or powdered metals. This does not include dot shipping containers if intimate mixtures are not present, and the shipping container is not inordinately contaminated.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
nitrogen oxides
halogenated compounds

Special protective actions for fire-fighters : Do not fight fires involving mixtures of perchlorates and fuels. Perchlorates is an oxidizing agent and may cause rapid combustion or explosions if mixed with fuels. Burning this substance may produce chlorine, chlorine dioxide, hydrogen chloride, and oxides of nitrogen as well as mixtures with any other compounds involved in the combustion. These are common by-products of combustion and are likely to be serious health concern; thus, keep upwind or wear self-contained breathing apparatus when attempting to rescue.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

Section 6. Accidental release measures

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from clothing, incompatible materials and combustible materials. Wear fire resistant clothing. Keep away from heat. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Do not store with reducing agents, organic materials, especially fuels, oils, greases, etc. Do not store with explosive substances that may detonate.
Do not store close to a heat source that could cause temperatures to approach the decomposition temperature.

Section 8. Exposure controls/personal protection

The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit. At this time, the other constituents have no known exposure limits.

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Ammonium perchlorate	**ACGIH TLV (United States)** TWA: 10 mg/m³ (Nuisance Dust).

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls/personal protection

Hygiene measures : Avoid contamination of cotton or other absorbent material. As in any industrial working environment, workers should routinely wear clean clothes to work. Do not wear any work clothing that has become contaminated with ammonium perchlorate. Remove contaminated clothing immediately and keep wet until thoroughly washed. Keeping contaminated clothing wet minimizes hazards until the laundering is completed. Showering is recommended after handling any industrial chemical. Smoking of tobacco should not be permitted while wearing contaminated clothing. Leather boots may become contaminated and could be a source of combustion damaging feet. Rubber boots are recommended unless a very strict management program to detect contaminated leather boots is in place much as listed on the glove section above.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Wear impervious aprons or rain gear to reduce contamination of cotton or other fibre clothing. Plastic, rubber, or latex gloves are recommended. Leather or cotton gloves should not be used unless a management program is implemented to ensure detection of contamination and immediate cleaning and change in case of contamination. Cotton clothing may be used if chance of contact is minimal or if clothing is monitored for contamination and changed if contamination occurs. In any case where combustible protection is used, a strong management system must be in place to monitor contamination and ensure appropriate removal and cleaning or severe risk of fire and personal injury or death exists. There are no known cloth materials that will not combust vigorously with perchlorates including Nomex, Kevlar based materials, or clothing that is normally considered fire retardant or resistive. Observation and management of contamination is the only practicable safety measure.
Type of glove recommended-Plastic, rubber or latex gloves are recommended. Leather or cotton gloves should not be used unless a management program is implemented to ensure detection of contamination and immediate cleaning and change in case of contamination.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Solid. [Crystals.]

Color : White.

Odor : Not available.

Odor threshold : Not available.

pH : Not applicable.

Melting point : 300°C (572°F)

Boiling point : Decomposes

Flash point : Not applicable.

Evaporation rate : Not available.

Flammability (solid, gas) : Extremely flammable in the presence of the following materials or conditions: heat and oxidizing materials.

Section 9. Physical and chemical properties

Lower and upper explosive (flammable) limits : Not applicable.

Vapor pressure : Not available.

Vapor density : Not applicable.

Relative density : 1.95

Molecular weight :

Solubility(ies) : Not available.

Partition coefficient: n-octanol/water : Not applicable.

Auto-ignition temperature : Not applicable.

Decomposition temperature : Not available.

Viscosity : Kinematic (104°F (40°C)): Not applicable.

Explosive properties : Extremely explosive in the presence of the following materials or conditions: heat and oxidizing materials.

Oxidizing properties : Not available.

Section 10. Stability and reactivity

Reactivity : Do not mix with organic materials, reducing agents, metal powders or powdered carbon.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
contact with combustible materials
Reactions may include the following:
risk of explosion

Conditions to avoid : Avoid elevated temperatures over 270º C, which can cause spontaneous exothermic decomposition. Cloth fabric of any type including dust collector bags intimately contaminated with ammonium perchlorate is subject to ignition through friction or impact. Water scrubber type dust collection systems are recommended. High-energy static electricity may also serve as an ignition source when contamination or combustibles are intermixed.

Incompatible materials : Sulfuric acid, powdered metals, and intimate mixtures with organics.

Hazardous decomposition products : Chlorine, Chlorine dioxide, Oxygen, nitrogen oxides, Hydrogen chloride.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Test	Result	Dose	Remarks
Ammonium perchlorate	None available. None available. OECD 402 [Acute Dermal Toxicity]	Rat - Oral - LD50 Rabbit - Oral - LD50 Rat - Dermal - LD50	4200 mg/kg 1900 mg/kg >2000 mg/kg	Based on data for a similar substance.

Conclusion/Summary : Harmful if swallowed.

Irritation/Corrosion

Product/ingredient name	Test	Result	Remarks
Ammonium perchlorate	OECD 404 [Acute Dermal Irritation/Corrosion] OECD 405 [Acute Eye Irritation/ Corrosion]	Rabbit - Skin - Not irritant Rabbit - Eyes - Irritant	Based on data for a similar substance. Based on data for a similar substance.

Conclusion/Summary

Skin : Not available.

Section 11. Toxicological information

Eyes : Causes serious eye irritation.

Respiratory : Not available.

Respiratory or skin sensitization

Product/ingredient name	Test	Result	Remarks
Ammonium perchlorate	OECD 429 [Skin Sensitization: Local Lymph Node Assay]	Mouse - skin Not sensitizing	Based on data for a similar substance.

Conclusion/Summary

Skin : Not available.

Respiratory : Not available.

Germ cell mutagenicity

Product/ingredient name	Test	Result	Remarks
Ammonium perchlorate	None available. OECD 476 [In vitro Mammalian Cell Gene Mutation Test] None available.	In vitro - Bacteria Negative In vitro - Mammalian-Animal Negative In vivo - Mammalian-Animal - Oral Negative	Based on data for a similar substance.

Conclusion/Summary : Not available.

Carcinogenicity

Product/ingredient name	Test	Result	Remarks
Not available.			

Conclusion/Summary : Not available.

Reproductive toxicity

Product/ingredient name	Test	Species	Result	Remarks
Ammonium perchlorate	OECD 416 [Two-Generation Reproduction Toxicity Study] OECD 414 [Prenatal Developmental Toxicity Study] OECD 414 [Prenatal Developmental Toxicity Study]	Rat - Oral Rat - Oral Rabbit - Oral	Maternal toxicity: Positive Fertility effects: Negative Developmental: Negative Maternal toxicity: Negative Fertility effects: Negative Developmental: Negative Maternal toxicity: Positive Fertility effects: Negative Developmental: Negative	

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Ammonium perchlorate	Category 2	-	thyroid

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Section 11. Toxicological information

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Airborne concentrations of ammonium perchlorate can aggravate pre-existing respiratory problems. Chronic exposure may interfere with the uptake of iodine by the thyroid which may cause hypothyroidism.

Skin contact : No specific data.

Ingestion : Ingestion of large quantities has been reported to cause staggering in small mammals. Chronic ingestion of sufficient quantities may interfere with uptake of iodine by the thyroid which may cause hypothyroidism.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Test	Result	Remarks
Ammonium perchlorate	OECD 408 [Repeated Dose 90-Day Oral Toxicity Study in Rodents]	Sub-chronic - Rat - Oral - NOAEL 1 mg/kg	

Conclusion/Summary : Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Section 12. Ecological information

Toxicity

Product/ingredient name	Test	Result	Species	Remarks
Ammonium perchlorate	OECD 203 [Fish, Acute Toxicity Test]	Acute - LC50 >200 mg/l [96 hours]	Fish - *Oncorhynchus mykiss*	
	OECD 202 [Daphnia sp. Acute Immobilization Test and Reproduction Test]	Acute - EC50 >341 mg/l [48 hours]	Crustaceans - *Daphnia magna*	
	OECD 201 [Alga, Growth Inhibition Test]	Acute - EC50 >505 mg/l [72 hours]	Algae - *Raphidocelis subcapitata*	
	OECD 201 [Alga, Growth Inhibition Test]	Chronic - EC10 189.2 mg/l [72 hours]	Algae - *Raphidocelis subcapitata*	
	OECD 209 [Activated Sludge, Respiration Inhibition Test]	EC50 >1000 mg/l [3 hours]	Micro-organism	
	OECD 215 [Fish, Juvenile Growth Test]	Chronic - NOEC 10 mg/l [84 days]	Fish - *Danio rerio*	Based on data for a similar

Section 12. Ecological information

		Chronic - NOEC 10 mg/l [6 days]	Crustaceans - *Ceriodaphnia dubia*	substance. Based on data for a similar substance.

Conclusion/Summary : Not available.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

RCRA classification : The unused product is a RCRA hazardous waste, discard as a solid and not in solution. If discarded as a solution carefully evaluate before any determination of waste status to avoid misinterpretation. Caution: Intentionally placing solid material into solution to dispose of it may violate several regulations if not managed carefully thereafter. Various states have local regulations that are applicable and are changing. Evaluate carefully all applicable regulations for your location before determining status and method of disposal.
The RCRA ID number is: D001.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	UN1442	UN1442	UN1442	UN1442
UN proper shipping name	AMMONIUM PERCHLORATE	AMMONIUM PERCHLORATE	AMMONIUM PERCHLORATE	AMMONIUM PERCHLORATE
Transport hazard class(es)	5.1 	5.1 	5.1 	5.1 
Packing group	II	II	II	II
Environmental hazards	No.	No.	No.	No.

Additional transport information:
For additional information on shipping regulations affecting this material, contact the information number found in Section 1. Note: AMPAC has performed tests as required and applied to DOT and received approvals listed at the right for various grades of AP as 5.1 oxidizer as shown to the right. Other AP does not automatically meet this classification and would require testing and DOT approval to achieve a 5.1 oxidizer class. These exemptions are specific to the facility located at 10622 West 6400 North, Cedar City, Utah 84720 Ammonium perchlorate Propellant grade 170 micron and greater has received classification as a 5.1 oxidizer under EX 2003110036.
Ammonium perchlorate propellant grade with average particle size of 70 microns and larger; Ammonium perchlorate wetted with not less than 5% water, and Ammonium perchlorate, non-propellant grade, with average particle size 70 microns and larger has received classification as a 5.1 oxidizer under EX2004020234. Both exemptions have container and weight restrictions and are not directly transferable to any other parties without application to and approval of DOT through the RSPA office or its successor office.

Special precautions for user : Do not heat the product.

Section 14. Transport information

Transport in bulk according to IMO instruments : Not applicable.

Notice to reader : The above transport information is provided to assist in the proper classification of this product and may not be suitable for all shipping conditions.

Section 15. Regulatory information

United States

TSCA 5(a)2 final significant new use rules

None of the components are listed.

TSCA 5(a)2 proposed significant new use rules

None of the components are listed.

TSCA 5(e) substance consent order

None of the components are listed.

TSCA 6 final risk management

None of the components are listed.

TSCA 12(b) - Chemical export notification

None of the components are listed.

SARA 302/304

None of the components are listed.

SARA 304 RQ : Not applicable.

Canada

Canada Significant New Activity Notice : None of the components are listed.

Canadian NPRI : The following components are listed: ammonia (total)

CEPA Toxic substances : None of the components are listed.

Singapore

Singapore - hazardous chemicals under government control

None.

Korea

K-REACH/CCA - Banned : None of the components are listed.

K-REACH/Article 39 (Accident Precaution Chemicals) : None of the components are listed.

Dangerous Materials Safety Management Act : Not applicable.

International regulations

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	*	2
Flammability		0
Reactivity		3
PPE		

National Fire Protection Association (U.S.A.)



Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations
WOE = Weight of Evidence

Indicates information that has changed from previously issued version.

Notice to reader

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