



Safety Data Sheet

1. Identification

Product Name:	Produced Water (Sour)
Synonyms:	Produced Brine, Salt Water, Formation Water
Chemical Family:	Water
Manufacturers Name:	Whiting Oil and Gas Corporation
Address:	1700 Broadway, Suite 2300 Denver, Colorado 80290
Product Use:	Bi-product of crude oil production.
Phone Number for Information:	(303) 837-1661
Emergency Phone Number:	(800) 424-9300 (Chemtrec)

Produced water is natural substance which contains water and minerals, primarily salt (NaCl). Substances in produced water can kill vegetation and should not be ingested, but they are not generally considered hazardous. Produced water can become hazardous if it contains hydrogen sulfide (H₂S) or hydrocarbons (crude oil, condensate or natural gas). Please refer to SDS's on these substances for more complete information

2. Hazard Identification

May contain toxic hydrogen sulfide (H₂S) gas. Vapor may be hazardous or fatal! May cause irritation to eyes, skin, and respiratory system! Avoid breathing fumes or vapors. Use only with adequate ventilation. Hydrogen sulfide is a flammable, irritating and a highly toxic gas. Odor is an inadequate warning of potentially hazardous concentration in air. Odor sensation lost immediately around 200 parts per million hydrogen sulfide (H₂S) in air. Always utilize approved respiratory protection

Produced water may also contain crude oil or condensate and may accumulate a layer of oil on its surface; the oil is flammable and may contain benzene which is a carcinogen. Along with oil or condensate, natural gas can get entrained or become dissolved in produced water. This gas can accumulate in tanks or vessels and become a fire hazard.

Produced water may also contain naturally occurring radioactive material (NORM), but the amount contained in the water itself should be well below any hazardous concentrations. NORM however, may be present at harmful concentrations in scales which can be deposited from produced water in piping, tanks and vessels. Certain state regulations may require a NORM survey be conducted before entering or working on any tanks, vessels, or lines with the potential to contain NORM contaminated scale or sediment. If NORM is present, contact Whiting's Safety Department for guidance.

WARNING!
MAY CONTAIN TOXIC LEVELS OF HYDROGEN SULFIDE (H₂S) GAS AND FLAMMABLE LIQUIDS

PRODUCES SKIN IRRITATION UPON PROLONGED OR REPEATED CONTACT. LONG-TERM EXPOSURE TO COMPONENTS OF THIS MATERIAL HAS CAUSED SYSTEMIC TOXICITY AND CANCER IN LABORATORY ANIMALS. MAY VENT HARMFUL CONCENTRATIONS OF HYDROGEN SULFIDE (H₂S) GAS WHICH CAN CAUSE RESPIRATORY IRRITATION AND ASPHYXIATION.

NO SMOKING!
DO NOT BREATHE GAS. WEAR RESPIRATORY PROTECTION, PROTECTIVE GLOVES, CLOTHING AND EYE WEAR WHEN HANDLING. AVOID RELEASE INTO THE ENVIRONMENT.

Globally Harmonized System (GHS) Information

Physical Hazards Classification

none

Health Hazards Classification

Acute Toxicity, Category 2

Skin Corrosion/irritation, Category 2

Serious eye damage/eye irritation, Category 2a

Specific Target organ toxicity, Category 1 (central nervous system, cardiovascular system, respiratory system)

Carcinogenicity, Category 1B

Environmental Hazards Classification

None

GHS Label Information



Symbols:

Signal Word: None

Hazard Statements:

Precautionary Statements:

Physical Hazards

None

Prevention

Do not breathe gas

Wear protective gloves/protective clothing/eye protection/face protection

Wash hands thoroughly after handling

Do not eat, drink or smoke when using this product

Avoid release to the environment

Health Hazards

Fatal if inhaled

Causes serious eye irritation

Causes damage to central nervous system,

cardiovascular system,

respiratory system

May cause cancer

Response

IF ON SKIN (or hair): Remove all contaminated clothing. Rinse skin with water/shower

If exposed or concerned: Get medical attention or advice

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

If exposed or concerned: Get medical attention or advice

Environmental Hazards

None

Storage

none

	<p>Disposal</p> <ul style="list-style-type: none"> Dispose of contents/container in accordance with local/regional/national/international regulations
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3. Composition/Information on Ingredients

<u>COMPOSITION</u>	<u>CAS NUMBER</u>	<u>PERCENT</u>
Water	7732-18-5	80-100
Sodium Chloride	7647-14-5	0-20
Hydrogen Sulfide	7783-06-4	<1
Benzene	71-43-2	<1
Crude Oil	8002-05-9	<1

4. First Aid Measures

Eye Contact

Immediately flush eyes, while holding eyelids open, with large amounts of clean, low-pressure tepid water for at least 15 minutes. If symptoms, irritation or injury persists, worsen or develop, seek medical attention.

Skin Contact

Remove contaminated clothing/shoes, wipe excess from skin. Immediately flush skin with water for 15 minutes then wash with soap and water. If illness or adverse symptoms develop or irritation persists, seek medical attention. Discard contaminated leather goods.

Inhalation

Immediately remove from contaminated area to fresh air. Give artificial respiration if not breathing. Give oxygen if breathing is difficult. Seek medical attention.

Ingestion

Rinse mouth with water. Drink 1-2 glasses of water or milk. Do not induce vomiting unless directed by medical personnel.

5. Fire-Fighting Measures

This material is generally not flammable; however, it may contain hydrogen sulfide which is extremely flammable, or crude oil, condensate or natural gas, all of which are flammable.

Extinguishing Media: Foam, dry chemical, CO₂

Special Fire Fighting Procedures and Precautions: None

Unusual Fire Explosion Hazards: None

NFPA Ratings

Health – 3

Flammability – 1

Reactivity – 0

Other – 0

Key: Least-0; Slight-1; Moderate-2; High-3; Extreme-4

6. Accidental Release Measures

This material should not present a serious problem under anticipated conditions. Contain spill and cleanup as soon as possible. Wastes can be disposed of by landfill, underground injection, or by permitted discharges. Federal, state, and local regulations should be followed in disposing of this material.

7. Handling and Storage

Comply with all regulatory requirements. Store in suitable tanks or closed, labeled containers in a cool, well-ventilated area.

Keep liquid and vapor away from heat, sparks and flame. Surfaces that are sufficiently hot may even ignite liquid product in the absence of sparks or flame. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapors are gone. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers. Static electricity may accumulate and create a fire hazard. Ground fixed equipment. Bond and ground transfer containers and equipment. Remove scales with elevated NORM before grinding or cutting.

Wash hands with soap and water before eating, drinking, smoking or using toilet facilities. Launder contaminated clothing before reuse. Dispose of leather articles including shoes which cannot be decontaminated.

Hydrogen Sulfide (H₂S) is very corrosive to all electro-chemical series metals. Can cause hydrogen embrittlement in steel pipe. Can cause blistering and pitting. Metal components used with H₂S service should be resistant to sulfide stress cracking (see API and/or NACE requirements). Where H₂S is regularly present, install continuous monitoring equipment or systems with alarms. Train workers in hazards associated with Hydrogen Sulfide and emergency situations.

Hydrogen Sulfide should only be a concern when the produced water is being collected and held. The vapor spaces in the container may contain dangerous concentrations of Hydrogen Sulfide.

8. Exposure Controls/Personal Protection

Occupational Exposure Limits

<u>COMPONENT</u>	<u>OSHA PEL</u>	<u>ACGIH TLV TWA</u>
Water	Not available	Not available
Sodium Chloride	Not available	Not available
Hydrogen Sulfide	20 ppm ceiling	1 ppm/STEL 5 ppm
Benzene	1 ppm**/STEL 5 ppm	0.5 ppm
Crude Oil	400 ppm ***	Not available

Notes:

** OSHA's action level is 0.5 ppm (29 CFR 1910.1028)

*** Listed PEL was vacated in 1993

Engineering Controls

Maintain air concentrations below flammable limits and occupational exposure standards for chemical components by using ventilation and other engineering controls.

Personal Protective Equipment

Eye/Face Protection

Eye protection (e.g. splash goggles or face shield) should be worn whenever there is a likelihood of splashing or spraying liquid. Contact lenses should not be worn. Suitable eye wash water should be available.

Skin Protection

Avoid skin contact. Wear protective clothing and gloves. Neoprene or nitrile gloves generally offer good protection. Wash thoroughly after handling.

Respiratory Protection

If ventilation is inadequate, use NIOSH certified respirator which will protect against organic vapor/mist. If operating conditions cause high vapor concentration of H₂S or the threshold limit value (TLV) of 10 PPM is exceeded; use supplied-air respirator approved by NIOSH.

9. Physical and Chemical Properties

Appearance and Odor: Colorless to cloudy may contain small amounts of solids or oil. May be odorless or smell like hydrocarbons or rotten eggs. Note that hydrogen sulfide causes olfactory fatigue or loss of smell at high concentrations.

pH:	approximately 7
Melting Point/freezing point:	<32 °F
Boiling Point:	212-220°F
Flash Point and Method:	not applicable
Evaporation Rate:	0.3 Slower (N-Butyl Acetate =1)
Flammable Limits:	not applicable
Vapor Pressure:	23.8 mm Hg
Specific Gravity:	1.0 to 1.2 (H ₂ O=1.0)
Vapor Density	0.625 for water vapor (Air=1)
Solubility:	100% (in water)
Partition coefficient (n-octanol/water):	not applicable
Auto ignition temperature	not applicable
Decomposition temperature	not available
Viscosity	1.0 to 2.0 cp at 68°F

10. Stability and Reactivity

Stability: Stable

Hazardous polymerization: Will not occur

Conditions and Materials to Avoid: Avoid heat, sparks, open flame, strong oxidizers, acids, bases

Hazardous Decomposition Products: Excessive heating releases harmful gases and vapors, entrained in the water.

11. Toxicological Information

Acute toxicity Produced water should not cause any adverse effects. Hydrogen sulfide (H₂S) gas can cause nose, throat, and lung irritation, and systemic toxicity and rapid death due to respiratory paralysis. Prolonged exposure to crude oil vapors can cause central nervous system depression.

Skin corrosion/irritation - Oil can cause a rash. The dissolved salts can cause dry/cracked skin.

Eye damage/irritation - H₂S gas can cause eye irritation leading to light sensitivity. Tests on similar materials suggest that crude oil is a sight eye irritant.

Sensitization - Not known to cause respiratory or skin sensitization

Germ cell mutagenicity – Not a known mutagen

Carcinogenicity – Product may contain benzene which is a known human carcinogen.

Reproductive toxicity – Not a known reproductive toxin

Specific Target Organs/Systemic Toxicity – Lungs

Aspiration hazard – Aspiration into lungs can produce chemical pneumonia.

12. Ecological Information

Produced water can kill vegetation.

13. Disposal Considerations

This product, as produced, is not specifically listed as an EPA RCRA hazardous waste according to 40 CFR 261. However, when disposed of, it may meet the criteria of a “characteristic” hazardous waste. This product could also contain benzene and could be considered hazardous because it exhibits the characteristic of “toxicity.” It is the responsibility of the user to determine if the material is considered hazardous for disposal under federal, state and local regulations.

14. Transportation Information

Department of Transportation Classification: Not considered a D.O.T. hazardous substance unless it is heavily contaminated with oil or other hazardous substances.

D.O.T. proper shipping name: not applicable

Other Requirements: not applicable

Hazard Class: not applicable

Packing Group not applicable

15. Regulatory Information

TSCA This product may contain hydrogen sulfide.

SARA Section 302 This product may contain hydrogen sulfide which has been listed on the EPA's extremely hazardous substance list.

SARA Section 304 This product may contain the following component(s) which in the event of a spill may be subject to SARA reporting requirements: hydrogen sulfide, benzene.

SARA Section 311/312 The following hazard categories may apply to this product:
Acute health hazard, Chronic health hazard, Fire hazard

SARA Section 313 This product may contain the following component(s) which may be subject to reporting on a toxic release inventory: hydrogen sulfide, benzene.

EPA-CWA Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 800-424-8802.

16. Other Information

Date Prepared:	August 29, 2008
Revised:	October 30, 2013
Last Review Date:	October 30, 2013

Disclaimer:

The information and recommendations contained in this SDS are believed to be accurate at the date of its preparation. Whiting Oil and Gas Corporation makes no representations or warranties, express or implied, with respect to the accuracy or completeness of the information contained herein. Whiting Oil and Gas Corporation assumes no responsibility for incorrect handling or use of the product or the inherent hazards in the product itself.