

**1. Product and Company Identification**

Product Name:	Produced Water
Synonyms:	Formation water, Brine
UN Number:	Not regulated
Recommended Use:	Process wastewater from natural gas well production
Supplier Address:	Dominion Energy Wexpro 333 South State Street P.O. Box 45433 Salt Lake City, UT 84145-0433 801-324-5111
Chemical Emergency Phone No.:	1-801-324-5111

**2. Hazards Identification**

Produced water is a complex mixture of water and mineral salts (sodium chloride, calcium chloride, magnesium chloride, bicarbonate), the composition of which varies depending upon the formation. Produced water may contain hydrocarbons or natural gas condensate as a surface layer. Natural gas condensate is a flammable liquid and contains benzene.

<p><b>EMERGENCY OVERVIEW</b></p> <p><b>DANGER!</b></p> <p><b>CONTAINS BENZENE – A KNOWN HUMAN CARCINOGEN</b></p> <p><b>CONTAINS <i>n</i>-HEXANE – A REPRODUCTIVE TOXICANT</b></p> <p><b>MAY CONTAIN FLAMMABLE LIQUIDS</b></p>	
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Health Hazard Classification

Carcinogenicity – Category 1A

Reproductive Toxicity – Category 2

Physical Hazard Classification

Flammable Liquids – Category 0

Potential Health Effects

Primary Route of Exposure:

Inhalation, skin contact

Inhalation:

May cause irritation to the nose and throat.

Eye Contact:

Contact with the eyes may cause irritation.

Skin Contact:

May cause irritation or reddening with prolonged exposure. May be absorbed through the skin and cause systemic toxicity with prolonged or repeated contact.

Ingestion:

May cause pulmonary edema or pneumonitis upon aspiration.

Chronic Effects:

Contains benzene, a human carcinogen. Prolonged exposure to benzene is associated with aplastic anemia and myeloid leukemia.

Contains *n*-hexane, a reproductive toxicant.

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 Aggravated Medical  
Conditions:

Blood chemistry disorders

### 3. Composition/Information on Ingredients

CHEMICAL	CAS NO.	VOLUME %
Water	Mixture	95 – 99%
Natural Gas Condensate	68919-39-1	1 - 5
Mineral Salts	Mixture	1 - 2
Benzene	71-43-2	< 1

### 4. First-aid Measures

Inhalation:	If inhaled remove affected person to fresh air, first ensuring your own safety. If experiencing breathing difficulty administer oxygen. If not breathing, administer CPR or artificial respiration. Seek medical attention immediately.
Ingestion:	If swallowed, DO NOT INDUCE VOMITING. If the victim is conscious, administer water by mouth. Call a physician or poison control center immediately.
Eye Contact:	In the case of eye contact, rinse the eyes with plenty of running water for at least 15 minutes. Obtain medical assistance.
Skin Contact:	Remove contaminated clothing, wash skin with plenty of running water. Obtain medical assistance if irritation persists.

### 5. Fire-fighting Measurements

Flammable Properties:	Fire is associated with flammable liquids and vapors at the surface of produced water.
Suitable Extinguishing Media:	Flame can be extinguished with dry chemical, CO <sub>2</sub> or foam.
Explosion Hazards:	Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors may ignite explosively. Liquid may float and ignite on the surface of water.
Hazardous Combustion Products:	Irritating gases of oxides of carbon including carbon dioxide and carbon monoxide.
Special PPE & Precautions for Fire-fighters:	Evacuate the area and fight the fire from a safe distance. Water may be ineffective to extinguish the fire, but should be used to keep

surroundings and containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to protect personnel attempting to stop a leak. Water spray may be used to flush spills away from areas of potential ignition. Divert run-off water away from sewers and waterways. Wear approved respiratory equipment and full protective equipment as indicated for fighting fire.

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## 6. Accidental Release Measures

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Personal Precautions:	All sparks, flames and sources of ignition must be restricted from the area, ventilate if indoors by opening doors and windows. Evacuate and clear a safe area.  Wear self-contained breathing apparatus and protective clothing where warranted.  Review Section 5, Fire-fighting Measures, before proceeding with containment and cleanup procedures.
Environmental Precautions:	Avoid washing, draining, or directing material into sewers and drainage.
Containment and Cleanup:	Contain spills immediately in the smallest possible area. Recover as much of the product as possible by such methods as vacuuming and return liquid to an appropriate container. Soak up residual liquid by using absorbent materials such as vermiculite, sand or clay and placing in a container along with other contaminated material, soils or debris for ultimate disposal.

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## 7. Handling and Storage

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Safe Handling:	Prevent eye and skin contact; do not breathe the mist or vapors. Wash hands after handling. Use in a well-ventilated area. Ground and bond all lines, containers and equipment used to prevent static sparks. Do not weld, cut, or grind on containers which have been emptied; flammable vapors and residues may remain.
Safe Storage:	Store in approved, labeled containers in a ventilated area; ensure containers are tightly closed. Keep containers away from flame, sparks and excessive temperatures. Keep away from incompatible chemicals including strong oxidizers. Comply with all federal, state and local regulatory requirements for handling, storage, transfer and disposal of flammable liquids.

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## 8. Exposure Controls/Personal Protection

CHEMICAL	OCCUPATIONAL EXPOSURE LIMIT (OEL) <sup>1</sup>		
	OSHA	ACGIH	NIOSH
Natural Gas Condensate	None Established	300 ppm 500 ppm (STEL) App. A3, Confirmed Animal Carcinogen (As Gasoline) <sup>2</sup>	App. A, Potential Human Carcinogen (As Gasoline) <sup>2</sup>
<i>n</i> -Hexane	500 ppm	50 ppm (skin)	50 ppm 1100 ppm IDLH
Benzene	1 ppm 5 ppm STEL	0.5 ppm (skin) 2.5 ppm STEL	0.1 ppm 1 ppm STEL 500 ppm IDLH

<sup>1</sup>OELs are 8-hour time weighted average exposure levels unless otherwise indicated as IDLH (Immediately Dangerous to Life and Health), STEL (15 minute Short Term Exposure Limit or Ceiling Limit), C (Ceiling Limit) or Peak (maximum ten minute concentration above the Ceiling Limit). Limits with a “skin” notation indicate that the substance can be absorbed through the skin.

<sup>2</sup>OEL is for Gasoline, CAS 86290-81-5.

Personal Protective Measures and Controls

- Eye Protection:** Avoid eye contact. Chemical goggles or face shield if there is a potential for sprays, mists or splashes.
- Skin and Body protection:** Avoid skin contact. Wear chemical protective gloves. Consult manufacturer for glove specifications. Where splashing is possible, wear protective coveralls. Remove immediately if contaminated and launder before re-use.
- Respiratory Protection:** Where necessary to maintain exposure levels below the Occupational Exposure Limits in Section 8, select appropriate NIOSH approved respiratory protection. Proper respirator selection should be determined by adequately trained personnel, and based on the contaminant(s), the potential exposure, and the published respirator protection factor.
- Hygiene measures:** Observe good hygiene practices. Wash after handling the material, and before eating, drinking or smoking. Wear clean protective clothing; contaminated clothing should be promptly removed for laundering or replacement.

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Engineering and Ventilation Controls:

Where applicable, adequate general or local exhaust ventilation should be used to maintain airborne concentrations below occupational exposure levels, to prevent the formation of explosive atmospheric concentrations, and to prevent the displacement of oxygen in confined areas.

### 9. Physical and Chemical Properties

Appearance & Odor:	Colorless liquid with a petroleum odor.
Flash Point:	Variable (Depending upon hydrocarbon content)
pH:	5.2 – 8.2
Boiling Point:	212° F (water)
Flammability Limits in Air:	Not applicable
Vapor Density:	> 1
Specific Gravity:	1 – 1.04 (water = 1)
Solubility in Water:	Soluble with the exception of any hydrocarbon content
Percent Volatile by Volume:	Minimal
Vapor Pressure:	Not done

### 10. Stability and Reactivity

Stability:	Stable under normal storage and handling conditions.
Conditions to Avoid and Incompatible Products:	Strong oxidizers, sources of heat or ignition.
Hazardous Decomposition Products;	Incomplete combustion may release carbon monoxide, carbon dioxide and smoke (non-combusted hydrocarbons).
Hazardous Polymerization:	None.

### 11. Toxicological Information

	INHALATION	ORAL/INGESTION	EYE	SKIN	REPRODUCTIVE
<i>n</i> -Hexane	Human TCLo 190 ppm/8W (PNS)	Rat oral LD <sub>50</sub> 28,710 mg/kg	Rabbit - Irritation		Inh Rat TCLo 10,000 pp,/17 H reproductive  Inh Rat TCLo

					5000 ppm Teratogenic
Benzene	Human TC 150 ppm/15M/8Y I (carcinogenic and blood effects)  Human 10 mg/m3/11Y I	Human oral LDLo 50 mg/kg	Rabbit 2 mg/24 H Severe	Rabbit 15 mg/24H mild	

**Summary Comments:**

Acute: When hydrocarbons are present, mildly toxic and narcotic by inhalation or skin absorption, may cause irritation to the respiratory tract and cardiac arrhythmia. Liquid may be irritating to the skin. If ingested, aspiration causes severe lung irritation, coughing and pulmonary edema.

Chronic: Exposure to aliphatic compounds may cause peripheral neuropathy. Chronic exposure to aromatic hydrocarbons may cause leukemia (benzene), aplastic anemia (benzene), and dysfunction of the kidney and liver.

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**12. Ecological Information**

Ecotoxicity:	Mixture is harmful to aquatic organisms; the median threshold limit (TL <sub>m</sub> ) is less than 100 ppm.
Persistence and degradability:	Mixture is expected to degrade naturally.
Bioaccumulation potential:	None.
Mobility:	The mixture will float on water with loss to air through volatilization, may foul shorelines. In soil, the mixture is expected to passively volatilize in air.

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**13. Disposal Considerations**

Waste Classification	If disposed of in a container, may be defined as a RCRA hazardous waste by the characteristic, "ignitability" (D001) and benzene (D018) if hydrocarbons are present. Refer to Sections 7 and 8 for the safe handling and storage precautions.  All disposal activities must comply with federal, state, and local regulations.
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**14. Transport Information**

Not considered a hazardous substance under D.O.T. unless a significant amount of hydrocarbon is present.

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UN Number:	Not applicable
UN Proper Shipping Name:	Not applicable
Hazard Class:	Not applicable
DOT Shipping Label	Not applicable
Emergency Response Guide Number:	Not applicable

### 15. Regulatory Information

United States Regulations: CERCLA Hazardous Substance List (40 CFR 302.):	Benzene (CAS 71-43-2): RQ 10 lbs.
SARA Title III, Section 311:	Acute: Yes Chronic: Yes Fire: Yes Pressure: No Reactive: No
CWA, Section 311:	Benzene
TSCA:	None
DOT:	49 CFR Parts 191-192
OSHA	29 CFR 1910.1028, Benzene

### 16. Other Information

NFPA:	Health Hazard 2	Fire Hazard 0	Instability 0	Special Hazard
HMIS:	Health Hazard 2	Flammability 0	Physical Hazard 0	Personal Protection

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#### Abbreviations and Acronyms:

ACGIH	American Conference of Governmental Industrial Hygienists
CERCLA	Comprehensive Environmental Response, Compensation, & Liability Act
DOT	U.S. Department of Transportation
HMIS	Hazardous Materials Information System
IARC	International Agency for Research on Cancer
IDLH	Immediately Dangerous to Life
NIOSH	National Institute of Occupational Safety and Health

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NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
ppm	parts per million
SARA	Superfund Amendments & Reauthorization Act
STEL	Short Term Exposure Limit (typically a 15-minute time weighted average)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (typically 8 hours)

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Disclaimer: While proper care has been taken in the preparation of this Safety Data Sheet, this information is provided without warranty. Each individual utilizing this document should make an independent determination of the methods to be used to protect the public, workers and the environment.