What Happened:

A contract-drilling employee was mixing caustic soda (sodium hydroxide) in the caustic mixing barrel in the mud area of the drilling rig. He had mixed one fifty-pound sack into the mixing barrel. As he began to mix a second sack into the same solution, a violent reaction occurred. The caustic solution was forced out of the barrel into his face, coating his upper body with concentrated caustic solution. This incident resulted in severe burns and impaired vision to the drilling employee.

Correctable Opportunities:

The contract company’s investigation of this accident identified the following:

- Proper procedures for mixing caustic were not followed.
  - The mixing of a second sack of caustic in the same batch is not the recommended procedure. The procedure calls for only one sack of caustic to be mixed per batch.
  - Proper Personal Protective Equipment (PPE) for mixing of caustic was not worn. The Material Safety Data Sheet (MSDS) for caustic specifies chemical resistant gloves, chemical resistant apron, chemical (splash proof) goggles, and a full-face shield.

Corrective Actions:

The following corrective actions have been taken by the contract company to prevent reoccurrence of this type of accident.

- Formal meetings were held with the company’s tool pushers, safety personnel, area managers, and drilling superintendents discussing this accident and reemphasizing the proper procedure for mixing caustic, use of proper PPE and the first aid for caustic burns. Additional meetings were held with all rig crews and personnel as well on these topics.
- A chain of authority for mixing caustic was established to give on site management responsibility for determining when to mix caustic and to ensure the proper PPE was being utilized.
- Installation of new mixing barrels with internal baffles to help prevent caustic solution from erupting back on the employee during the mixing process.

Caustic Information:

Caustic is used extensively in the drilling industry to elevate the pH of the water used in the mixing of mud during the drilling process. It is important to remember that while dry caustic dissolves freely, it is a hazardous material and should be treated with the utmost care and safety at all times. Protective equipment is to be worn at all times when handling caustic.

(The following information was obtained from the MSDS for Caustic Soda)

Special Mixing and Handling Instructions

Considerable heat is generated when the product is mixed with water. Therefore, when making solutions always carefully follow the following steps:

- Always wear ALL the PPE prescribed.
- NEVER add water to the caustic.
- ALWAYS add the caustic, with constant stirring, slowly to the surface of lukewarm water (80-100°F), to assure the caustic is being completely dissolved as it is added.
• Caustic can react EXPLOSIVELY with acids, aldehydes, and many other organic chemicals. Add the caustic very gradually while stirring constantly.

• If caustic is added too rapidly, or without stirring, or if added to hot liquid and becomes concentrated at the bottom of the mixing vessel, excessive heat may be generated, resulting in DANGEROUS boiling and spattering and possible IMMEDIATE AND VIOLENT ERUPTION of a highly caustic solution.