1. Product and Company Identification

Product Name: Produced Water (Flammable, Sour)
Synonym: Formation water, Produced Brine.
Product use: Disposal.
Manufacturer: Keyera
Address: Suite 600, Sunlife Plaza West
144 – 4th Avenue SW
Calgary, AB, T2P 3N4
Emergency Contact: 1-866-377-7110

2. Hazards Identification

EMERGENCY OVERVIEW
This product contains hydrogen sulfide, which is an extremely toxic and flammable gas at low concentrations. Exposures to hydrogen sulfide above 100 ppm are immediately dangerous to life and health (IDLH) and may be fatal. Exposures to hydrogen sulfide above 10 ppm to 100 ppm may produce irritation to eyes, nose, throat and respiratory system. Potentially toxic based on impurities including salts and Hydrogen Sulfide. Potentially flammable based on impurities. May be contaminated with crude oil or hydrocarbon condensate. Hydrocarbon vapors are heavier than air and may travel considerable distances to a source of ignition and flash back. Vapors may spread along the ground and may enter sewers, basements and other confined spaces. Refer to North American Emergency Response Guide (NAERG) 131.

POTENTIAL HEALTH EFFECTS/ROUTES OF EXPOSURE

Eyes: This product is an irritant of the eyes.
Skin: This product is an irritant of the skin.
Ingestion: If this product is ingested, vomiting and diarrhea may occur. Aspiration of the liquid into the lungs may produce chemical pneumonia, severe lung damage and/or respiratory failure.
Inhalation: Exposures to hydrogen sulfide above 100 ppm are immediately dangerous to life and health (IDLH) and may be fatal. Exposures to hydrogen sulfide between 10 ppm and 100 ppm may produce irritation to the respiratory tract. Potential effects target the Central Nervous System, liver and kidneys.

3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>%</th>
<th>CAS No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved minerals salts and water</td>
<td>100</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>0-1</td>
<td>7783-06-4</td>
</tr>
<tr>
<td>Crude oil and hydrocarbons</td>
<td>Trace</td>
<td>8005-02-9</td>
</tr>
</tbody>
</table>

Produced water may contain a variety of dissolved mineral salts including sodium chloride, calcium chloride, and potassium carbonate. Depending upon the pressure of
the formation from which the water originates it may contain significant quantities of dissolved gases. This could represent a health hazard. The water may also contain hydrocarbons in suspension with a potential flammability hazard.

This product is a complex mixture consistent with the definition within WHMIS regulation CPR section 2. The listed components are provided as guidance based on the available knowledge of the stream.

### 4. First Aid Measures

**Eyes:** Immediately flush eyes while holding eyelid open, with water for at least 20 minutes. Seek medical attention if irritation persists.

**Skin:** Remove contaminated clothing and launder before wearing. Wash exposed skin with soap and water (waterless hand cleaner may be used if clean water is not readily available). Seek medical attention if irritation persists.

**Inhalation:** Ensure your own safety and use the appropriate respiratory protection to immediately remove the victim to an area free of contaminants. Give CPR or artificial respiration as needed and give oxygen if breathing is difficult. Keep victim at rest and get immediate medical attention.

**Ingestion:** Do not induce vomiting because of the danger of aspiration of liquids into the lungs. Obtain immediate medical attention.

### 5. Fire Fighting Measures

**FLAMMABLE PROPERTIES**
Water based liquid with the potential of entrained hydrocarbon gas that can be released and could create the conditions for a flash fire.

**HAZARDOUS COMBUSTION PRODUCTS**
Carbon monoxide, carbon dioxide and irritating products of incomplete combustion may be generated.

**FIRE AND EXPLOSION HAZARDS**
This product is primarily water but can have hydrocarbon gas that can be released with the potential fire hazard.


**EXTINCTION MEDIA**

- **Small Fires:** Use dry chemical or CO2 fire extinguishers.
- **Large Fires:** Dry chemical, foam or CO2 using the manufacturer’s recommended technique. Water may be used to cool fire-exposed containers.

**FIRE FIGHTING INSTRUCTIONS:**
The Produced Water itself will not burn, however contaminants contained within or that could float on top of the produced water could support combustion. Approved self-contained breathing apparatus (SCBA) with full-face piece and full protective firefighting clothing should be worn.

**UNUSUAL FIRE & EXPLOSION HAZARDS**
Produced water is rarely considered as a fire hazard however fires have occurred as the result of hydrocarbons being released.
6. Accidental Release Measures

ACTIVATE SITE SPECIFIC EMERGENCY RESPONSE PLAN, IF AVAILABLE.

Small Spills: Remove all ignition sources. Ventilate area of leak. Stop flow of liquid.

Large Leaks: CALL Emergency Response Activation Telephone Number. Keep unauthorized personnel away and stay upwind. Gases maybe heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks). Keep out of low areas. Protect bodies of water by dyking, if possible.

Evacuation: Evacuate unnecessary personnel.

Caution: Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Consideration should be given to environmental clean-up and waste material generation when deciding if the use of large volumes of water is appropriate for non-fire emergency situations. Clean-up crews must be properly trained and must utilize proper protective equipment.

7. Handling and Storage

HANDLING PRECAUTIONS
Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Handle as a toxic flammable liquid. Keep away from all sources of heat, sparks, open flame or any sources of ignition as well as flammable materials or oxidizers. Ensure adequate ventilation. Avoid breathing vapors. Wash thoroughly after handling. DO NOT drink or siphon by mouth.

STORAGE PRECAUTIONS
Outside storage is recommended. Store in a well ventilated area and away from all sources of ignition. Avoid storage in confined locations or near incompatible materials oxidizers or materials that support combustion.

WORK/HYGIENIC PRACTICES
An emergency eye wash station should be available in the vicinity of any potential splash exposure. Use good personal hygiene practices. Avoid skin exposure and wash hands before eating, drinking, smoking, or using toilet facilities. Do not eat, drink or smoke in areas of use or storage. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer.

8. Exposure Controls / Personal Protection
ENGINEERING CONTROLS

Ensure your own safety and use the appropriate respiratory protection. An approved self-contained breathing apparatus (SCBA) with full-face piece may be required. Ensure adequate ventilation to keep vapor and gas concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces. Ventilation system and other equipment must be approved for flammable areas. Showers and/or eyewash fountains should be provided within the immediate work area for emergency use when there is any possibility of liquids splashing.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: Wear safety glasses with side shields when handling this product.
Skin Protection: Avoid skin contact.
Respiratory Protection: Ensure your own safety and use the appropriate respiratory protection. When assessing the proper type of respiratory protection, also consider the occupational exposure limits applicable to individual ingredients. Refer to CSA Standard “Selection, Use and Care of Respirators” (Z94.4-11) and NIOSH Respirator Decision Logic for additional guidance on respiratory protection.

Exposure Limits

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CAS No.</th>
<th>Exposure Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved minerals salts and water</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>7783-06-4</td>
<td>ACGIH TLV-TWA= 1 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ACGIH TLV-TWA= 5 ppm</td>
</tr>
<tr>
<td>Sodium Chloride</td>
<td>7647-14-5</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Crude oil and hydrocarbons</td>
<td>8005-02-9</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

9. Physical and Chemical Properties

Appearance and state: Clear liquid with slight amber color
Odour: Rotten eggs or Hydrocarbon. Care must be taken in the event the sulfur odor of rotten eggs is not detectable.
Odour Threshold: Not available
Boiling Point: >100 C
Melting Point: <0 C
Flash Point: 18 C
Auto Ignition: Not available
Lower Explosive Limit (%): Not available
Upper Explosive Limit (%): Not available
Vapour Pressure: Not available
Vapour Density (Air = 1): Not available
Viscosity: Not available
Specific Gravity: 1.0 to 1.2
10. Stability and Reactivity

STABILITY
Stable

CONDITIONS TO AVOID (STABILITY)
Material is stable under normal conditions. Avoid high temperatures, open flames, sparks, welding, smoking and other ignitions sources.

INCOMPATIBLE MATERIALS
Keep away from strong oxidizers such as peroxides, chlorine, nitrates, perchlorates and mineral acids, ignition sources and heat.

HAZARDOUS DECOMPOSITION PRODUCTS:
Irritating or toxic substances may be emitted upon thermal decomposition. Decomposition products may include carbon monoxide and carbon dioxide.

HAZARDOUS POLYMERIZATION
Will Not Occur.

11. Toxicological Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>LD50</th>
<th>LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved minerals salts and water</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Crude oil and hydrocarbons</td>
<td>Not available</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

POTENTIAL HEALTH EFFECTS
Acute: Contact will damage or irritate eyes and skin..
Chronic effects: Not available.
Sensitization: Not available.
Mutagenicity: Not available
Reproductive effects: Not available
Carcinogenicity: Not listed by IARC, NTP or ACGIH.
Target organs: Eyes, skin.

12. Ecological Information

May contain salts.

13. Disposal Considerations

Water injection in approved wells. Avoid contact of spilled material and runoff with soil and surface waterways. Consult an environmental professional to determine if local, regional or national regulations would classify spilled or contaminated materials as hazardous waste. Use only approved transporters, recyclers, treatment, storage or
dispersion capabilities. Dispose of in accordance with all applicable local and national regulations.

### 14. Transport Information

**PROPER SHIPPING NAME:** Oilfield Wastes, N.O.S.  
**TDG CLASS:** 3  
**TDG IDENTIFICATION NUMBER:** UN1267  
**TDG SHIPPING LABEL:** Flammable Liquid  
**NAERG:** Guide 131

### 15. Regulatory Information

**WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)**  
Workplace Hazardous Materials Information Systems (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Product Regulations), and the MSDS contains all of the information required by the CPR.

Class B2 – Flammable Liquid  
Class D1A – Materials Causing Immediate Serious and Toxic Effects  
Class D2B – Materials Causing Other Toxic Effects

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)**  
All components of this product are listed on the Canadian DSL Inventory.

### 16. Other Information

Prepared for: Keyera Health and Safety  
Issue Date: October 4, 2011  
More Information: (403) 205-7698  
Technical Preparation by: Deerfoot Consulting Inc.

**Disclaimer of Expressed and Implied Warranties**

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