SAFETY DATA SHEET

1. Identification

Product identifier **Produced Water, Sour**

Other means of identification Not available.

Recommended use Natural Gas Production Liquids

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company name Noble Energy, Inc.

Address 1001 Noble Energy Way
Houston, TX 77070 US
US

Telephone Non-emergency Telephone: 720-587-2085

E-mail SDSGLOBAL@nobleenergyinc.com

Emergency phone number 24 Hour Emergency: 1-760-476-3962
Access code 333053

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards

Acute toxicity, inhalation	Category 2
Serious eye damage/eye irritation	Category 2B
Germ cell mutagenicity	Category 1B
Carcinogenicity	Category 1A

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Fatal if inhaled. Causes eye irritation. May cause genetic defects. May cause cancer.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe gas. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection.

Response If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. If exposed or concerned: Get medical advice/attention.

Storage Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Water	7732-18-5	90

Calcium chloride	10043-52-4	< 10
Potassium Chloride	7447-40-7	< 10
Sodium Chloride	7647-14-5	< 10
Benzene	71-43-2	< 1
Petroleum Distillate	8002-05-9	< 1
Hydrogen sulfide	7783-06-4	250 ppm - 3

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
Note: Composition will vary with geographic location, geologic formation, temperature and pressure. Normal composition ranges are shown. Exceptions may occur depending upon source of the produced water.

4. First-aid measures

Inhalation Move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Skin contact Wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Ingestion Seek medical advice.

Most important symptoms/effects, acute and delayed Fatal if inhaled. Causes eye irritation. Prolonged or repeated skin contact may cause irritation. May cause cancer. May cause genetic defects. May contain poisonous and flammable hydrogen sulfide vapor in container headspace. Odor does not provide a reliable indicator of the presence of hazardous levels in the atmosphere. In high concentrations (500-1000 ppm), H2S acts as a systemic poison causing unconsciousness and death.

Indication of immediate medical attention and special treatment needed Treat symptomatically.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media Use any media suitable for the surrounding fires.

Unsuitable extinguishing media None known.

Specific hazards arising from the chemical May contain harmful concentrations of hydrogen sulfide, which can accumulate in the head space.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Wear appropriate personal protective equipment (See Section 8). Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulfide (H2S) and flammability.

Methods and materials for containment and cleaning up Absorb spill with vermiculite or other inert material, then place in a container for chemical waste for proper disposal.

Large Spills: Flush with plenty of water. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

Environmental precautions Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Do not breathe gas. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Use only with adequate ventilation. May contain poisonous and flammable hydrogen sulfide vapor in container headspace.

Conditions for safe storage, including any incompatibilities Keep containers tightly closed. Store away from incompatible materials. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulfide (H2S) and flammability.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Components	Type	Value
Benzene (CAS 71-43-2)	STEL	5 ppm
	TWA	1 ppm

US. OSHA Table Z-2 (29 CFR 1910.1000)

Components	Type	Value
Benzene (CAS 71-43-2)	Ceiling	25 ppm
	TWA	10 ppm
Hydrogen sulfide (CAS 7783-06-4)	Ceiling	20 ppm

US. ACGIH Threshold Limit Values

Components	Type	Value
Benzene (CAS 71-43-2)	STEL	2.5 ppm
	TWA	0.5 ppm
Hydrogen sulfide (CAS 7783-06-4)	STEL	5 ppm
	TWA	1 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Benzene (CAS 71-43-2)	STEL	1 ppm
	TWA	0.1 ppm
Hydrogen sulfide (CAS 7783-06-4)	Ceiling	15 mg/m3
		10 ppm
Petroleum Distillate (CAS 8002-05-9)	Ceiling	1800 mg/m3
	TWA	350 mg/m3

Biological limit values

ACGIH Biological Exposure Indices

Components	Value	Determinant	Specimen	Sampling Time
Benzene (CAS 71-43-2)	25 µg/g	S-Phenylmercapturic acid	Creatinine in urine	*
	25 µg/g	S-Phenyl - mercapturic acid		*

* - For sampling details, please see the source document.

Exposure guidelines

US - California OELs: Skin designation

Benzene (CAS 71-43-2) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Benzene (CAS 71-43-2) Can be absorbed through the skin.

Appropriate engineering controls Ensure adequate ventilation, especially in confined areas. Provide easy access to water supply and eye wash facilities.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin protection

Hand protection Chemical resistant gloves are recommended.

Other Wear chemical-resistant gloves, footwear, and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.

Respiratory protection	Hydrogen sulfide impairs olfactory nerve function above 20 ppm, odor warning property (rotten egg smell) lost at higher concentrations. If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister.
Thermal hazards	Not applicable.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	Clear or opaque liquid.
Physical state	Liquid.
Form	Liquid.
Color	Clear.
Odor	Rotten egg.
Odor threshold	0.2 ppm
pH	6.5 - 8
Melting point/freezing point	33.8 °F (1 °C)
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	Not relevant.
Evaporation rate	< 1 (n-Butylacetate=1)
Flammability (solid, gas)	Not relevant.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not relevant.
Flammability limit - upper (%)	Not revelant.
Vapor pressure	17.5 mm Hg @ 70°F (21°C)
Vapor density	> 1 @ 68°F (20°C) (Air=1)
Relative density	1.018 - 1.02 @ 68°F (20°C)
Solubility(ies)	
Solubility (water)	Completely soluble
Partition coefficient (n-octanol/water)	3.6
Auto-ignition temperature	Not relevant.
Decomposition temperature	Not relevant.
Viscosity	1 mPa·s
Viscosity temperature	100.04 °F (37.8 °C)
Other information	Solubility complete except for possible crude component.
Bulk density	8.33 lb/gal
VOC (Weight %)	Negligible.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	None known.
Incompatible materials	Strong oxidizing agents.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Ingestion	No adverse effects due to ingestion are expected.
Inhalation	Fatal if inhaled.
Skin contact	May be irritating to the skin.
Eye contact	Causes eye irritation.
Symptoms related to the physical, chemical and toxicological characteristics	Fatal if inhaled. Causes eye irritation. Prolonged or repeated skin contact may cause irritation. May contain poisonous and flammable hydrogen sulfide vapor in container headspace. In high concentrations (500-1000 ppm), H2S acts as a systemic poison causing unconsciousness and death.

Information on toxicological effects

Acute toxicity Fatal if inhaled.

Components	Species	Test Results
Benzene (CAS 71-43-2)		
Acute		
Inhalation		
LC50	Mouse	9980 ppm
		9980 ppm, 7 Hours
	Rat	43767 mg/m3, 4 Hours
		13700 ppm, 4 Hours
		10000 ppm, 7 Hours
Oral		
LD50	Mouse	4700 mg/kg
	Rat	3306 mg/kg
Calcium chloride (CAS 10043-52-4)		
Acute		
Oral		
LD50	Rat	1000 mg/kg
Hydrogen sulfide (CAS 7783-06-4)		
Acute		
Inhalation		
LC100	Rat	2317 mg/m3, 3 Minutes
		780 - 800 ppm, 10 Minutes
LC50	Mouse	940 mg/m3
		634 ppm, 1 Hours
	Rat	950 mg/m3
		712 ppm, 1 Hours
		444 ppm, 4 Hours
		335 ppm
		> 0.38 mg/l, 960 Minutes

Skin corrosion/irritation	Prolonged or repeated skin contact may cause irritation.
Serious eye damage/eye irritation	Causes eye irritation.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	Not classified.
Germ cell mutagenicity	May cause genetic defects.
Carcinogenicity	May cause cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Benzene (CAS 71-43-2) 1 Carcinogenic to humans.

Petroleum Distillate (CAS 8002-05-9) 3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Benzene (CAS 71-43-2) Known To Be Human Carcinogen.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Benzene (CAS 71-43-2) Cancer

Reproductive toxicity Not classified.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not classified.

12. Ecological information

Ecotoxicity The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Benzene (CAS 71-43-2)			
Aquatic			
Crustacea	EC50	Water flea (Daphnia magna)	8.76 - 15.6 mg/l, 48 hours
Fish	LC50	Rainbow trout,donaldson trout (Oncorhynchus mykiss)	5.3 mg/l, 96 hours
Hydrogen sulfide (CAS 7783-06-4)			
Aquatic			
Fish	LC50	Lake whitefish (Coregonus clupeaformis)	0.002 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.007 mg/l, 96 hours
Petroleum Distillate (CAS 8002-05-9)			
Aquatic			
Fish	LC50	Cutthroat trout (Oncorhynchus clarki)	2.1 - 4.3 mg/l, 96 hours

Persistence and degradability Not established.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Produced Water, Sour (CAS Mixture) 3.55

Benzene (CAS 71-43-2) 2.13

Mobility in soil Not available.

Other adverse effects Not established.

13. Disposal considerations

Disposal instructions Do not discharge into drains, water courses or onto the ground. Discharge, treatment, or disposal may be subject to national, state, or local laws.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

US RCRA Hazardous Waste U List: Reference

Benzene (CAS 71-43-2) U019

Hydrogen sulfide (CAS 7783-06-4) U135

Waste from residues / unused products Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

15. Regulatory information

US federal regulations This product is hazardous according to OSHA 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Benzene (CAS 71-43-2)	Cancer Central nervous system Blood Aspiration Skin Eye respiratory tract irritation Flammability

CERCLA Hazardous Substance List (40 CFR 302.4)

Benzene (CAS 71-43-2)	LISTED
Hydrogen sulfide (CAS 7783-06-4)	LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Chemical name	CAS number	Reportable quantity	Threshold planning quantity	Threshold planning quantity, lower value	Threshold planning quantity, upper value
Hydrogen sulfide	7783-06-4	100	500 lbs		

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Benzene	71-43-2	< 1
Petroleum Distillate	8002-05-9	< 1
Hydrogen sulfide	7783-06-4	250 ppm - 3

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Benzene (CAS 71-43-2)
Petroleum Distillate (CAS 8002-05-9)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Hydrogen sulfide (CAS 7783-06-4)

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations WARNING: This product contains chemicals known to the State of California to cause birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Benzene (CAS 71-43-2)
Hydrogen sulfide (CAS 7783-06-4)
Petroleum Distillate (CAS 8002-05-9)

US. New Jersey Worker and Community Right-to-Know Act

Benzene (CAS 71-43-2)
Hydrogen sulfide (CAS 7783-06-4)
Petroleum Distillate (CAS 8002-05-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Benzene (CAS 71-43-2)
Hydrogen sulfide (CAS 7783-06-4)
Petroleum Distillate (CAS 8002-05-9)

US. Rhode Island RTK

Benzene (CAS 71-43-2)
Hydrogen sulfide (CAS 7783-06-4)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Benzene (CAS 71-43-2)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 19-March-2014

Revision date 03-July-2014

Version # 03

NFPA ratings

References

ECHA registered substances database
HSDB® - Hazardous Substances Data Bank
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
Registry of Toxic Effects of Chemical Substances (RTECS)

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