

## **Appendix J – Plant Operation Manual**



# Raw Water Production Facility Big Spring Plant

## Operation and Maintenance Manual



December, 2013

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## **1.0 INTRODUCTION**

The Raw Water Production Facility is a unique facility which transforms treated wastewater effluent into a clean source of raw water suitable for supply to municipal utilities as a component of their drinking water supply. The facility employs three state-of-the-art treatment processes which render the product water superior in most respects to typical natural water sources. Effluent is diverted and pumped from the Big Spring Water Reclamation Plant to the CRMWD Raw Water Production Facility (RWPF), treated, and then pumped to the District's E.V. Spence Raw Water Transmission Line, as shown in Figure 1.1.

Completed in 2013, the RWPF is located east of Big Spring. The plant is designed for an influent capacity of 2.5 MGD, yielding a product water capacity of 1.8 MGD. The Operation and Maintenance (O&M) Manual developed for this system includes recommendations from several equipment manufacturers, the project's design engineer, and the Colorado River Municipal Water District staff.

### **1.1 HISTORICAL SIGNIFICANCE**

The Raw Water Production Facility is thought to be the first facility to produce reclaimed water for direct in-line blending with surface water for municipal supply. It is also one of the first facilities in North America to provide reclaimed water as a source for public drinking water without first discharging the reclaimed water to a natural water body. For these reasons, this facility has been watched with great anticipation by the professional community of water reuse practitioners, regulators, operators and others interested in water reclamation. This interest is expected to continue as the facility accumulates operating experience, and it will no doubt be cited as an example as similar projects are pursued in the future.

### **1.2 FACILITY DESCRIPTION**

#### **1.2.1 Source Water Diversion & Pumping**

Source water for the Raw Water Production Facility (RWPF) is treated secondary effluent from the Big Spring Water Reclamation Plant (WRP). Effluent flows over a weir in the Filter Effluent Channel and travels by gravity pipeline to the Source Water Pump Station wetwell, located in the southeast portion of the City's facility. Effluent not pumped by the Source Water Pump Station will flow over the City's

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effluent weir and discharge to Beals Creek. The Source Water Pump Station pumps water to the Source Water Storage Tank located on the main RWPF site.

### 1.2.2 Membrane Filtration System

The first treatment step provided is microfiltration, a very efficient form of particle filtration using hollow fiber membranes bundled into pressure vessels in a modular arrangement. The hollow fibers have a consistent porous structure which excludes passage of particles larger than 0.1 microns, including protozoan pathogens such as Giardia and Cryptosporidia. Flow enters each module and water pressure forces water across the wall of each hollow fiber to its interior. This filtrate is then collected from the top of each module. Two Pall Corporation microfiltration systems are provided at the RWPF, each containing 78 modules. Related facilities are provided to pump, clean and monitor the system performance.

### 1.2.3 Reverse Osmosis System

Filtrate from the microfiltration systems is stored briefly in the Break Tank, which supplies feed water to the Reverse Osmosis (RO) system. The reverse osmosis system uses a semi-permeable membrane to remove very small particles and colloids passing the membrane filtration step as well as bacteria, viruses, and a variety of dissolved solids including metals, salts, and medium to large molecular weight organic molecules. The membranes are wound in a spiral pattern around a central axis within a horizontal tubular pressure vessel. As flow proceeds the length of the vessel under high pressure, water seeps through the membrane while most dissolved solids remain in the concentrated fluid which continues to the far end. The water passing the membrane, called permeate, is collected as the end product, while the concentrate reaching the far end is redirected to a second stage, where additional permeate is produced and blended with the 1st stage permeate. Second stage concentrate is discharged to Beals Creek in accordance with the facility's TPDES permit.

### 1.2.4 Ultraviolet Disinfection/Advanced Oxidation

Permeate from the RO system proceeds directly to the Ultraviolet (UV) Oxidation system, consisting of two ultraviolet reactors operating in series, preceded by hydrogen peroxide addition. The system provides two simultaneous modes of treatment: ultraviolet radiation and intensive oxidation. Some

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chemicals of potential concern, such as NDMA, are reduced by the direct action of the ultraviolet radiation, through a process called photolysis. Ultraviolet radiation is also effective as a disinfectant against various pathogens, including viruses, protozoa and bacteria. Although some viruses are not easily inactivated by UV light, they are susceptible to the very high doses applied by the reactors provided. In addition to the radiation/photolysis mode of action, many other chemical compounds, particularly organics, are broken apart by high-level oxidation. This high-level oxidation is accomplished by the interaction of the UV light and hydrogen peroxide, producing a highly charged ion known as a hydroxyl radical. This environment allows the destruction of many compounds likely to exist in wastewater-derived sources, such as various pharmaceutical compounds, personal care products, pesticides, and other man-made chemicals.

### 1.2.5 Product Water Pumping and Blending

The permeate, after treatment by UV Oxidation, is now considered product water, or reclaimed “raw water” suitable for blending with other raw water sources. After leaving the UV reactors, it proceeds to the 0.5 million gallon Product Water Storage Tank. Product water is pumped from the Product Water Storage Tank by the adjacent Product Water Pump Station, sending the water approximately one mile to intersect the Spence Pipeline, a 42” raw water pipeline from Lake E.V. Spence. The product water tie-in is on the third and final segment of the Spence Pipeline; this segment begins at the Moss Creek Pump Station adjacent to Moss Creek Lake and continues to the CRMWD Base 5 facility north of Big Spring, where it may be stored in the 15 million gallon balancing reservoir or intersect other pipelines to/from Lake J.B. Thomas and the Odessa/Midland Terminal Reservoir. From this location, raw water is also pumped to the City of Big Spring’s surface water treatment plant.

### 1.2.6 Residuals Handling

The membrane processes produce three residual streams: MF flushing to remove accumulated particles, RO concentrate containing the concentrated salts and other compounds rejected by the membranes, and the neutralized spent chemicals from the chemical cleaning process (CIP) for both systems.

|                                                                                               |                                              |                                                                           |
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#### 1.2.6.1 Membrane Filtration Flushing

Frequent flushing (once or twice per hour) of the microfiltration membranes is employed to remove accumulated particles and maintain operating pressure within the designed conditions. This will generate up to 160,000 gallons per day of backwash water at 2.5 MGD influent flow, although early operations have resulted in somewhat less, about 90,000 gpd. The waste water from the flushing operation is discharged to the sewer and returned to the Big Spring WRP.

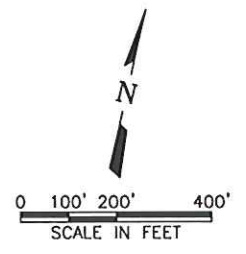
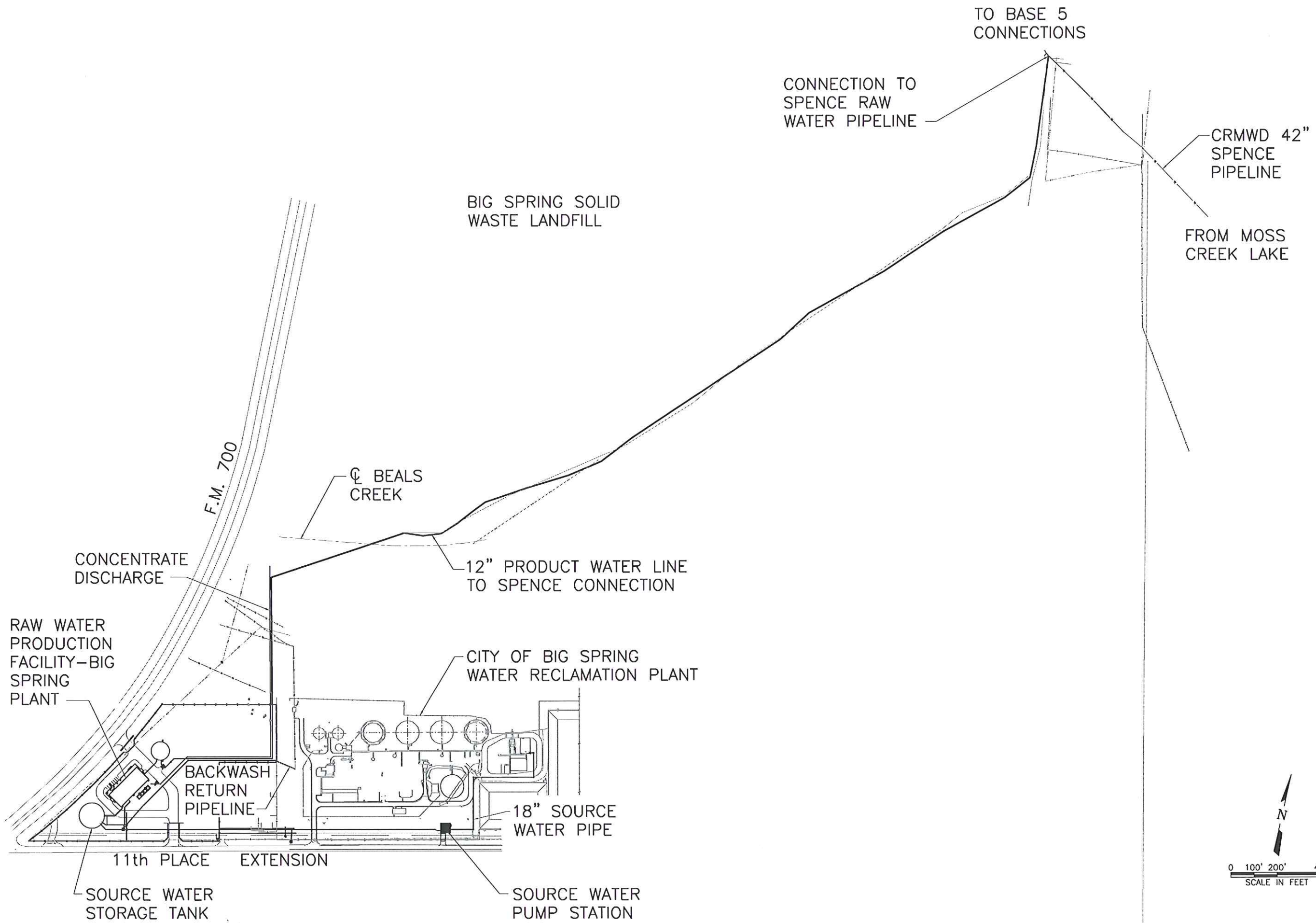
#### 1.2.6.2 RO Concentrate Discharge

As noted in the RO system description above, water which does not pass through the RO membrane is collected at the far end of each RO vessel. This water contains the dissolved solids which are rejected by the membrane, and is called concentrate because the solids have been concentrated to roughly four times their original level. This flow is also sometimes called reject or brine. Concentrate is produced continuously by the RO system, and is discharged to Beals Creek in accordance with the District's TPDES permit. At full production, this flow is up to 600,000 gallons per day, approximately 25% of the RO feed flow.

#### 1.2.6.3 Membrane Cleaning Residuals

The membrane treatment processes require periodic chemical cleaning. Two chemical cleaning processes are used for the MF system, and a single process for the RO system. An Enhanced Flux Maintenance (EFM) is performed about once every other day on each MF system, circulating a high-strength chlorine solution through the membranes to prevent biological growth and fouling. About once per month, each system undergoes a more extensive chemical cleaning regimen, termed a Clean-in-Place (CIP) procedure. The MF CIP process includes a minimum of 4-hours of soaking of the membranes in acid, sodium hypochlorite and caustic solutions. Due to the varied pH of the cleaning chemical solutions, the CIP waste is pumped into a neutralization tank to adjust the pH to near 7 before it is discharged into the sewer. The total volume of waste generated from the CIP process is less than 5,000 gallons per event.

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| FILE Figure 1-1.dwg  |           |

|                                                      |  |
|------------------------------------------------------|--|
| COLORADO RIVER MUNICIPAL WATER DISTRICT              |  |
| RAW WATER PRODUCTION FACILITY AND RELATED FACILITIES |  |
| GENERAL                                              |  |
| AREA PLAN                                            |  |

|                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br>4055 International Plaza, Suite 200<br>Fort Worth, Texas 76109-4895<br>Phone - (817) 735-7300<br>Fax - (817) 735-7491 |
| FIG 1-1                                                                                                                                                                                                        |
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|                                                                                               |                                              |                                                                            |
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### 1.3 PLANT DESIGN CRITERIA AND CAPACITIES

The following table summarizes the key design criteria and capacities of the project components.

|                                     |                       |                         |                                         |              |
|-------------------------------------|-----------------------|-------------------------|-----------------------------------------|--------------|
| <b>Source Water Pump Station</b>    |                       |                         |                                         |              |
|                                     | 3 Main Pumps          | 900 gpm design flow     | 62.8 ft. design TDH                     |              |
|                                     | 1 Auxiliary Pump      | 209 gpm design flow     | 21.8 ft. design TDH                     |              |
| <b>Membrane Filtration System</b>   |                       |                         |                                         |              |
|                                     | 2 Skids               | 78 modules each         | Approved Flux: 37.2 gfd (average daily) |              |
| <b>Reverse Osmosis System</b>       |                       |                         |                                         |              |
|                                     | 2 Skids               | 36 modules each         | Approved Flux: 10.5 gfd (average daily) |              |
| <b>Ultraviolet Oxidation System</b> |                       |                         |                                         |              |
|                                     | 2 Reactors            | 72 lamps each           | Approved Virus Credit: 2 log/reactor    |              |
| <b>Product Water Pump Station</b>   |                       |                         |                                         |              |
|                                     | 3 Pumps               | 660 gpm design flow     | 259 ft. design TDH                      |              |
| <b>Water Storage Tanks</b>          |                       | <b>Nominal Capacity</b> | <b>Diameter</b>                         | <b>Depth</b> |
|                                     | Source Water          | 1.0 million gallons     | 100 ft.                                 | 18 ft.       |
|                                     | Break Tank (Filtrate) | 70,000 gallons          | 25 ft.                                  | 19 ft.       |
|                                     | Product Water         | 500,000 gallons         | 81 ft.                                  | 15 ft.       |
|                                     |                       |                         |                                         |              |
|                                     |                       |                         |                                         |              |

### 1.4 DOCUMENT ORGANIZATION

This document serves as a guidance document to operating staff for the Raw Water Production Facility. It is intended to provide an overall description of the facilities and equipment and to present the context of the treatment systems and how they are used to provide a safe and high quality source of additional water to the members and customers of the Colorado River Municipal Water District. This document is intended to complement the detailed operating and maintenance information and instructions contained in the operation and maintenance manuals provided by manufacturers of the various components of the Raw Water Production Facility. The following sections are provided:

- Section 1: An overview of the RWPF and the principal components.
  - Section 2: More detailed description of the role and basic operation of each of the major systems of the RWPF.
  - Section 3: Monitoring systems and laboratory testing requirements for the facility.
  - Section 4: Description of required responses to emergency conditions and water quality events.
  - Section 5: Overview of maintenance.
  - Section 6: Regulatory aspects of the facility, including records and reporting.
- Numerous reference documents are included as appendices.

|                                                                                              |                                                                         |                                                                                        |
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## **2.0 FACILITY COMPONENTS AND PROCESSES**

This section contains the operating instructions for each of the major components and unit processes used at the Raw Water Production Facility. It includes operating conditions that may be routinely or periodically encountered. Each major valve located at the plant has been identified and assigned an identification number. Appendix D contains a Valve Summary. This appendix lists the valves by service and provides an identification number, type of valve, normal valve position and type of valve operator. A brief description of the location and function of the valves is also included in the tables.

Operating instructions provided herein are for reference only to assist in plant operation. These operating procedures should be used in addition to the operator's academic knowledge and work experience. Although this section provides operating instructions for treatment plant units, an operator should be trained in detailed control and operation of equipment components by the equipment manufacturer and should be familiar with the entire plant prior to operation. This section of the O&M manual will be supplemental to the manufacturer's O&M manuals, training and Guides provided with the individual treatment equipment. Plant personnel shall refer to the manufacturer's O&M manuals as necessary to perform proper maintenance and operation procedures on different equipment. In the event of a conflict between this manual and the manufacturer's recommendations, the manufacturer's O&M manuals shall take precedence.

The valve designation is shown as "VALVE I.D.". The VALVE I.D. consists of two parts. The first part consists of letters showing the valve service. This is immediately followed by a number which designates the pump or valve number. The valve information is shown as "VALVE DATA". The VALVE DATA consists of three parts: the type of valve, the normal position (open or closed), and the type of actuator. The following abbreviations and numbers listed in Table 2.1 were used for the valve I.D. and valve data.

|                                                                                              |                                                                         |                                                                                        |
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**Table 2.1 Abbreviations Used in Valve Schedules and Schematics**

| <b>TYPE OF SERVICE</b>                                                                                                                                                                                                                                                                                                                                                                      | <b>TYPE OF SERVICE</b>                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACD Acid<br>AIR Air<br>AS Acid Solution<br>BWS Backwash Supply<br>BWW Backwash Waste<br>C Caustic<br>CSL Chlorine Solution<br>D Drain (Process)<br>DP Drain (Pumped)<br>FE Filtered Effluent<br>FW Finished Water<br>RW Raw Water<br>SL Sludge<br>SW Settled Water<br>W1 Potable Water<br><br><b><u>VALVE TYPE</u></b><br>BV Ball Valve<br>BFV Butterfly Valve<br>BBV Block and Bleed Valve | <b><u>VALVE TYPE</u></b><br>CV Check Valve<br>GBV Globe Valve<br><br>PV Plug Valve<br>PRV Pressure Relief Valve<br>SV Solenoid Valve<br>SG Slide Gate or Sluice Gate<br>TV Telescoping Valve<br><br><b><u>ACTUATOR TYPE</u></b><br>E Electric<br>EZ Electric w/positioner<br>H Hydraulic<br>M Manual<br>P or A Pneumatic<br><br><b><u>NORMAL POSITION</u></b><br>0 Close<br>1 Open |

## **2.1 SOURCE WATER DIVERSION AND PUMPING**

Source water for the Raw Water Production Facility (RWPF) is treated secondary effluent from the Big Spring Water Reclamation Plant (WRP). Effluent flows over a weir in the Filter Effluent Channel and travels by gravity pipeline to the Source Water Pump Station wetwell, located in the southeast portion of the City's facility. Effluent not pumped by the Source Water Pump Station will flow over the City's effluent weir and discharge to Beal's Creek. An isolation valve is located outside the Filter Structure, which may be closed to stop flow to the Source Water Pump Station.

### **2.1.1 Source Water Pump Station**

The Source Water Pump Station is equipped with four submersible pumps, three main pumps and one low flow pump to recirculate flow to the City's WRP. The three main pumps are automatically controlled to pump flow as it is available to fill the 1.0 million gallon Source Water Storage Tank, as long as

|                                                                                              |                                                                         |                                                                                        |
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sufficient space is available in the tank. Available flow is measured as water level in the Source Water Pump Station wetwell, and level in the Source Water Storage Tank is also continuously monitored.

### 2.1.2 Source Water Quality Monitoring

Source water quality is monitored through a sample tap on the source water pipeline, upstream of the Source Water Storage Tank. This stream is continuously monitored for turbidity and free chlorine. If the turbidity exceeds 10 NTU, the water is deemed unacceptable for raw water production, and the water is automatically returned to the City's WRP by opening the return valve and closing the tank entrance valve. This action will also stop operation of the main source water pumps and initiate operation of the low flow source water pump to allow continued monitoring of the source water quality. Similar actions are programmed to occur if the free chlorine concentration is less than 1 mg/l in the source water, but this provision has been disabled in favor of achieving virus inactivation by the ultraviolet oxidation reactors. (See Section 2.4 below).

Frequent communication between the staffs of the RWPF and the City's WRP is encouraged to promote awareness of the interdependent nature of the facilities and any unusual conditions which might affect water quality. Any unusual water quality observed in the source water should be investigated to determine if it is due to a short-term anomaly or an upset condition which may result in a significant interruption in source water availability.

## 2.2 MICROFILTRATION MEMBRANE SYSTEM

### 2.2.1 The Microfiltration (MF) System Process

The first treatment step provided is microfiltration, a very efficient form of particle filtration using hollow fiber membranes bundled into pressure vessels in a modular arrangement. The hollow fibers have a consistent porous structure which excludes passage of particles larger than 0.1 microns, including protozoan pathogens such as *Giardia* and *Cryptosporidia*. Flow enters each module and water pressure forces water across the wall of each hollow fiber to its interior. This filtrate is then collected from the top of each module.

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Source water flows from the Source Water Storage Tank to two parallel Pall hollow fiber microfiltration systems and then to the 70,000 gallon Break Tank. Each system contains two feed pumps, reverse filtration pump, influent strainer, 78 parallel vertical microfiltration modules and an automatic operating system. Detailed operation and maintenance instructions are provided in the manual furnished by Pall Corporation. Automatic controls include flow control in response to source water availability (Source Water Tank level) and Break Tank level. Frequent flux maintenance (FM) events using air scour and water flushing are used to remove accumulated solids and maintain optimum operating conditions. Enhanced flux maintenance (EFM) events, sometimes called chemically enhanced backwash, are used to remove mineral or organic buildup, generally 3-4 times weekly. Approximately monthly, a full chemical cleaning regimen, called a clean-in-place (CIP) event, is manually initiated to provide more thorough removal of organic or mineral foulants. Spent flush water and cleaning solutions are returned to the City's WRP.

The performance and integrity of the microfiltration system is continuously monitored by measurement of low-range turbidity in the filtrate by a laser turbidimeter. At least once daily, a Direct Integrity Test (DIT) is conducted on each system, applying pressurized air to the outside of the membranes and observing the pressure response. Pressure loss may indicate a membrane fiber break, with a resulting reduction in effectiveness, particularly as a barrier to passage of protozoan pathogens such as *Giardia* and *Cryptosporidia*. In the event of an unacceptable DIT, procedures to isolate and repair a fiber breach are provided in the Pall manual. Isolation of the breach and a successful DIT must be accomplished before the system can be returned to service. In the event of an unexpected increase in filtrate turbidity, the system will be automatically paused to conduct an immediate DIT to determine if there is an integrity issue. Influent is also monitored for total chlorine residual, but no automated control actions are based on this result.

The Pall Membrane System is a direct Microfiltration membrane system that operates in an outside-in mode. The membrane operation is a four step process: Forward Filtration, Reverse Filtration, Enhanced Flux Maintenance (EFM), and Clean-In- Place (CIP).

Two identical racks of Pall model Aria AP8 microfiltration membranes are installed at the WTP. Each AP-8 unit is designed for 1.25 MGD and includes the following system components:

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- One (1) off-skid module rack – 78 membrane modules per rack
- Two (2) feed pumps with VFD for flow control
- One (1) control panel, one (1) filtrate flow meter, two (2) turbidimeters

Together, the membrane units share the following equipment:

- EFM/CIP Skid System with tank heater
- One (1) 2,500 gallon hot water tank
- Compressed air system for air scour
- Chemical neutralization system

### 2.2.2 Forward Filtration (FF)

Forward filtration is the primary operating mode of the microfiltration system, when water is flowing through the membrane fibers and continuing into the Break Tank for further treatment. Two feed pumps on each skid draw water from the Source Water Tank and push water through the membranes as long as there is adequate water available as indicated by the Source Water Tank level, and space in the Break Tank as indicated by the Break Tank level. The feed pumps are equipped with variable frequency drives to vary the production of the MF system in accordance with the available space in the Break Tank.

### 2.2.3 Flux Maintenance (FM): Air Scrub and Feed Flush

Once an MF skid has processed a designated volume in forward filtration mode, the skid is designated for a Flux Maintenance (FM) event, to occur as soon as conditions permit. When the FM event begins, feed flow to the skid is halted and valves are placed in proper configuration. The reverse flush pump sends filtrate to the inside (lumen) of each membrane tube to dislodge accumulated particles from the outer surface of the tubes. Concurrently, compressed air is diffused into the bottom of each membrane module to create additional turbulence and scrubbing action to efficiently clear the module of particles captured during the preceding filter run. This event is called an air scrub, and is followed by a flush of the system with feed water to continue clearing of the particles and air bubbles. The combined sequence of reverse flush and air scrub followed by feed flush comprises the flux maintenance event.

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Following the FM event, the skid is returned to service to resume forward filtration. FM events will typically occur 1-2 times per hour for each active skid.

#### 2.2.4 Enhanced Flux Maintenance (EFM)

In addition to accumulation of trapped particles, membrane filters are subject to biological activity which can reduce the size and number of available pores within the membrane walls for the passage of water. This phenomenon, termed fouling, in turn causes the required operating pressure to rise, and/or decreases the rate of filtrate production. A pre-emptive chemical cleaning procedure is used to counteract this fouling, allowing the membranes to continue producing filtrate efficiently. The chemical cleaning procedure is called an Enhanced Flux Maintenance (EFM) event, and is activated for each skid after production of a designated volume, normally once every two days of operation. During an EFM, a moderate concentration of sodium hypochlorite (bleach) solution is typically circulated through the membrane system, although “recipes” using other chemicals such as citric acid may be substituted periodically. After the designated circulation time, the chemical is pumped to the equalization tank for neutralization and the membrane system is rinsed before it is returned to service.

#### 2.2.5 Integrity Test (IT)

A key benefit of membrane filtration is its effectiveness as a barrier to protozoan pathogens such as *Cryptosporidia* and *Giardia*. These organisms are significantly larger than the pores within the membrane wall, precluding their passage as long as the membrane remains intact. Membrane integrity is evaluated two ways: by continuous turbidity measurement of the membrane filtrate, and by periodic air pressure hold tests. The pressure hold test was developed with the recognition that under controlled conditions, air will not pass through the membrane wall as long as that wall remains intact. By placing a measured air pressure on the system upstream of the membranes, the operator can confirm that the membranes within the system are intact if the air pressure holds without leakage. If leakage occurs, as indicated by a drop in applied pressure, there is presumed to be a breach of a membrane, which must then be identified and corrected through sealing the lumen and removing it from the flow path. The air pressure hold test is commonly referenced as an Integrity Test (IT) or Direct Integrity Test (DIT) and for this facility is required to be performed daily for each skid.

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### 2.2.6 Clean-in-Place (CIP)

Reliable, efficient MF performance is enhanced through thorough chemical cleaning events to remove organic foulants and mineral scale which may resist the regular flux maintenance procedures. These events circulate cleaning chemicals through the membrane modules, and are called Clean-in-Place events, or CIPs. These typically rely on at least two chemical cycles in sequence, which may include caustic (sodium hydroxide), bleach (sodium hypochlorite) and/or citric acid. In some cycles bleach and caustic may be used in combination. Pall Corporation recommends ongoing consultations with their technical staff so that these sequences may be modified as appropriate based on operating history and water quality. Normal frequency for CIPs is monthly, although this also is subject to adjustment. Following a CIP event, the MF skid should be flushed and checked with a DIT before it is returned to service.

### 2.2.7 Troubleshooting and Alarms

Refer to the Pall Operation and Maintenance Manual for specific information on system alarms and associated troubleshooting.

### 2.2.8 Other Equipment

#### 2.2.8.1 Air Compressors

A compressed air system is provided to support numerous functions of the Microfiltration and Reverse Osmosis systems. Compressed air is used for the air scrub events, the direct integrity tests and air is used to power automated valves and chemical feed pumps. The required air must be instrument quality, meaning it must be dry and free of oils and particulates. The system contains two air compressors, each with a 1.0 micron secondary filter and a 0.01 micron hydrocarbon filter, and a common receiver tank.

#### 2.2.8.2 Clean-In-Place System

The CIP system consists of a heated water storage tank subsystem, a MF CIP recirculation subsystem, and four chemical feed systems. The CIP system is also closely coordinated with the Neutralization System described below. The heated water storage tank subsystem is based around a 2500 gallon tank (T-80) which receives RO permeate and heats it to the desired temperature for cleaning operations. A

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hot water pump (P-80) recirculates water through the heater (H-80) until the desired temperature is achieved. The recirculation system, also referenced as the CHN skid, is based around another 2500 gallon tank (T-40) which is used to batch chemical solutions and as the reservoir for circulating chemical solution through the membrane skids. This system also includes a recirculation pump (P-40) used to push the cleaning solutions through the membranes and is closely coordinated with the chemical feed systems. Chemicals used are citric acid, sodium hypochlorite (bleach), sodium hydroxide (caustic) and sodium bisulfite. Sodium bisulfite is stored in a day tank which can be refilled from the bulk storage tank outside, while the other chemicals are stored in portable plastic totes. Each chemical has a dedicated metering pump used to batch the cleaning solutions and to support the Neutralization System. These chemical feed systems, along with the heated water storage tank, also support the Reverse Osmosis CIP system.

### 2.2.8.3 Neutralization System

The Neutralization System is used to adjust the chemical characteristics of spent solutions to make them suitable for discharge back to the Big Spring WRP. This system is used for cleaning solutions from both the MF system and the RO system, and centers around an 8000 gallon recirculation storage tank (T-70). Following cleaning cycles, spent solutions are pumped to the neutralization tank by the respective recirculation pump to the extent practical, then remaining solution is gravity drained to a sump located east of the hot water tank, where two pumps lift the solution into the neutralization tank. The contents of the tank are checked for Oxidation-Reduction Potential (ORP) and for pH. ORP is brought to a neutral level by the addition of sodium bisulfite, and pH is adjusted up with caustic or down with citric acid. The neutralization pump (P-70) is used to circulate the tank contents and facilitate chemical mixing and is also used to empty the tank contents when acceptable conditions are confirmed.

## 2.3 REVERSE OSMOSIS MEMBRANE SYSTEM

### 2.3.1 The Reverse Osmosis Process

Filtrate from the microfiltration systems is stored briefly in the Break Tank, which supplies feed water to the Reverse Osmosis (RO) system. The reverse osmosis system uses a semi-permeable membrane to remove very small particles and colloids passing the membrane filtration step as well as bacteria, viruses, and a variety of dissolved solids including metals, salts, and medium to large molecular weight

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organic molecules. The membranes are wound in a spiral pattern around a central axis within a horizontal tubular pressure vessel. As flow proceeds the length of the vessel under high pressure, water seeps through the membrane while most dissolved solids remain in the concentrated fluid which continues to the far end. The water passing the membrane, called permeate, is collected as the end product, while the concentrate reaching the far end is redirected to a second stage, where additional permeate is produced and blended with the 1st stage permeate. Second stage concentrate is discharged to Beals Creek in accordance with the facility's TPDES permit.

### 2.3.2 Forward Flow (FF)

Filtrate returns into the Treatment Building from the Break Tank, and sulfuric acid is injected for scale control prior to low pressure pumping. Three low pressure pumps are provided; each is sized to feed a single RO train, with an additional pump serving as a spare. The low pressure pump discharge is routed through two cartridge filters operating in parallel as an additional safeguard against particulates within the RO system. Following the cartridge filters, sodium bisulfite is added to remove any remaining chlorine from the feed water, and an anti-scalant chemical is added to supplement the action of the acid. The prepared feed water is continuously monitored for oxidation reduction potential to ensure that complete dechlorination is accomplished and is monitored for pH to verify it is properly conditioned for reverse osmosis. Water not meeting the RO conditioning criteria is returned to the Break Tank, where it is blended with filtrate and subject to additional chemical conditioning.

Feed water meeting the conditioning parameters is pumped by the high pressure pumps into the RO vessels, operating as described above. Permeate conductivity is continuously monitored at the pipe exiting each train. Upon startup, conductivity will initially be high, and permeate will be diverted back to the Break Tank until conductivity falls below the setpoint value, and it is suitable for use as product water. After startup, the conductivity continues to be monitored continuously and recorded every 5 minutes. If the conductivity exceeds the previous value by 20% or 40µS/cm (whichever is greater) for two consecutive readings, the train will be removed from service until it can be examined to determine if one or more of the membranes has been compromised. Complete operation and maintenance instructions, including chemical cleaning (CIP) procedures, are included in the Pall O&M manual.

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### 2.3.3 Clean-in-Place (CIP)

Periodically, the RO membranes will require cleaning to remove material which may accumulate and obscure the membrane surface, increasing the pressure required to force water across the membrane. Similar to the MF membranes, fouling can occur either through biological activity, or chemical scaling. Biofouling is more commonly observed in the first stage, and is typically cleaned with caustic solution, which may be enhanced through the addition of surfactants or other additives. Chemical scaling can occur when a chemical compound (e.g. calcium carbonate, barium sulfate) is concentrated beyond its limit of solubility. This is most often observed in the second stage, where the feed water has already been concentrated to approximately double the first stage feed concentrations for most constituents, and is further concentrated as it proceeds through the second stage. Chemical scaling is typically resolved by acid cleaning cycles.

CIP for the RO system has a dedicated 1500-gallon conical-bottom CIP recirculation tank (T-95) and pump (P-430), but shares the heated water system and CHN skid with the MF system. Spent solutions are handled by the common neutralization system. Controls for the RO system are less automated than the MF system, with most valves operated manually. The control system does include operator prompts to step through the prescribed sequences.

## 2.4 ULTRAVIOLET DISINFECTION AND ADVANCED OXIDATION SYSTEM

### 2.4.1 The Disinfection/Oxidation Process

Permeate from the RO system proceeds directly to the Ultraviolet (UV) Oxidation system, consisting of two ultraviolet reactors operating in series, preceded by hydrogen peroxide addition. The system provides two simultaneous modes of treatment: ultraviolet radiation and intensive oxidation. Some chemicals of potential concern, such as NDMA, are reduced by the direct action of the ultraviolet radiation, through a process called photolysis. Ultraviolet radiation is also effective as a disinfectant against various pathogens, including viruses, protozoa and bacteria. Although some viruses are not easily inactivated by UV light, they are susceptible to the very high doses applied by the reactors provided. In addition to the radiation/photolysis mode of action, many other chemical compounds, particularly organics, are broken apart by high-level oxidation. This high-level oxidation is accomplished by the interaction of the UV light and hydrogen peroxide, producing a highly charged ion known as a

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hydroxyl radical. This environment, often termed an Advanced Oxidation Process (AOP), allows the destruction of many compounds likely to exist in wastewater-derived sources, such as various pharmaceutical compounds, personal care products, pesticides, and other man-made chemicals. There is evidence the AOP action also provides significant disinfection beyond what is achieved by the UV light alone, but this mode of action has not yet been documented in the water industry for regulatory credit.

#### 2.4.2 Ultraviolet Light Reactors

The permeate feeding the UV reactors is continuously monitored for UV transmittance, a measure of water clarity. This value must be verified weekly by benchtop or laboratory measurement. Each reactor is equipped with a UV sensor which verifies that for a representative location in the reactor, UV light is generated in sufficient quantity and passes easily through the water to provide at least the minimum UV dose expected. This sensor must be checked monthly against the spare sensor, which serves as a reference. The actual dose, designed to achieve destruction of benchmarked contaminants, will be much higher than required for virus or protozoan pathogens. Each reactor is equipped with 72 lamps, and each lamp is monitored to verify that it is on and operating within normal power parameters. If a single lamp is out of service, an alarm will be indicated, notifying the operator that replacement is required. Modeling of the reactor conditions shows that up to two single lamp failures will not create areas of reduced UV dose below the value required for 2-log viral inactivation. If more than two lamps are out of service (between the two reactors), a failure condition will be activated, causing the RO system, and thus the water flow, to shut down. Both reactors are required to be operating to achieve the required 4-log virus inactivation. Detailed operation and maintenance instructions are provided in the Trojan O&M manual.

#### 2.4.3 Hydrogen Peroxide Feed System

A hydrogen peroxide feed system is provided to achieve advanced oxidation conditions as described in the preceding section. This system was provided by US Peroxide as part of the overall AOP package supplied by Trojan UV. The system includes a hydrogen peroxide storage tank system, a duplex metering pump system, and a Koflo inline static mixer, which is located a short distance upstream of the first UV reactor.

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#### 2.4.3.1 Hydrogen Peroxide Storage

Hydrogen peroxide is stored outside the treatment building in a 7800 gallon HDPE tank. The tank is equipped with an outer containment vessel with a volume 110% that of the primary tank, providing containment of the chemical in the event the primary tank is compromised with a leak.

#### 2.4.3.2 Hydrogen Peroxide Feed Pumps

Two ProMinent Gamma metering pumps are provided to dose hydrogen peroxide into the RO permeate prior to the static mixer and UV reactors. Each pump has a capacity of 1.1 gallons per hour, and is expected to dose hydrogen peroxide at a concentration of 4.3 ppm. The feed pumps are located within an enclosure adjacent to the first UV reactor.

### 2.5 PRODUCT WATER PUMPING AND BLENDING FACILITIES

#### 2.5.1 Product Water Blending Overview

The permeate, after treatment by UV Oxidation, is now considered product water, or reclaimed “raw water” suitable for blending with other raw water sources. After leaving the UV reactors, it proceeds to the 0.5 million gallon Product Water Storage Tank. A standpipe, or vertical pipe loop, is located right before the product water pipe exits the Treatment Building to maintain proper pressure on the UV reactors and the RO system, and a final sample tap is available just upstream. The product water has a low pH and is deficient in minerals, and therefore corrosive, but otherwise of excellent purity. Product water is pumped from the Product Water Storage Tank by the adjacent Product Water Pump Station, sending the water approximately one mile to intersect the Spence Pipeline, a 42” raw water pipeline from Lake E.V. Spence. The product water tie-in is on the third and final segment of the Spence Pipeline; this segment begins at the Moss Creek Pump Station adjacent to Moss Creek Lake and continues to the CRMWD Base 5 facility north of Big Spring, where it may be stored in the 15 million gallon balancing reservoir or intersect other pipelines to/from Lake J.B. Thomas and the Odessa/Midland Terminal Reservoir. From this location, raw water is also pumped to the City of Big Spring’s surface water treatment plant.

The Product Water Pump Station consists of three can-mounted vertical turbine pumps operating at constant speed. The product water pumps operate in a lead-lag arrangement based on the available

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water, measured as level in the Product Water Tank. Two pumps are designed to pump the full production of reclaimed raw water from the facility, with the third pump serving as a standby. Detailed operation and maintenance instructions for the pump station and pump control valves are provided in the Flowtronix O&M manual.

## 2.5.2 Water Quality Monitoring

Nitrate is measured continuously in the product water by an online analyzer at this location, and daily grab sample checks of nitrate and nitrite are also conducted.

## 2.5.3 Blend Percentage Monitoring

A signal from the CRMWD Central Operation Center SCADA system relays the measured flow from the Moss Creek Pump Station, enabling the continuous calculation of the percentage of reclaimed water in the Spence Pipeline. The contribution is calculated as the product water flow divided by the sum of the product water and Moss Creek Pump Station flow. This contribution should average approximately 15%, but is currently limited by TCEQ to a maximum of 20%. If extreme low levels in Lake Spence require the use of a modified blending scheme in the future, this scheme will require modification of the current blending limit.

## 2.6 CHEMICAL FEED SYSTEMS

### 2.6.1 Chemicals Used

| Chemical            | Common name(s) | System | Use                 | Storage          |
|---------------------|----------------|--------|---------------------|------------------|
| Sodium hypochlorite | Bleach         | MF     | EFM/CIP             | Tote             |
| Citric Acid         | Citric         | MF     | CIP/Neutralization  | Tote             |
|                     |                | RO     | CIP/Neutralization  |                  |
| Sodium hydroxide    | Caustic [soda] | MF     | EFM/CIP/Neut.       | Tote             |
|                     |                | RO     | CIP/Neutralization  |                  |
| Sodium bisulfite    | Bisulfite, SBS |        |                     | Bulk (5500 gal.) |
|                     |                | MF     | Neutralization      | Day ( 150 )      |
|                     |                | RO     | Feed dechlorination | Day ( 330 )      |
| Sulfuric Acid       |                | RO     | Feed conditioning   | Bulk (5500 gal.) |
|                     |                |        |                     | Day (405 gal.)   |
| Anti-scalant        |                | RO     | Feed conditioning   | Tote             |
| Hydrogen peroxide   | Peroxide       | UV/AOP | Oxidation           | Bulk (7800 gal.) |
|                     |                |        |                     |                  |

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## 2.6.2 Chemical Storage and Handling

### 2.6.2.1 Chemical Vendors

All chemicals are provided by the following supplier:

|                       |                                                                    |
|-----------------------|--------------------------------------------------------------------|
| <b>Supplier</b>       | Hydro Plus                                                         |
| <b>Contact Name</b>   | Will Dugger                                                        |
| <b>E-mail Address</b> | <a href="mailto:wdugger@hydro-plus.net">wdugger@hydro-plus.net</a> |
| <b>Phone</b>          | 325-660-5350                                                       |

### 2.6.2.2 Ordering Procedures

Deliveries are not on a fixed schedule, but are usually made on intervals of approximately one month. Allow at least **one week** for delivery. Check every other day that sufficient supply of each chemical is on hand to meet the anticipated usage for the next **two weeks**. If additional supplies are required, contact the supplier as indicated above to request delivery.

## 2.7 RESIDUALS HANDLING

Several liquid streams result from the RWPF treatment processes in addition to the product water. Each of these must be managed properly in order to meet the facility's environmental and regulatory obligations. Additional regulatory discussion, including reporting requirements, is included in Chapter 7.

### 2.7.1 Membrane Filtration Flushing

Microfiltration membrane flushes are described in Section 2.2, and result in a stream of water which is chemically similar to the source water, but concentrated with accumulated particles removed during the previous forward filtration run. This stream is directed to the Big Spring WRP through the facility's main sewer line, and is subject to monitoring and reporting to the City of Big Spring in accordance with Wastewater Discharge Permit No. COBS-011-01. A copy of the permit is included in Appendix J.

### 2.7.2 Membrane Cleaning Residuals

CIP events for both the MF and RO systems result in spent chemical solutions upon completion of the cleaning cycles. Although the solutions contain strong chemicals, they are chemically simple and are

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readily made safe through pH neutralization or chemical reduction (for bleach). These neutralized chemical solution batches are also discharged to the sewer, and hence to the Big Spring WRP, subject to the Wastewater Discharge Permit.

### 2.7.3 RO Concentrate Discharge

The reverse osmosis process is described in Section 2.3, and produces a large concentrate stream containing the dissolved minerals and organics separated from the product water. This water is routed to a discharge structure on Beals Creek, and is regulated by a Texas Pollutant Discharge Elimination System (TPDES) permit issued by the TCEQ. A copy of the TPDES permit is included in Appendix G. Although the concentrate is high in dissolved solids, it was suitable for discharge due to the high background concentration of dissolved salts in Beals Creek.

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### **3.0 MONITORING AND LABORATORY PROCEDURES**

#### **3.1 CRITICAL PROCESS MONITORING**

Due to the unusual nature of the source water origin and the potential to impact public health in the public water systems receiving the product water produced by the facility, the Texas Commission on Environmental Quality (TCEQ) requires significant monitoring of plant operations and performance in order to detect unusual events which might compromise public health.

##### **3.1.1 Monitoring Overview**

A series of measures are included to monitor the quality of water as it enters the facility and passes through the treatment steps before ultimately blending with other raw water in the E.V. Spence pipeline. Most of these measures consist of online instruments which report either directly to the on-site Supervisory Control and Data Acquisition (SCADA) system or to an individual process control system such as the microfiltration control panel. This information is used to initiate automated control functions for efficient operation as well as alerting the control system and staff of unusual conditions, and in many cases triggering automated responses to prevent production and distribution of water which has not been treated through the full regimen intended. Although these measures are also noted elsewhere, this section provides a summary of the critical process monitoring required as a condition of TCEQ approval of the product water as a source for municipal water supply.

##### **3.1.2 Central Operation Center Monitoring**

Although the Raw Water Production Facility will typically be manned for only one shift (5 days/week), the plant will be continuously monitored through SCADA at the CRMWD Central Operations Center. Key operating parameters and alarm conditions will be observed at this location, allowing remote shutdown if necessary, although programming is already provided to stop production when integrity issues are observed (high source water turbidity, high MF filtrate turbidity, MF DIT failure, RO permeate conductivity increase, UV excessive lamp failure, low UVT or low UV dose). Central operators can also call on field operators or the on-call plant operator to perform critical on-site shutdown or other emergency functions. The Central Operations Center will have primary responsibility for monitoring the percentage of product water in the E.V. Spence raw water pipeline.

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### 3.1.3 Source Water Monitoring

Suitable source water is important as a starting point for the production of raw water for public supply. Turbidity is monitored continuously on source water prior to entering the Source Water Storage Tank. If the turbidity exceeds 10 NTU, source water pumping is temporarily stopped. A diversion valve allows a small pump to be operated to allow continued monitoring of the source water turbidity, with the diverted flow returning to the influent of the Big Spring WRP.

### 3.1.4 Microfiltration Monitoring

Each MF system is checked daily by a Direct Integrity Test, applying pressurized air to the membrane and measuring the pressure drop over time to confirm that the entire membrane surface of each fiber is intact. The microfiltration system is also monitored continuously by measuring the filtrate turbidity. Turbidity above 0.15 NTU indicates incomplete particle removal, and triggers an automatic shutdown. An additional DIT is to be performed in this event before the system is returned to service.

### 3.1.5 Reverse Osmosis Monitoring

RO permeate from each skid is continuously monitored for conductivity, an indication of salt passage. The measured value is recorded every 5 minutes, and an alert level is calculated as the larger of 120% of the recorded value or the recorded value plus 40  $\mu\text{S}/\text{cm}$ . At any given time, the current conductivity value is compared to the latest recorded value. If the alert value is exceeded, the event is noted, and the system monitoring continues for an additional 5 minutes. If the alert value is still exceeded after 5 minutes, the RO skid is shut down for troubleshooting, requiring an on-site operator to determine when a restart is appropriate. If, after 5 minutes, the permeate conductivity is below the alert value, the alert condition is cleared and a new alert value is calculated. This approach is used to identify sudden changes in system performance which could be an indication of a membrane breach that might compromise treatment. The 5-minute delay reduces the premature shutdowns which could be triggered by a momentary spike which is unrelated to membrane integrity. Some examples are included to illustrate the system response:

Example 1: At 9:25, a Skid B conductivity value of 76  $\mu\text{S}/\text{cm}$  is recorded. An alert value is calculated as the larger of:  $1.2 \times 76 = 91.2$  and  $76 + 40 = 116$ . At 9:30, a Skid B value of 109  $\mu\text{S}/\text{cm}$  is measured. Since

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this is below the alert value of 116, a new alert value [156] is calculated, and the system continues to operate in normal mode.

Example 2: At 11:10, a Skid A conductivity value of 93  $\mu\text{S}/\text{cm}$  is recorded. An alert value is calculated as 133. At 11:15, a Skid A value of 155 is measured. This value is identified as an alert condition, and the alert value of 133 is held for an additional 5 minutes. At 11:20, a Skid A value of 127 is measured. Since this is below the alert value of 133, the alert condition is resolved and a new alert value of 167 is established.

Example 3: At 3:00, a Skid B conductivity value of 226  $\mu\text{S}/\text{cm}$  is recorded. An alert value is calculated as 271. At 3:05, a Skid B value of 302 is measured, and identified as an alert condition. At 3:10, a Skid B value of 288 is measured. Since this is above the alert value of 271, Skid B will alarm and shut down until manually restarted by the operator.

### 3.1.6 Ultraviolet Disinfection Monitoring

Ultraviolet disinfection provides critical virus inactivation in addition to its function in the advanced oxidation of potential contaminants of concern. The virus inactivation credit granted by TCEQ is based on validation studies commissioned previously by Trojan UV to demonstrate their effectiveness for pathogen reduction. To ensure that virus inactivation is achieved continuously, several related parameters are monitored. Ultraviolet Transmittance (UVT) is measured in the RO permeate prior to reaching the UV reactors. To stay within the reactors' validated range, the UVT must be above 41%. Each reactor is provided with a UV intensity sensor, which demonstrates that the radiant energy anticipated from the lamps is actually generated and passes through the water. The sensor must indicate an intensity ( $S/S_0$ ) above 0.692 to result in the prescribed virus inactivation credit. Finally, a minimum of 142 of the 144 total lamps must be operating for TCEQ to grant the virus inactivation credit. Failure to meet any of these conditions will cause automatic shutdown of the RO system to prevent production of water which does not meet the disinfection requirements.

### 3.1.7 Product Water Blending Monitoring

Product water is monitored after the second UV reactor, at a tap located adjacent to the standpipe in the Treatment Building. The product water is tested daily for nitrite, weekly for *E. Coli* bacteria, monthly for *Cryptosporidium* and *Giardia*, and quarterly for a wide range of parameters listed in the U.S. Safe Drinking Water Act. Product water is also monitored continuously for nitrate using an online analyzer.

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Additional sampling will be conducted for a Texas Water Development Board project to monitor water quality achieved in a dedicated potable reuse facility.

### 3.1.8 Critical Monitoring Summary

The following table summarizes the critical monitoring required to comply with the source water blending approval granted by the TCEQ.

| <b>Parameter</b>      | <b>Limit</b>                            | <b>Frequency</b>     | <b>Stream/Location</b>                                   | <b>Action</b>                                                |
|-----------------------|-----------------------------------------|----------------------|----------------------------------------------------------|--------------------------------------------------------------|
| Turbidity             | 10 NTU                                  | Continuous           | Source Water, U/S Source Water Tank                      | Stop Source Water Pumping                                    |
| Direct Integrity Test | 0.07 psi/min.                           | Daily                | Microfiltration System (each skid)                       | Stop MF System                                               |
| Turbidity             | 0.15 NTU                                | Continuous           | MF Filtrate (each skid)                                  | Conduct DIT                                                  |
| Conductivity          | 40 $\mu$ S or 20% increase              | 5 minutes            | RO Permeate (each skid)                                  | Stop RO System                                               |
| Nitrate               | 10 mg/l                                 | Daily                | Product Water, U/S Product Water Tank                    | Stop Production (Both RO skids and Product Water PS)         |
| Nitrite               | 1 mg/l                                  | Daily (working days) | Product Water, U/S Product Water Tank                    | Stop Production (Both RO skids and Product Water PS)         |
| E. Coli               | 0                                       | Weekly               | Product Water, U/S Product Water Tank                    | Stop Production (Both RO skids and Product Water PS)         |
| UV Transmittance      | >40.3%                                  | Continuous           | RO Permeate, U/S UV reactors                             | Stop Production (Both RO skids)                              |
| UV Dose               | >100 mJ/cm <sup>2</sup> in each reactor | Continuous           | UV Reactors                                              | Record off-spec condition or Stop Production (Both RO skids) |
| UV Lamps              | >142 total lamps on                     | Continuous           | UV Reactors                                              | Record off-spec condition or Stop Production (Both RO skids) |
| Blend Ratio           | 20% reclaimed water                     | 4 hours              | Spence Pipeline, monitored from Central Operation Center | Reduce Product Water Pumping                                 |

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### 3.1.9 Critical Monitoring Verification

Critical monitoring actions should be verified at least annually to demonstrate the protective controls are functioning as intended. The following testing should be conducted and documented using the Verification Record included in Appendix L.

#### Source Water System:

1. **Turbidity.** Confirm high turbidity response by placing turbidimeter calibration tray (“Ice-pick”) in sample well. Hold signal output during placement and release when setup is ready. System should turn source water pumps off, switch valves at vault, and pump with small pump until acceptable turbidity is restored and operator resumes normal operation. Check set points for high condition.

#### Microfiltration System (Check separately for each skid):

2. **Filtrate Turbidity.** Force high filtrate turbidity by disconnecting sample tube, draining sample well and filling with unfiltered source water. Hold signal output during placement and release when setup is ready. Confirm that high turbidity alarm is triggered and skid is locked out until alarm is acknowledged.
3. **DIT.** Force DIT failure condition by allowing air to release through loosened spare filter air connection during pressure hold phase (setpoint may also be reduced to decrease air release required). Confirm that failure alarm is activated and skid is locked out from forward operation. If setpoint is changed, make sure normal value is restored. Tighten air connection after completion of test.

#### Reverse Osmosis System (Check separately for each skid):

4. **Conductivity.** Force high permeate conductivity (at least 100 mS/cm above base reading) by placing conductivity sensor in elevated conductivity solution. Hold signal output during placement and release when setup is ready. System should record single high value for 5 minute reading and remain in operation. Maintain high conductivity sample exposure for up to 15 minutes. System should indicate high conductivity alarm and shut down.

#### Ultraviolet Oxidation

5. **UV Transmittance.** Manually enter low UV Transmittance (<40%) at Trojan panel. RO Permissive should be immediately suspended, resulting in “UV Not Ready” indication and shutdown of both RO skids. Restart with normal transmittance should allow normal operation to resume.
6. **UV Dose.** Disconnect sensor from UV reactor. (Each reactor to be tested independently). Clear “End Cap Open” alarm. RO Permissive should be immediately suspended, resulting in shutdown of RO skids upon completion of the startup cycle. Restart with sensor in place should allow normal operation to resume.
7. **UV Lamps.**
  - a. Disconnect one ballast, shutting down 2 lamps. (UV must be powered down to disconnect ballast.) System should alarm the reduced lamp condition, but should continue to operate normally.

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- b. Disconnect second ballast (opposite reactor), shutting down 4 lamps total. System should alarm the excessive lamp out condition, and suspend the RO Permissive, resulting in shutdown of RO skids upon completion of the startup cycle. (Operation will be interrupted by UV power down.)
- c. Reconnect all ballasts. Alarms should stop and system should restart normally.

### **3.2 TURBIDITY – ONLINE MONITORS**

Turbidity is an indication of the light-scattering properties of water solutions, and is well-correlated with the concentration of particles. Turbidity is used at the RWPF as a key indication that the Big Spring Water Reclamation Plant is meeting its goals for removal of solids and source water is deemed acceptable for processing. Source water is sampled near the flow meter, prior to entering the Source Water Storage Tank, with a maximum acceptable turbidity of 10 NTU. Consult the Hach O&M manual for detailed operation and maintenance instructions for the turbidimeters.

The MF systems also include turbidimeters, with a conventional scatter-type device on the influent source water, and a laser turbidimeter on the filtrate. The laser device measures light passage through the sample rather than the light-scattering method used for the source water devices. The laser unit is required to provide a meaningful measurement on the filtrate, which is typically free of particles. The alert level for filtrate is 0.015 NTU, sometimes indicated as 15 mNTU. Levels above this will trigger a shutdown of the MF skid as noted in Section 3.1.4. The laser units are also manufactured by Hach, and the detailed operation and maintenance instructions are contained in the Hach portion of the Pall System manual.

### **3.3 CHLORINE RESIDUALS – ON-LINE MONITORS**

Two Hach chlorine residual analyzers are provided at the RWPF. The first is designed to measure free chlorine in the source water upstream of the Source Water Storage Tank. This was originally required by TCEQ, but its use is now at the discretion of the operating staff. It is useful in documenting the free chlorine present in the source water, but is not essential. The second is designed to measure total chlorine in the source water feed to the MF system. This is also for informational purposes, and provides the operator with a record of chlorine fluctuations after storage in the Source Tank. Chlorine at this point in the process is a benefit in preventing biological growth in the MF system, but must be removed prior to reaching the RO membranes downstream. Both monitors require a supply of buffer solution to

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continue operation, and require a pumped sample to the analyzer. The pre-tank sample is shared with the source water turbidimeter, while the post-tank sample relies on a dedicated pump.

### **3.4 TEMPERATURE AND PH**

Temperature and pH are measured at several locations, using Rosemount devices which integrate the measurement of both parameters. They are used to monitor conditions during forward filtration as well as cleaning cycles. Transmembrane pressures are sensitive to water temperature, and pH control is very important to the chemical conditioning of the RO feed, to prevent chemical scaling of the membranes. Certain cleaning cycles rely on pH control for proper cleaning conditions, and neutralization is required before spent cleaning solutions can be returned to the Big Spring WRP. Finally, pH is a measured parameter for the facility's concentrate discharge to Beals Creek.

### **3.5 RECORDING DATA INTO SCADA FOR REPORTS**

The membrane systems and UV system are all equipped with an abundance of monitoring instruments and automation to control operation and record pertinent data. These data are in turn recorded by the plant SCADA system, generally at 5-minute intervals, to document the plant performance for the benefit of operational optimization, regulatory compliance, identification of maintenance needs and troubleshooting. Periodically data will require archiving to limit the data storage requirements of the plant computer and to provide permanent secure storage of the information.

### **3.6 REFERENCE LABORATORIES**

CRMWD currently utilizes the services of the City of Odessa for all outside laboratory work. Most of this work is to satisfy TCEQ requirements as contained in the blending authorization (Appendix E), but some testing is done for the plant operations, as recommended by the manufacturers. Testing should be scheduled and coordinated in advance to allow determination of sample containers required, compliance with allowable hold times, sample preparation and preservation, etc.

|                        |                                                  |
|------------------------|--------------------------------------------------|
| <b>Laboratory</b>      | City of Odessa                                   |
| <b>Mailing Address</b> | 817 W. 42 <sup>nd</sup> Street, Odessa, TX 79764 |
| <b>Phone</b>           | 432-368-3536                                     |
| <b>Email</b>           | jwells@odessa-tx.gov                             |

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## 4.0 EMERGENCY RESPONSE AND COMMUNICATION

### 4.1 NOTIFICATIONS OF COMPROMISED TREATMENT EVENTS

Due to the unusual nature of the source water origin and the potential to impact public health in the public water systems receiving the product water produced by the facility, communication of unusual events which might compromise public health is required. Specifically the following events require issuing notice to the TCEQ and the receiving Public Water Systems:

- a. Bypass of a Treatment Process. If water is pumped into the Spence Pipeline without treatment by Microfiltration, Reverse Osmosis and UV Disinfection, the District must notify regarding the omission, including what step was compromised and the amount of water involved.
- b. Excessive Nitrate/Nitrite. If product water nitrate/nitrite concentrations exceed 10/1 mg/l, respectively, the water downstream of the blending point in the Spence Pipeline must be tested. If concentrations at this location also exceed the respective drinking water limits of 10 and 1 mg/l, the District must notify.
- c. Operation after DIT Failure. If water is treated with a microfiltration unit which has failed its Direct Integrity Test without passage of subsequent retest, the District must notify.
- d. Operation after Conductivity Failure. If water is treated with a reverse osmosis unit which has exceeded its Conductivity limit for more than two consecutive tests, the District must notify.
- e. Extended UV non-compliance. If water is treated for more than 4 hours without proper virus inactivation in accordance with the site-specific TCEQ requirements, the District must notify.
- f. If the product water tests positive for *E. Coli*, the District must notify.

#### 4.1.1 Receiving Water Systems

The following systems have the potential to receive blended water which includes product water from the facility:

- 1) The City of Big Spring (PWS ID 1140001)
- 2) The City of Snyder (PWS ID 2080001)
- 3) The City of Odessa (PWS ID 0680002)
- 4) The City of Stanton (PWS ID 1590001)
- 5) The City of Midland (PWS ID 1650001)

Each system must be notified of a reportable event within 24 hours, unless it is verified that the system was not taking water including the product water for the duration of the event, including applicable

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travel time. Refer to the CRMWD Working Directory in Appendix A for current contact information for each City.

#### 4.1.2 Texas Commission on Environmental Quality (TCEQ)

In addition to receiving systems, TCEQ must be notified of an event listed above within 24 hours by telephone at 1-888-777-3186 or by e-mail at [pdws@tceq.state.tx.us](mailto:pdws@tceq.state.tx.us).

Within 5 working days, the District must submit written notification to:

TCEQ Technical Review and Oversight Team (MC 159)  
P.O. Box 13087  
Austin, TX 78711-3087

The written notification must include:

- a. The problem that resulted in the event;
- b. The corrective actions taken;
- c. The quantity and duration of any unacceptable water discharged to the Spence pipeline; and
- d. A list of the PWSs using the water at that time.

## 4.2 EMERGENCY RESPONSE AND CONTINGENCY PLAN [RESERVED]

## 4.3 MATERIAL SAFETY DATA SHEETS (MSDS)

The MSDS documentation required for the following chemicals can be found in Appendix C.

Sodium Bisulfite  
Sodium Hypochlorite (Chlorine Bleach)  
Sodium Hydroxide (Caustic Soda)  
Citric Acid  
Sulfuric Acid  
Anti-scalant  
Hydrogen Peroxide

## 4.4 NSF/ANSI CERTIFICATION DATA

Chemicals used in the Raw Water Production Facility are required to be certified for use in potable water production in accordance with NSF Standard 61. A certificate should be provided by the supplier whenever a new source is used or otherwise upon request.

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## **5.0 MAINTENANCE**

This section provides a brief overview of maintenance activities required for sustainable operation of the Raw Water Production Facility. Each equipment system requires specific actions to keep the facility operating reliably and efficiently, and continuing to produce water which is safe and economical. The specific recommendations for preventive maintenance, lubrication, calibration, cleaning, scheduled replacement and troubleshooting are located in the operation and maintenance manuals issued by each manufacturer/supplier of the major equipment systems.

### **5.1 MICROFILTRATION MEMBRANE SYSTEM**

Maintenance of the microfiltration system includes daily EFM cleans (typically initiated automatically), monthly CIP events for each skid, and frequent observation of the pumps and strainers. Careful attention to operating parameters is also a key to maintenance, since problems tend to get worse with time. Early identification may allow operational adjustments rather than replacement of components in some cases. Frequent inspection for water or chemical leaks, unusual noises or vibrations increase the opportunity for early diagnosis.

Direct integrity tests are scheduled to occur automatically; these should be verified daily that they are recorded properly and have satisfactory results. If a high filtrate turbidity is recorded, an additional DIT should be performed, and if an integrity test fails, the system should be checked for broken fibers in accordance with Pall's recommended procedure. Pall should also be consulted if any unusual events are observed related to the MF system.

### **5.2 REVERSE OSMOSIS MEMBRANE SYSTEM**

Similar to the MF system, routine maintenance of the RO system includes CIP events, which may vary in frequency depending on the operating conditions observed. The RO system should also be frequently observed for leaks, noises and vibrations which could indicate a change in operation, along with careful attention to the operating parameters indicated on the SCADA system. Periodic trending capabilities are built into the operating software, and can be very useful in identifying changes which could require operational adjustments or physical adjustments or replacement of worn parts. Chemical preconditioning is important to the RO system, and periodic testing of the feed water is needed to make

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sure acid and anti-scalant dosing are appropriate to the current water quality. Avista (anti-scalant manufacturer) and Pall Corporation are both available to assist in this determination.

### **5.3 UV DISINFECTION SYSTEM**

The UV disinfection system has no moving parts, but will still require regular attention. The UVT monitor requires regular checks in accordance with TCEQ requirements, and the UV sensor in each reactor requires monthly checks against the spare sensor. Lamp life will require monitoring so that replacements are ordered for a timely exchange when the maximum lamp operating hours are reached. If any lamps fail before scheduled replacement, prompt replacement is needed to maintain the required disinfection credit.

The hydrogen peroxide system does have moving parts and will require frequent observation to confirm it is dosing as intended, and that degassing features are working properly to allow smooth operation.

### **5.4 CHEMICAL FEED SYSTEMS**

Each chemical feed system requires attention to confirm that chemicals are being dosed properly. This includes periodic calibration as well as physical observation of the pumps in operation, as well as monitoring the related parameters through system monitoring (pH, ORP, etc.) Some chemical systems include screens to intercept foreign material from the chemical supply, and these must be periodically checked and cleaned if necessary.

### **5.5 SOURCE WATER PUMP STATION**

The source water pump station should be checked frequently for accumulation of floating debris and to observe that each pump operates normally. Check valves and pumps require periodic inspection to confirm that they are free from obstructions and are functioning properly. SCADA records should be regularly consulted for any changes in typical flow rates. The manholes in the gravity portion of the source water system should also be periodically inspected for accumulation of solids.

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| <b>COLORADO RIVER MUNICIPAL WATER DISTRICT<br/>RAW WATER PRODUCTION FACILITY – BIG SPRING</b> | <b>OPERATION AND MAINTENANCE<br/>MANUAL</b> |                                                                            |

## **5.6 PRODUCT WATER PUMP STATION**

The product water pump station should be observed for general operation, including vibration, noises and leakage. The pit underneath should also be checked for leakage. Similar to the Source Water Pump Station, the flow data should be regularly reviewed for inconsistencies.

## **5.7 FLOW METERS**

The source water and product water flow meters are independent from the membrane systems, and will require periodic confirmation/calibration, but otherwise require little attention unless unusual conditions are observed.

## **5.8 VALVES**

### **5.8.1 Butterfly Valves**

Numerous butterfly valves are included in the membrane systems provided by Pall, but there are additional valves provided independently. These require periodic operation for exercise if they are not used frequently for operation.

### **5.8.2 CLA-VAL Flow Control Valves**

The Product Water Pump Station includes Cla-Val flow control valves on the discharge of each pump. These should be monitored for indications of internal leakage or other indications of inconsistent operation.

|                                                                                               |                                                       |                                                                            |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------|
| <b>SECTION:<br/>6</b>                                                                         | <b>OPERATING PROCEDURES<br/>RECORDS AND REPORTING</b> | <b>REVISION NO.: 0<br/>EFFECTIVE DATE: NOVEMBER 2013<br/>PAGE 38 OF 42</b> |
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## 6.0 RECORDS AND REPORTING

This section tells what records (operating data, laboratory results, training records, etc.) are kept and for how long. It also identifies the individual who maintains the plant's "official" records and tells where the records are stored. The section contains original copies of the daily log sheets used at the plant and the monitoring reports that must be filed, along with instructions for completing these forms.

Daily records and reports of the operation of the plant and system will serve many useful purposes. They are helpful to those directly responsible for plant and distribution system operations and to city officials, consulting engineers, state regulatory agencies, and others who have an interest in evaluating water characteristics, treatment costs and plant performance.

The operator should use these records as a guide in regulating, adjusting and modifying the treatment process and operation. The establishment of a reliable and continuing record of proof of performance, justifying decisions, expenditures, and recommendations is of great importance. Should an adverse legal action be threatened, records and reports provide the administration and legal counsel with information upon which a sound defense and adjustment may be established.

### 6.1 RECORD MAINTENANCE

The TCEQ recognizes this facility as having a unique and critical role in production of water which is ultimately distributed for human consumption. They have stipulated specific data retention times for the facility in their authorization, which is included in Appendix E. It is summarized as follows:

Minimum of 2 years:

|                                                     |                                                |
|-----------------------------------------------------|------------------------------------------------|
| Daily Chemical Usage (except weekends & holidays)   | Water Volume Treated Daily                     |
| Cleaning dates for Storage Tanks & other facilities | Maintenance Records for equipment & facilities |

Minimum of 3 years:

|                                                  |                                                          |
|--------------------------------------------------|----------------------------------------------------------|
| Filtrate Turbidity (each MF skid)                | Calibration records for equipment performance monitoring |
| All data for virus inactivation calculation (UV) |                                                          |

|                                                                                               |                                                       |                                                                            |
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Minimum of 5 years:

|                                           |                                                 |
|-------------------------------------------|-------------------------------------------------|
| Blending Authorization (after expiration) | Inspection Results for Water Storage Facilities |
|-------------------------------------------|-------------------------------------------------|

Minimum of 10 years:

|                                                                                       |                                                                                          |
|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Daily Maximum Source Water Turbidity                                                  | Daily Maximum Flow to MF Skids                                                           |
| Total Filtrate from each MF Skid                                                      | Daily Total Flow to RO Skids                                                             |
| Daily Maximum MF Filtrate Turbidity                                                   | DIT Test Pressures and Decay Rates                                                       |
| Equipment Performance Correction Measures                                             | CIPs Performed (MF and RO)                                                               |
| Daily Maximum RO Permeate Conductivity (each skid)                                    | Daily Minimum UV dose (each reactor) and calculation parameters                          |
| Daily Volume Off-spec Water (UV system)                                               | Consecutive Off-spec Operating Hours (UV)                                                |
| Monthly Percentage Off-spec Water                                                     | Daily Volume Source Water Treated                                                        |
| Daily Volume Product Water Blended                                                    | Daily Max Percent Product Water in Raw Blend                                             |
| Daily Nitrate/Nitrite Concentrations                                                  | Weekly E. Coli Results, Source and Product Water                                         |
| Daily TOC (first month only) for Source Water, RO Feed, RO Permeate and Product Water | <i>Cryptosporidium</i> and <i>Giardia</i> lab reports for Source Water and Product Water |
| All chemical analyses                                                                 |                                                                                          |

## 6.2 FORMS AND INSTRUCTIONS

### 6.2.1 Daily Logs

The treatment systems employed at the RWPF are highly automated and monitored, so much of the key operating information is automatically recorded by the equipment control systems and by the plant SCADA system. However, there are a few items which operators will identify that need to be recorded manually, especially observations of any unusual or varying equipment performance characteristics which may not be obvious from the automated records. A consistent format of the staff's choosing is recommended to maximize the value of the daily logging of information; however, it should be

|                                                                                               |                                                       |                                                                            |
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recognized that this daily log will evolve as new issues evolve and old items are determined to be of less value.

### 6.2.2 Maintenance Records

Detailed maintenance records are helpful in documenting required preventive maintenance, and tracking recurring problems which may require future equipment or system modifications. Similar to the daily log, the maintenance log should be developed, kept and adjusted by the operating staff to meet the needs of the facility. Preventive maintenance records can be critical in preserving equipment warranties and records of failures, parts replacement, etc. can be extremely valuable if troubleshooting is required to resolve a nuisance condition or premature failure of components.

## 6.3 REGULATORY REQUIREMENTS

### 6.3.1 Site-Specific Authorization for Raw Water Blending

The Raw Water Production Facility is the first facility in Texas approved as a direct potable reuse facility, meaning that the reclaimed water is not discharged to an environmental buffer before it is incorporated into the drinking water supply. Because there are no published regulations or guidelines for this form of water reuse, the facility was regulated under the TCEQ's jurisdiction to review and approve sources of public water supply. After an extended dialogue with TCEQ staff regarding the proposed facility, initial approval was granted through the approval of the membrane pilot study via a letter dated May 26, 2010. In response to comments submitted on behalf of the District, an amended letter was issued dated November 30, 2010. Construction plans and specifications were approved by TCEQ via a letter dated March 14, 2011. Following construction of the treatment facilities, submission of UV reactor validation data for pathogen inactivation, and testing by TCEQ of a sample from the full-scale facility, TCEQ approved the facility to begin blending of the product water with other raw water sources in a letter dated April 11, 2013. This letter supersedes the previous documents and serves as the current governing document for the RWPF. Subsequent correspondence with TCEQ has been exchanged addressing minor issues of operating protocol and monitoring, and a replacement document is anticipated to be issued eventually. The current approval letter is included in Appendix E.

|                                                                                               |                                                       |                                                                            |
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### 6.3.2 Monthly Operating Report

A key provision of the blending approval is the monthly submission of an operating report detailing recorded performance from the preceding month. This monthly operating report, or MOR, is similar to reports required of surface water treatment facilities in Texas, but the report has been customized for the RWPF due to its unique configuration and use. A copy of the current MOR form is included in Appendix F.

### 6.3.3 TPDES Permit (Concentrate Discharge)

The reverse osmosis treatment system produces a concentrated reject stream as described in Section 2.7.3. This flow is discharged to Beals Creek in accordance with a Texas Pollutant Discharge Elimination System Permit (TPDES Permit No. WQ0004872000) issued August 6, 2009. This permit details the allowable flow and pollutant concentrations, monitoring requirements and other conditions. A copy of the permit is included in Appendix G. The permit will expire July 1, 2014 and typically at five year intervals after that. A permit renewal application should be made at least 6 months prior to the permit expiration. The TPDES permit requires submission of a monthly Discharge Monitoring Report (DMR); an example form is included in Appendix H.

### 6.3.4 City of Big Spring Wastewater Discharge Permit (Return Sewer Discharge)

Other byproduct or residual flows from the RWPF are returned to the Big Spring Water Reclamation Plant via a sewer line from the plant site. These flows were described in Sections 2.7.1 and 2.7.2, and the sewer line also collects the sanitary flow from the Treatment Building. The return flow discharge is authorized by a discharge permit issued by the City of Big Spring, Wastewater Discharge Permit No. COBS-011-01. A copy of the permit is included in Appendix J. A required monthly report for submittal to the City is included in Appendix K.

### 6.3.5 City of Big Spring Water Reclamation Authorization (Chapter 210)

The transfer of source water from the Big Spring Water Reclamation Plant to the District's Raw Water Production Facility is authorized by the TCEQ in accordance with Chapter 210 of the Texas Water Code.

|                                                                                               |                                                       |                                                                            |
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This authorization is associated with the City's TPDES discharge permit for their facility and was reauthorized April 5, 2013, following issuance of a new TPDES permit to the City of Big Spring. Although the authorization is issued to the City as the permit holder, compliance with the authorization is a joint effort between the City and the District, including data sharing to allow the City to comply with their reporting requirements. A copy of the current authorization is included in Appendix I.

|                                                                                              |                                                              |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>COLORADO RIVER MUNICIPAL WATER DISTRICT</b><br>RAW WATER PRODUCTION FACILITY – BIG SPRING | <b>OPERATION AND MAINTENANCE MANUAL</b><br><b>APPENDICES</b> |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|

## **APPENDIX A CRMWD WORKING DIRECTORY**

# CRMWD

*Colorado River Municipal Water District*

## Working Directory



Revised February 2013



# Colorado River Municipal Water District WORKING DIRECTORY

|                           |   |
|---------------------------|---|
| Mobile Units.....         | 2 |
| Facilities.....           | 4 |
| Contacts & Customers..... | 6 |

## **HEADQUARTERS OFFICE - BIG SPRING\***

400 East 24th Street

P.O. Box 869

Big Spring, Texas 79721-0869

Phone 432-267-6341 Fax 432-267-3121

**\*OFFICIAL ADDRESS OF CRMWD FOR NOTICE AND BILLING**

## **CENTRAL CONTROL - BIG SPRING**

401 East 24th Street

P.O. Box 869

Big Spring, Texas 79721-0869

Phone 432-267-6070\*\* Fax 432-268-1196\*\*

WATTS 800-687-2452\*\*

**\*\*UNLISTED NUMBERS for internal use and operations only**

## **WATER QUALITY LAB / RECORDS STORAGE**

406 East 23rd Street

P.O. Box 869

Big Spring, Texas 79721-0869

Phone 432-267-6341 Fax 432-267-3121

**CRMWD WORKING DIRECTORY**  
**Mobile Units**

| <i>CAR #</i> | <i>NAME</i>                 | <i>DEPT</i> | <i>CELL</i>  |
|--------------|-----------------------------|-------------|--------------|
| Car 1        | John Grant                  | GM          | 432-213-0345 |
| Car 2        | Mitch Holmes                | GM          | 432-213-0355 |
| Car 3        | Cole Walker                 | O           | 432-213-1022 |
| Car 4        | JR Ramirez                  | OE          | 432-213-3054 |
| Car 5        | David Salazar               | OW          | 432-213-0352 |
| Car 6        | Contract Administration     | ES          |              |
| Car 7        | Jim Coley                   | ES          | 432-213-3134 |
| Car 8        | John Cantrell               | OEE         | 432-213-4942 |
| Car 9        | Wesley Cox                  | OELT        | 432-213-0359 |
| Car 10       | John McGee                  | OEEE        | 432-213-0342 |
| Car 11       | Open                        | OWMC        |              |
| Car 12       | Randy Dickens               | OEET        | 432-213-6874 |
| Car 13       | BS Leadman                  | OEBS        |              |
| Car 14       | Henry Edwards               | OEBS        | 432-213-0358 |
| Car 15       | Spence Crew                 | OSP         | 325-234-4817 |
| Car 16       | Leadman                     | OELT        |              |
| Car 17       | Jay Service                 | OSSR        | 325-763-7826 |
| Car 18       | Roy Arellano                | OSSR        |              |
| Car 19       | Travis Frey                 | OSSA        | 325-234-4817 |
| Car 20       | Curt Edwards                | OEEE        |              |
| Car 21       | Big Spring Route            | OEBS        |              |
| Car 22       | Don Meeks                   | OWWC        | 432-213-0351 |
| Car 23       | Ward Co. Crew               | OWWC        | 432-213-0353 |
| Car 24       | Vacant - Water Quality Tech | NRWQ        |              |
| Car 25       | Roving Crew                 | ORC         | 432-213-0350 |
| Car 26       | Martin Co. Crew             | OWMC        | 432-213-3205 |
| Car 27       | Elect. Tech                 | OEET        | 432-213-8540 |
| Car 28       | Chris Yater                 | OWMC        | 432-213-3205 |
| Car 29       | Larry Cate                  | ORC         | 432-213-0354 |
| Car 30       | Spence Rec Crew             | NRRS        | 325-453-2061 |
| Car 31       | Doug Frey                   | NRRS        | 432-213-0347 |
| Car 32       | Neal Humphrey               | NRRT        | 432-213-0348 |
| Car 33       | Lake Thomas Rec             | NRRT        | 325-574-6853 |
| Car 34       | Joe Longoria                | NRRS        |              |
| Car 35       | Spence Rec Crew             | NRRS        |              |
| Car 36       | Ward Co. Crew               | OWWC        | 432-213-0353 |
| Car 37       | Electrical Crew             | OEEE        | 432-234-4876 |
| Car 38       | Electrical Crew             | OEET        | 432-234-4876 |
| Car 39       | Elect. Bucket Truck         | OEEE        |              |

**CRMWD WORKING DIRECTORY**  
**Mobile Units**

| <i>CAR #</i> | <i>NAME</i>                  | <i>DEPT</i> | <i>CELL</i>  |
|--------------|------------------------------|-------------|--------------|
| Car 40       | Meter Tech                   | OEET        | 432-213-2778 |
| Car 41       | Brandon Dickson              | OS          | 325-234-4890 |
| Car 42       | Steve Beal                   | OSIR        | 325-656-5029 |
| Car 43       | Ivie Crew                    | OSIR        | 325-234-4843 |
| Car 44       | Kyle Krueger                 | ES          | 432-213-2195 |
| Car 45       | Tom Carter                   | OSIR        |              |
| Car 46       | Doc O'Bryant                 | OSIR        |              |
| Car 47       | David Hale                   | NRRI        | 325-656-5330 |
| Car 48       | Ivie Rec Crew                | OSIR        |              |
| Car 49       | John Burch                   | NRWQ        | 432-213-0346 |
| Car 50       | Richard Halfmann             | NRRI        | 325-234-4862 |
| Car 51       | Thomas Rec Crew              | NRRT        |              |
| Car 53       | Al Cialone                   | ORC         |              |
| Car 54       | Roving Crew Truck            | ORC         |              |
| Car 57       | Dale Humphreys T/C           | OEEC        | 432-213-0356 |
| Car 58       | Cathodics - Tony Thatcher    |             | 432-213-3949 |
| Car 59       | Pat Percifull                | OSSR        |              |
| Car 60       | Martin Co Crew               | OWMC        | 432-213-3205 |
| Car 61       | Martin Co. Crew              | OWMC        | 432-213-3205 |
| Car 62       | Big Spring Crew              | OEBS        | 432-213-2350 |
| Car 63       | Thomas Crew                  | OELT        | 432-213-6766 |
| Car 70       | Engineering                  | E           |              |
| Car 71       | Haul TruckU/1313             | ORC         |              |
| Car 72       | Haul TruckU/1447             | ORC         |              |
| Car 73       | Haul TruckU/1317             | OS          |              |
| Car 74       | Pulling Unit U/1517          | OWMC        |              |
| Car 75       | 12CY Dump Truck U/1500       | ORC         |              |
| Car 76       |                              |             |              |
| Car 77       | 5CY Dump U/1321              | ORC         |              |
| Car 78       |                              |             |              |
| Car 79       | Ford Dump U/1315             | ORC         |              |
| Car 80       | CC Loaner                    | GM          |              |
| Car 81       | OP Loaner                    | O           |              |
| Car 82       | Engineering                  | E           |              |
| Car 84       | West-Mini Mack (haul truck)  | OW          |              |
| Car 85       | East-Mini Mack (haul truck)  | OE          |              |
| Car 86       | South-Mini Mack (haul truck) | OS          |              |
| Car 87       | Mike Williams                | OEET        | 432-234-4894 |
| Car 88       | John Womack                  | OR          | 432-213-0344 |
| Car 89       | West-Flat Bed U/493          | OW          |              |
| Car 90       | S-8 Crew                     |             | 432-213-2791 |

**CRMWD WORKING DIRECTORY  
FACILITIES**

| Radio     | Radio Call Letters                | Base Station                                                                                                                                                                                                                                                                            | Telephone                                          |
|-----------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>1</b>  | <b>KKN-861</b><br><b>WNGP-460</b> | <b>BIG SPRING HQ</b><br>400 E. 24 <sup>th</sup> , Big Spring, TX 79720                                                                                                                                                                                                                  | <b>432-267-6341</b>                                |
| <b>2</b>  | <b>KKN-964</b>                    | <b>B/2: MARTIN CO. ST.</b><br>2599 East FM 1212, Stanton, TX 79782                                                                                                                                                                                                                      | <b>432-458-3296</b>                                |
| <b>3</b>  |                                   | <b>B/3: SNYDER PUMP ST.</b><br>@Lake J.B. Thomas<br>13575 CR 8, Ira, TX 79527                                                                                                                                                                                                           | <b>325-573-7046</b>                                |
| <b>4</b>  | <b>No Radio</b>                   | <b>B/4: BS/ODESSA INTAKE ST.</b><br><i>412 CR 340, Ira, TX 79527<sup>911*</sup></i><br><b>District House</b> (Wes Cox)<br>470 CR 340, Ira, TX 79527                                                                                                                                     | <b>432-965-3490</b><br><br><b>432-965-3491 (H)</b> |
| <b>5</b>  | <b>KKN-861</b><br><b>WNGP-460</b> | <b>B/5: MAINTENANCE YARD</b><br><b>Electronics/Electrical</b><br><i>1717 SH 350, Big Spring, TX 79720<sup>911*</sup></i><br><b>Roving Crew &amp; Big Spring Crew</b><br>(Main gate - for all B/5 deliveries)<br>1705 SH 350, Big Spring, TX 79720                                       | <b>432-267-8395</b><br><br><b>432-267-3497</b>     |
|           |                                   | <b>SNYDER RESERVOIR</b><br>6363 CR 362, Snyder, TX <sup>911*</sup>                                                                                                                                                                                                                      |                                                    |
| <b>6</b>  | <b>KKN-963</b>                    | <b>SNYDER WTP</b><br>3201 Avenue M, Snyder, TX <sup>911*</sup>                                                                                                                                                                                                                          | <b>325-573-3782</b>                                |
| <b>8</b>  |                                   | <b>B/8: MORGAN CREEK ST.</b><br>2814 E. HWY 350, Big Spring, TX 79720 <sup>911*</sup>                                                                                                                                                                                                   |                                                    |
| <b>10</b> | <b>No Radio</b>                   | <b>B/10: MCWHORTER</b><br><i>2699 CR B3701, Stanton, TX 79782<sup>911*</sup></i>                                                                                                                                                                                                        |                                                    |
| <b>11</b> | <b>KKY-351 &amp;<br/>KTG-924</b>  | <b>ODESSA WTP</b><br>811 W. 42nd Street, Odessa, TX 79764 <sup>911*</sup>                                                                                                                                                                                                               | <b>432-368-3544</b>                                |
| <b>13</b> | <b>KJC-717</b>                    | <b>E.V. SPENCE RESERVOIR</b><br><b>Operations Maintenance Shop</b><br>1011 Spillway Rd., Robert Lee, TX 76945<br><b>District House</b> (Jay Service)<br>1904 Spillway Rd., Robert Lee, TX 76945                                                                                         | <b>325-453-2811</b><br><br><b>325-453-2851 (H)</b> |
| <b>15</b> | <b>WNGP-460</b>                   | <b>SPENCE PUMP ST.</b><br><i>1390 Cedar Cove Rd., Robert Lee, TX<br/>76945<sup>911*</sup></i><br><b>District House</b><br>1400 Cedar Cove Rd, Robert Lee, TX 76945<br><b>SPADE PUMP ST.</b><br><i>32°03'47.4"N, 100°51'42.6"W</i><br><i>Sterling County, Texas 79512<sup>911*</sup></i> | <br><br><br><br><br><br><b>325-453-2917 (H)</b>    |
|           |                                   | <b>STANTON WTP</b>                                                                                                                                                                                                                                                                      | <b>432-756-2525</b>                                |
|           |                                   | <b>Pyote Lift Station</b><br>10640 W. I-20, Monahans, TX 79756                                                                                                                                                                                                                          |                                                    |
|           |                                   | <b>Pyote Well Field</b><br>8842 W. Spur 57, Monahans, TX 79756                                                                                                                                                                                                                          |                                                    |
|           |                                   | <b>Terminal Maintenance Facilities</b><br>1400 S. FM 1788, Midland, TX 79703                                                                                                                                                                                                            |                                                    |
|           |                                   | <b>San Angelo Maintenance Facilities</b><br>2601 Armstrong St., San Angelo, TX 76903                                                                                                                                                                                                    |                                                    |

<sup>911\*</sup> **Italicized addresses are for emergency 911 only (no mail delivery)**

**CRMWD WORKING DIRECTORY  
FACILITIES**

| Radio | Radio Call Letters | Base Station                                                                                                                                                                                                                                                                                                                                                                                                                           | Telephone                                                                                                                                   |
|-------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 21    | KTG-924            | <b>B/21: WARD CO WF #1</b><br>599 N. Yucca Dr, Monahans, TX 79756                                                                                                                                                                                                                                                                                                                                                                      | <b>432-943-3533</b>                                                                                                                         |
| 22    | KTG-924            | <b>B/22: WARD CO WF #2</b> <i>79745<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                             |
| 23    | KTG-924            | <b>B/23: WARD CO WF #3</b><br><i>2550A W. I-20, Odessa, TX 79741<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                             |
|       | WPJW-930           | <b>HORTON STATION</b><br>5500A E. CR 190, Midland, TX 79701                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                             |
| 24    | WNIL-366           | <b>O.H. IVIE RESERVOIR</b><br>Lake Field Office<br>133 PR 3141, Voss, TX 76888<br><b>Operations Shop</b><br><i>3608 FM 1929, Voss, TX 76888<sup>911*</sup></i><br><b>District House</b> (Richard Halfmann)<br>202 PR 3141, Voss, TX 76888<br><b>District House</b> (David Hale)<br>15451 FM 1929E, Millersview, TX 76862<br><b>Ivie Intake Station</b><br><i>17013 Mustang Creek Rd</i><br><i>Millersview, TX 76862<sup>911*</sup></i> | <b>325-357-4486</b><br>Fax <b>325-357-4496</b><br><br><b>325-357-4487 (H)</b><br><br><b>325-365-2135 (H)</b><br><br><b>325-483-5473 (H)</b> |
| S/1   |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                             |
| S/2   |                    | <b>MILES PUMP ST</b><br><i>7614 N FM 1692, Miles, TX 76861<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                          | <b>325-653-9042</b>                                                                                                                         |
| S/3   |                    | <b>SAN ANGELO PUMP ST</b><br><i>7218 N US 87, S. A., TX 76901<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                             |
| S/4   |                    | <b>TURNER PUMP ST</b><br><i>16506 Turner Rd, Carlsbad, TX 76934<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                             |
| S/5   |                    | <b>MAHAFFEY PUMP ST</b><br><i>1700 PR 108 &amp; FM 2139</i><br><i>Sterling City, TX 76951<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                           |                                                                                                                                             |
| S/7   |                    | <b>HORTON PUMP ST</b><br><i>5500A E. CR 190, Midland, TX 79701<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                             |
| S/8   |                    | <b>TERMINAL PUMP ST</b><br><i>1400 S FM 1788, Midland, TX 79703<sup>911*</sup></i>                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                             |
| 30    | KKN-966            | <b>LAKE J.B. THOMAS</b><br><b>Lake Field Office</b><br>13509 CR 5, Ira, TX 79527<br><b>District House</b> (Neal Humphrey)<br>11818 CR 1, Ira, TX 79527                                                                                                                                                                                                                                                                                 | (Phone & Fax)<br><b>325-574-6853</b><br><br><b>325-573-6044 (H)</b>                                                                         |
| 31    | KKN-829            | <b>E.V. SPENCE RESERVOIR</b><br><b>Lake Field Office</b><br><b>District House</b> (Doug Frey)<br>241 Paint Creek Marina Rd<br>Robert Lee, TX 76945                                                                                                                                                                                                                                                                                     | <b>325-453-2061</b><br>(Phone & Fax)<br><b>325-453-9361 (H)</b>                                                                             |
|       |                    | <b>Big Spring Low Head Pump Station</b><br>2219 E. HWY 350, Big Spring, TX 79720 <sup>911*</sup>                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                             |
|       |                    | <b>Raw Water Production Facility</b><br>3500 E. FM 700, Big Spring, TX 79720                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                             |

<sup>911\*</sup> **Italicized addresses are for emergency 911 only (no mail delivery)**

## **CRMWD WORKING DIRECTORY**

## CRMWD WORKING DIRECTORY

### AEP COMPANY (formerly West Texas Utilities Co) (cont.)

#### Ballinger:

Bob Boone, Service Mgr.

Ph: 325-365-8297

Area Manager

Ph: 325-365-9841

#### Robert Lee:

Field Office

Ph: 325-453-2412

#### San Angelo:

Blake Burchard, Acct. Rep.

106 S. Chadbourne, Suite B

San Angelo, TX 76903

Ph: 325-657-2733

Clay Gibson

Ph: 325-547-2871

Mike Nikolauk

Ph: 325-657-2800

Sterling City

Field Office

Ph: 325-378-3341

### ALON, U.S.A.

P.O. Box 1311

Big Spring, TX 79721-1311

Ph: 432-263-7661

AFTER HRS TO HAVE ANYONE PAGED

Ph: 432-263-9272

Responsible Personnel:

Dave Foster, Plant Manager

Ph: 432-263-9375

or 432-263-9332

Eric Ekinrode, Project Manager

Ph: 432-263-9395

Jeff Borman, Operation Manager

Ph: 432-263-9314

Jimmy Miller, Environmental Group Leader

Ph: 432-263-9234

M: 432-934-4099

Fax: 432-263-9366

Shift Supervisor

Ph: 432-263-9505

Pump House, Fire Mtr. Usage

Ph: 432-263-9472

or 432-263-9482

Robert Cambell, Safety Manager

Ext. 427

Pat Perez, Accounts Payable

Ph: 432-263-9330

Boilers:

Ph: 432-263-9525

### BALLINGER, CITY OF

P.O. Box 497

Ballinger, TX 76821

Ph: 325-365-5437

Tommy New, City Manager

### BARBER LAKE

Pat Barber

M: 325-436-1721

(leave msgs at office, not on cell)

O: 325-728-3391

## **CRMWD WORKING DIRECTORY**

### **BIG SPRING, CITY OF**

|                                   |                   |
|-----------------------------------|-------------------|
| 310 Nolan Street                  | Ph: 432-264-2401  |
| Big Spring, TX 79720              | Fax: 432-263-8310 |
| Gary Fuqua, City Manager          | Ph: 432-264-2400  |
| Todd Darden, Asst. City Manager   | Ph: 432-264-2500  |
|                                   | M: 432-816-1019   |
| Peggy Walker, Finance Director    | Ph: 432-264-2512  |
| Kenny Scott, Water Plant (24 Hr)  | Ph: 432-264-2391  |
|                                   | M: 432-816-9776   |
| Wastewater Plant Operator (24 Hr) | Pgr: 432-268-5224 |
| Jim Piper, D&C Superintendent     | M: 432-816-1020   |
| Rick Boyles, Moss Creek Lake Supt | O: 432-264-2395   |
|                                   | M: 432-816-1027   |

### **BRIGHT & COMPANY**

|                         |                   |
|-------------------------|-------------------|
| Oil & Gas Producers     |                   |
| 2911 Turtle Creek Blvd. |                   |
| Suite 700               | Ph: 214-559-0889  |
| Dallas, TX 75219-6241   | Fax: 214-559-0021 |
| Tracy Tennison          | Ph: 432-686-0072  |
| Terry Woktek            | M: 325-650-3926   |

### **COKE COUNTY**

|                                 |                  |
|---------------------------------|------------------|
| The Honorable Roy Blair - Judge | Ph: 325-453-2641 |
| Paul Burns - Commissioner       | H: 325-453-2641  |
| Bill Wheat - Commissioner       |                  |
| Gaylen Pitcock - Commissioner   | H: 325-453-4633  |
| George Snapp - Commissioner     |                  |

### **COLEMAN COUNTY ELEC. CO-OP**

|                               |                  |
|-------------------------------|------------------|
| Roland Whitt, General Manager | Ph: 325-625-2128 |
|-------------------------------|------------------|

### **COLEMAN COUNTY TELEPHONE CO-OP**

|                                                     |                  |
|-----------------------------------------------------|------------------|
| Trans Texas Technologies Division                   | Ph: 800-439-1723 |
| P.O. Box 910, 801 S. Sante Fe, Santa Anna, TX 76878 |                  |

### **CONCESSIONS AT DISTRICT RESERVOIRS**

|                                        |                  |
|----------------------------------------|------------------|
| Spence - Paint Creek Marina            | Ph: 325-453-2982 |
| Spence - Wildcat Fish-A-Rama           | Ph: 325-453-2801 |
| Ivie - Elm Creek Village, Kennedy Park | Ph: 325-357-4776 |
| Ivie - Concho Park Concession          | Ph: 325-357-4466 |

## **CRMWD WORKING DIRECTORY**

### **CROWN QUEST**

303 W. Wall, Suite 101  
Midland, TX 79701-3178  
Elaine Compton  
Iatan-East Howard Field Office (Coahoma)  
(Invoice Billing)  
P.O. Box 690  
Coahoma, TX 79511-0690  
(7:00 AM - 4:00 PM)  
Responsible Personnel:  
Pumper: Wade Roberts  
Jody Beaver

Ph: 432-683-4768  
Fax: 432-571-5063  
Ph: 432-683-4768  
  
Ph: 432-394-4953  
  
M: 432-213-6843  
M: 432-213-0451

### **CSA - REESE ALBERT**

P.O. Box 60693  
San Angelo, TX 76906-0693  
Midland Hot Mix Plant  
Midland, Reese-Albert Ofc.

Ph: 325-573-0725  
Ph: 432-570-9469  
Ph: 432-570-0481

### **DIAMOND M PRODUCTION COMPANY**

Snyder Plant  
4459 S. FM 1606  
Snyder, TX 79549  
Service

Ph: 325-573-0725  
Ph: 325-573-0762  
Ph: 325-574-7500

### **DRUG SCREEN COMPLIANCE**

After Hours Pager  
Big Spring Office (501 Birdwell #17)  
Midland Office (1305 N. Big Spring St.)  
Odessa Office (706 N. Adams)  
San Angelo Office (1736 B. Sunset Dr.)

Pgr: 432-499-3500  
Ph: 432-264-7506  
Ph: 432-570-6160  
Ph: 432-332-9421  
Ph: 325-942-1372

### **EOTT ENERGY**

Lake Thomas Area-Jim Small, Asst Dist Mgr  
Control Center (Toll Free)

Ph: 806-872-7048  
Ph: 877-456-7688

### **ECTOR COUNTY**

Richard Farrio, Road Div.

Ph: 432-385-1620

## CRMWD WORKING DIRECTORY

### **ENERGEN (formerly Chevron; formerly Ennervest)**

|                                           |                   |
|-------------------------------------------|-------------------|
| 1001 Fannin, Suite 111, Houston, TX 77002 | Ph: 713-495-6531  |
| Rick Cohagan, General Manager             | Ph: 432-687-7123  |
| Deidra Owen, Asset Manager                | Ph: 432-687-7133  |
|                                           | Pgr: 800-401-0432 |
| Westbrook, Iatan & Murray Lease Office    |                   |
| P.O. Box 129 (Primary)                    | Ph: 325-644-3831  |
| Westbrook, TX 79565 (Secondary)           | Ph: 325-644-2721  |
| Aaron Garrison                            | M: 432-213-0762   |
| Emergencies Only:                         | 325-928-6109      |
| Karl Ivanhoe                              | M: 432-557-1619   |
|                                           | Ph: 432-967-2609  |
| Westbrook-Iatan                           | Pgr: 800-519-4433 |
| Operations Supervisor                     | H: 432-520-2941   |
|                                           | Fax: 915-244-3421 |
| James Day                                 | M: 325-338-4847   |
| Artificial Lift Specialist                | H: 325-573-8743   |
| Marcus Parham                             | O: 325-644-2911   |
| Field Specialist                          | H: 325-573-0325   |
| Joe Hall                                  | M: 325-338-6443   |
| Contract Lease Operator                   | H: 325-573-3105   |
| David Silva                               | O: 325-644-2911   |
|                                           | Ph: 432-517-0744  |
| Contract Lease Operator                   | H: 325-728-3750   |
| Dean Bragord                              | Ph: 432-517-0740  |
| Iatan Field Office (Daytime only)         | Ph: 325-644-2911  |
|                                           | or 325-644-3281   |
| Lee Bennett, Supt                         | Ph: 325-242-1570  |
| Foreman                                   | Ph: 432-556-0985  |

### **FASKIN OIL & RANCH, LTD**

|                                            |                  |
|--------------------------------------------|------------------|
| 300 West Wall                              |                  |
| Midland, TX 79701-5116                     | Ph: 432-687-1777 |
| Mike Barnett, Foreman (if tone dial 05222) |                  |
|                                            | H: 432-563-5536  |
| Tony Adams, Pumper                         | M: 325-242-0144  |
| Snyder Wells 8:00-12:00, daily             | H: 325-728-2989  |
|                                            | or 325-728-3785  |

## **CRMWD WORKING DIRECTORY**

### **GPM (formerly Phillips Petroleum)**

Sprayberry District

Ray Wood

Ph: 432-684-5027

### **GRANDFALLS, CITY OF**

P.O. Box 327

Ph: 432-547-2331

Grandfalls, TX 79742-0327

Fax: 432-547-2839

### **HOWARD COLLEGE**

1001 Birdwell Lane

Ph: 432-264-5036

Big Spring, TX 79720

Ph: 432-264-5000

Jason Mims, Dir. Of Business Services

Ph: 432-264-5167

Maintenance

O: 432-264-5095

M: 432-816-9427

### **HOWARD COUNTY**

P.O. Box 1468

Big Spring, TX 79721-1468

Ph: 432-267-8561

Eddie Jamson

### **JONES BROTHERS**

P.O. Box 3983

Ph: 432-332-0721

Odessa, TX 79760

Ph: 432-563-2122

Fax: 432-332-0724

### **JVA OPERATING COMPANY**

P.O. Box 3634, Midland, TX 79702

Ph: 432-682-1052

Jerry Atkinson, President

Higgins Lease

David Hayes, Pumper

M: 325-650-5423

Pgr: 325-278-7825

### **KINDER-MORGAN UNIT OPERATOR**

4632 W. Hwy 180, Snyder, TX 79549

Ph: 325-573-2668

(Field & Unit Office)

Hugh Gray, District Mgr.

Ph: 325-574-7020

Admin. Asst. & Claims

Ph: 325-574-7023

Night Ph: 325-573-8659

Responsible Personnel:

Ed Payne

Ph: 325-574-7006

Paula Williams

Ph: 325-574-7043

Ruby Smith

Ph: 325-574-7000

## CRMWD WORKING DIRECTORY

### **KINDER-MORGAN UNIT OPERATOR (cont.)**

|                 |                                    |
|-----------------|------------------------------------|
| Jessie Rios     | Ph: 325-574-7063                   |
| Richard Logston | Ph: 325-574-7064                   |
| Kerry Shoemake  | Ph: 325-574-7005                   |
| Control         | Ph: 325-573-9045<br>& 325-573-1008 |

### **LOWER COLORADO RIVER AUTHORITY (LCRA)**

|                                            |                  |
|--------------------------------------------|------------------|
| P.O. Box 220 (use 78767-0220)              |                  |
| 3700 Lake Austin Blvd.                     |                  |
| Austin, TX 78703                           | Ph: 800-776-5272 |
| Alicia Gill, Lab Manager                   | Ext: 6026        |
| David Cowan, CPD Coordinator               | Ext: 2495        |
| Emergency Contact (Public Safety Dispatch) | Ph: 512-482-6322 |

### **MARTIN COUNTY ROAD & BRIDGES**

|                   |                  |
|-------------------|------------------|
| P.O. Box 778      |                  |
| Stanton, TX 79782 | Ph: 432-459-2405 |
| (Lenorah, TX)     |                  |

### **MAYNARD OIL COMPANY**

|                                  |                   |
|----------------------------------|-------------------|
| Wells @ Lake Thomas              |                   |
| 8080 N Central Expway, Suite 660 | Ph: 241-891-8880  |
| Dallas, TX 75206                 | Fax: 214-891-8827 |
| Ron Wagland (call first)         | Ph: 432-557-7673  |
| Danny Brazeal (call second)      | H: 432-524-9069   |

### **MERIT ENERGY (formerly Anadarko Petroleum Corporation)**

|                                      |                           |
|--------------------------------------|---------------------------|
| 1300 Independence Plaza              |                           |
| P.O. Box 2497                        | Ph: 432-683-0034          |
| Midland, TX 79702-2497               | Fax: 432-688-0066         |
| Responsible Personnel:               |                           |
| Michael P. Coder, Senior Landman     | Ph: 432-682-1666          |
| Michael Bridges, Division Landman    |                           |
| Field Office: 103 South First Street |                           |
| P.O. Box 70, Coahoma, TX 79511       | Ph: 432-394-4371          |
| Danny Gray                           | M: 432-638-8954           |
| Phone Exchange:                      | After Hours: 432-267-6549 |
| Field Rep: Abel Torres               | Ph: 432-634-4567          |

## **CRMWD WORKING DIRECTORY**

### **MIDLAND, CITY OF**

P.O. Box 1152

Midland, TX 79702-1152

Ph: 432-685-7100

Fax: 432-685-0523

432-681-7606

Water Plant:

Responsible Personnel:

Courtney Sharp, City Mgr.

Ph: 432-685-7100

Tommy T. Hudson & Marcus Johnston, Asst City Managers

Stuart Purvis, Director of Utilities

Ph: 432-685-7261

Pgr: 432-567-9175

Matt Kerley, Water Supt.

Ph: 432-681-7607

Gary Wiggins, Asst. Water Supt.

Ph: 432-681-7608

Pam Scott, Finance Dir.

Wes Perry, Mayor

Water Treatment Plant

Ph: 432-681-7606

### **MILLERSVIEW-DOOLE WATER SUPPLY CORPORATION**

General Manager

Ph: 325-483-5438

### **MITCHELL GAS SERVICES L.P. (formerly Oryx-Sun Plant)**

#### **C & L GAS PARTNERSHIP**

209 NE Railroad

P.O. Drawer S

Bronte, TX 76933

Donnie Devoll

Ph: 915-435-2105

or 915-435-2106

Area Foreman

M: 325-277-5758

H: 325-453-2439

Fax: 325-453-2109

Pgr: 281-308-2608

### **MONAHANS, CITY OF**

112 W. 2nd Street

Monahans, TX 79756

Ph: 432-943-4343

City Hall

Responsible Personnel:

David Mills, City Manager

Ph: 325-643-3471

Bobby Sinclair, Water Supt.

David Cutbirth, Mayor

## **CRMWD WORKING DIRECTORY**

### **MOSS CREEK LAKE**

|                  |                  |
|------------------|------------------|
| Moss Lake        | Ph: 432-393-5246 |
| Utilities        | O: 432-264-2392  |
| Rick Boles, Supt | M: 432-816-1027  |

### **ODESSA, CITY OF**

|                                          |                   |
|------------------------------------------|-------------------|
| P.O. Box 4398                            |                   |
| Odessa, Tx 79760                         | Ph: 432-335-3200  |
| (City Hall)                              | Fax: 432-335-4698 |
| Responsible Personnel:                   |                   |
| Richard Morton, City Mgr.                | Ph: 432-335-4101  |
| Michael Marrero, Assistant City Mgr.     | Ph: 432-335-4105  |
| James Zentner, Finance Dir.              | Ph: 432-335-3232  |
| Matt Squyres, Dir. Of Public Works       | Ph: 432-335-3244  |
| Debbie McReynolds, Director of Utilities | Ph: 432-335-4625  |
| Roy Staggs, Asst. DoU                    | Ph: 432-335-4636  |
|                                          | M: 432-238-6087   |
| Assistant DOU for Field Services         | Ph: 432-335-4637  |
| Water Treatment Plant Control Room       | Ph: 432-368-3544  |
| Lab                                      | Ph: 432-368-3536  |
| Permian Basin Research Center            |                   |
| Mr. Carroll Skaggs                       | Ph: 432-552-2760  |

### **O'RYAN OIL & GAS**

|                                  |                 |
|----------------------------------|-----------------|
| P.O. Box 14821                   |                 |
| Odessa, TX 79768                 |                 |
| Attn: Ryan C. Hoerauf (Office)   | O: 432-550-2112 |
| Joe Ditto (Coahoma Field Office) | O: 432-394-4415 |
|                                  | H: 432-394-4820 |
|                                  | M: 432-268-3818 |

### **PHILLIPS PETROLEUM COMPANY (Mound at Lake Thomas)**

|                     |                  |
|---------------------|------------------|
| Sprayberry District |                  |
| Ray Wood            | Ph: 432-684-5027 |

### **POWER RESOURCES, INC.**

|                           |                   |
|---------------------------|-------------------|
| P.O. Box 2700             | Ph: 432-263-8468  |
| Big Spring, TX 79721-2700 | Fax: 432-267-9772 |
| Control Room              |                   |
| (Ext. 19)                 | Ph: 432-263-8468  |
| Jerry Baker, Plant Mgr.   |                   |
| (Ext. 12)                 | Ph: 432-263-8468  |

## **CRMWD WORKING DIRECTORY**

### **PRICE CONSTRUCTION**

|                             |                  |
|-----------------------------|------------------|
| P.O. Box 1029               | Ph: 432-267-1691 |
| Big Spring, TX 79721        | Ph: 432-267-5709 |
| Equipment Maintenance Dept. | or 432-267-1133  |

### **PROPERTY OWNERS**

|             |                  |
|-------------|------------------|
| Jim Trulock | Ph: 325-338-7499 |
| Randy Koch  | Ph: 432-517-0401 |

### **PYOTE, CITY OF**

|                                                 |                 |
|-------------------------------------------------|-----------------|
| 201 E. 11th, P.O. Box 137, Pyote, TX 79777-0137 |                 |
| Willie Bates, Mayor                             | H: 432-389-5677 |
| Elaine Rives, City Secretary                    | H: 432-389-5660 |
| (Main # for City)                               |                 |
| Darrall Shirey, Councilman                      | H: 432-389-5613 |
| Steve Plasky, Water Supt.                       | H: 432-389-5544 |

### **RAILROAD COMMISSION**

#### **Austin Office:**

|                       |                   |
|-----------------------|-------------------|
| 1701 N. Congress      |                   |
| P.O. Box 12967        | Ph: 512-463-6803  |
| Austin, TX 78711-2967 | Fax: 512-463-6780 |

#### **Midland Office:**

|                                         |                   |
|-----------------------------------------|-------------------|
| Paul Whitehead, District Director       | Ph: 432-570-5884  |
| Conoco Towers, 10 Desta Drive Ste. 500E | Fax: 432-682-1325 |
| Midland, TX 79705                       |                   |
| Tim Prude, Site Remediation Coordinator | M: 432-556-8381   |

#### **San Angelo State Service Center**

|                               |                   |
|-------------------------------|-------------------|
| Don Horner, District Director |                   |
| 622 S. Oakes St., Suite J     | Ph: 325-657-7450  |
| San Angelo, TX 76903          | Fax: 325-657-7455 |
| Ronnie Pollard, State Plugger | M: 325-656-4360   |

### **ROBERT LEE, CITY OF**

|                            |                  |
|----------------------------|------------------|
| P.O. Box 26                |                  |
| Robert Lee, TX 76945-0026  | Ph: 325-453-2831 |
| James Royal, Water Supt.   |                  |
| Kay Torres, City Secretary |                  |
| Joe White, Mayor           |                  |

## **CRMWD WORKING DIRECTORY**

### **SAN ANGELO, CITY OF**

|                                                    |                   |
|----------------------------------------------------|-------------------|
| P.O. Box 1751                                      | Fax: 325-657-4335 |
| San Angelo, TX 76902                               | Ph: 325-657-4241  |
| Harold Dominguez, City Mgr.                        | Ph: 325-657-4241  |
| Rick Weise, Assistant City Mgr.                    | Ph: 325-657-4241  |
| Michael Dane, Finance Dir.                         | Ph: 325-657-4268  |
| Charles McGuire, Treatment Plant                   | Ph: 325-657-4297  |
| Will Wilde, Dir. Of Water Utilities                | Ph: 325-657-4209  |
| Tom Kerr, Asst. Director of Water Utilities/Plants |                   |
| City Transit                                       | Ph: 325-657-4499  |
| Courtney, Water Utilities Secretary                | Ph: 325-657-4209  |
|                                                    | Fax: 325-657-6397 |

### **SANTA FE SNYDER CORP. (formerly Santa Fe Energy & Snyder Oil Corp.)**

|                              |                  |
|------------------------------|------------------|
| 840 Gessner, Suite 1400      |                  |
| Houston, TX 77024            | Ph: 713-507-5000 |
| Midland Office:              |                  |
| James Moore                  |                  |
| 550 W. Texas St., Suite 1330 |                  |
| Midland, TX 79701            | Ph: 432-686-6624 |

### **SCURRY COUNTY**

|                          |                  |
|--------------------------|------------------|
| County Judge:            |                  |
| The Honorable Rod Waller |                  |
| 1300 26th St. 2nd Floor  |                  |
| Snyder, TX 79549         | Ph: 325-573-8576 |
| County Commissioners:    |                  |
| Jerry House              | Ph: 325-573-7197 |
| Howard Limmer            | Ph: 325-573-7165 |
| Chloanne Lindsey         | Ph: 325-573-7345 |
| Ralph Treavey            | Ph: 325-573-1502 |

### **SDG (formerly Patriot Services & before that, CNG Producing Co.)**

|                              |                   |
|------------------------------|-------------------|
| 203 Bird Street              |                   |
| P.O. Box 61                  | Ph: 325-644-5031  |
| Westbrook, TX 79565          | Fax: 325-644-5241 |
| Richard Koch, Owner/Operator | M: 325-338-5764   |
| Randy Gambrell               | M: 325-270-0043   |

## CRMWD WORKING DIRECTORY

### **SHARON RIDGE CANYON UNIT (Exxon Co. U.S.A.)**

|                             |                   |
|-----------------------------|-------------------|
| Field Office                |                   |
| 14005 FM 1610               | Ph: 325-573-6328  |
| Ira, TX 79527               | Fax: 325-573-6320 |
| Ross Cornett, Field Foreman | M: 325-575-0574   |

### **SHERIDAN (formerly Kerr McGee/Oryx, formerly Attheon)**

|                              |                  |
|------------------------------|------------------|
| Tommie Deese, Superintendent | Ph: 325-288-4242 |
| Tom Philly, Pumper           | Ph: 325-453-2108 |
| Rick Sanchez, Pumper         | Ph: 325-453-2108 |
|                              | M: 325-650-2432  |
| Tim                          | Ph: 325-453-2213 |
|                              | Ph: 325-453-4698 |
| John Hill                    | Ph: 432-561-9500 |
| Toll Free                    | 1-877-839-7473   |

### **SID RICHARDSON CARBON BLACK CO.**

|                                   |                  |
|-----------------------------------|------------------|
| 1211 N Midway Rd.                 |                  |
| P.O. Box 470                      |                  |
| Big Spring, TX 79720              | Ph: 432-263-7389 |
| North Midway Road                 |                  |
| Ken Pope, Plant Mgr.              | Ext. 22          |
| Brad Roberts, Process Supt.       | Ext. 36          |
| Les Montgomery, Tech. Supt.       | Ext. 33          |
| Don Stabeno, Maint. Supt.         | Ext. 31          |
| Jeff Rhodes, QC Lab Mgr.          | Ext. 28          |
| Tom Bradley, Pilot Plant Mgr.     | Ext. 43          |
| Jason Johnson, EH & S Coordinator | Ext. 41          |
| Paul Pittman, Operations Manager  |                  |

### **SID RICHARDSON GASOLINE CO.**

|                                               |                   |
|-----------------------------------------------|-------------------|
| WEST TEXAS AREA OFFICE                        |                   |
| 5030 E. University, Boardwalk Bldg. Ste. C104 | Ph: 432-367-2867  |
| Odessa, TX 79762                              | Fax: 432-367-2862 |
| Curtis Clark, Area Mgr.                       |                   |
| Ross Boyd, Area Engineer                      |                   |
| Keystone Plant (24Hrs)                        | Ph: 432-586-3431  |

### **SNYDER, CITY OF**

|                                 |                   |
|---------------------------------|-------------------|
| 1825 24th Street, P.O. Box 1341 | Ph: 325-573-4957  |
| Snyder, TX 79549-1341           | Fax: 325-573-7505 |

## CRMWD WORKING DIRECTORY

### **SNYDER, CITY OF (cont.)**

|                                 |                                                          |
|---------------------------------|----------------------------------------------------------|
| Responsible Personnel:          |                                                          |
| Merle Taylor, City Manager      | Ph: 325-573-4957                                         |
| City Engineer's Office          | Ph: 325-573-4959                                         |
| Jeannie Johnson, Finance Dept.  | Ph: 325-573-4959                                         |
| Chris Woodard, Utility Director | M: 325-575-7401                                          |
| Bobby Kenner, Public Works Dir. | M: 325-575-3001                                          |
| Anson Luna, Street Foreman      | M: 325-575-3004                                          |
| Plant Superintendent            | Ph: 325-573-3782<br>or 325-573-5823<br>Fax: 325-573-7428 |

### **STANTON, CITY OF**

|                                 |                                     |
|---------------------------------|-------------------------------------|
| P.O. Box 370                    |                                     |
| Stanton, TX 79782-0370          |                                     |
| Danny Fryar, City Administrator | Ph: 432-756-3301                    |
| Responsible Personnel:          |                                     |
| Charles Freeman, Water Supt.    |                                     |
| Randy, Water Plant              | Ph: 432-756-2525<br>M: 432-270-2248 |

### **TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ)**

|                                                       |                   |
|-------------------------------------------------------|-------------------|
| Abilene Office: Winona Henry, Regional Director       |                   |
| 1977 Industrial Blvd., Abilene, TX 76902              |                   |
| Water                                                 | Ph: 325-698-9674  |
| Midland Office: Jed Barker, Regional Director         |                   |
| 3300 N. A Street, Bldg 4 Suite 107, Midland, TX 79705 |                   |
| Water: Michael Edmonson                               | Ph: 432-570-1359  |
| Mr. Lindsey Buckner, Field Environ. Investigator      | Fax: 432-570-4795 |
| San Angelo Office: Regional Director                  |                   |
| 6225 S. Oaks, Suite K, San Angelo, TX 76903           |                   |
| Water: Mark Newman                                    | Ph: 325-655-9479  |
| Austin Number                                         | Ph: 512-239-1000  |

### **TORCH ENERGY MARKETING, INC. (formerly Oryx Gas Co.)**

|                                  |                                                       |
|----------------------------------|-------------------------------------------------------|
| Operator of the Snyder Gas Plant |                                                       |
| First Call:                      |                                                       |
| 24 Hour Emergency Number         | Ph: 325-573-3511                                      |
| Second Call:                     |                                                       |
| Alton Patterson, Field Foreman   | O: 325-574-7505<br>H: 325-573-0817<br>M: 325-575-4230 |

## CRMWD WORKING DIRECTORY

### **TORCH ENERGY MARKETING, INC. (formerly Oryx Gas Co.) (cont.)**

|                               |                  |
|-------------------------------|------------------|
| Third Call:                   |                  |
| Mike Post, Plant Manager      | O: 325-574-7501  |
|                               | H: 325-573-1289  |
| Snyder Gas Plant Main Office  | Ph: 325-574-7500 |
| Snyder Gas Plant Control Room | Ph: 325-574-7520 |
| Randy Gambrel                 | Ph: 432-270-0043 |

### **TEXAS PARKS & WILDLIFE DEPARTMENT**

|                      |                  |
|----------------------|------------------|
| 4200 Smithschool Rd. |                  |
| Austin, TX 78744     | Ph: 800-792-1112 |

### **TRANSIT MIX**

|                   |                  |
|-------------------|------------------|
| 2608 N. FM 1788   |                  |
| Midland, TX 79707 | Ph: 432-561-8922 |

### **TXU ENERGY SERVICES (See TXU Delivery for wires & transmission)**

|                                     |                         |
|-------------------------------------|-------------------------|
| <b>LARGE ACCOUNT OUTAGE REPORTS</b> | <b>Ph: 866-878-7239</b> |
| Don Morman                          | Ph: 512-930-2668        |
|                                     | M: 512-431-2217         |
| Keith Hutton                        | Ph: 972-507-8786        |

### **TXU DELIVERY (formerly TXU Electric/ONCOR)**

|                              |                  |
|------------------------------|------------------|
| <b>Big Spring</b>            |                  |
| District Mgr.                | Ph: 432-264-5755 |
| Acct. Mgr.                   | Ph: 432-264-5752 |
| Brad Ewing, Distribution     | Ph: 432-264-5700 |
| Pete Carthart, Trans Mgr.    | Ph: 432-264-5703 |
| <b>Midland</b>               |                  |
| Western Region               |                  |
| Cust. Service & Mkt. Mgr.    | Ph: 432-620-1210 |
| Denny Burns, Western Region  |                  |
| Distribution Manager         | Ph: 432-620-1205 |
| John Reese, Western Region   |                  |
| Transmission Manager         | Ph: 432-498-2801 |
| Midland District Mgr.        | Ph: 432-620-1250 |
| Padrig Ennis, Region         |                  |
| Account Mgr.                 | Ph: 432-620-1215 |
| Jim Chase, Distribution Mgr. | Ph: 432-334-5320 |

## CRMWD WORKING DIRECTORY

### TXU DELIVERY (formerly TXU Electric/ONCOR) (cont.)

#### **Monahans**

Tedd Knisley, Mgr. Ph: 432-943-7527

Richard Smith,  
Distribution Supt. Ph: 432-943-7528

#### **Odessa** Ph: 432-334-5250

Ron Prince, District Mgr. Ph: 432-334-5225

Royce Overcash, Acct. Mgr. Ph: 432-334-5320

Jim Chase, Distribution Mgr. Ph: 432-580-1910

Odessa Transmission Jim Clements Ph: 432-580-3600

Dispatcher

#### **Snyder** Ph: 325-574-6600

Office Ph: 325-573-2311

Daryl Thomas, Mgr. Ph: 325-574-6606

Tim Burk, Distribution Supt. Ph: 325-574-6601

Mark Totty, Service Mgr.

#### **Sweetwater**

Linda Bean, Mgr. Ph: 325-235-6300

Frank Beights  
Distribution Mgr. Ph: 325-235-6400

Ernest Bickerstaff  
Transmission Mgr. Ph: 325-235-6417

Ward County - Freddy Ph: 432-413-4018

Dallas - Al Ph: 972-507-8395

**OUTAGE REPORT NUMBER - SEE TXU ELECTRIC**

### UNITED STATES GEOLOGICAL SURVEY (USGS)

Wade Kress (wkress@usgs.gov)

944 Arroyo Drive

San Angelo, TX 76903-9345 Ph: 325-944-4600

Jay May (jmay@usgs.gov) Ph: 512-927-3568

TX District Data Chief

### UNIVERSITY OF TEXAS OF THE PERMIAN BASIN (UTPB)

4901 E. University

Odessa, TX

1400 N. FM 1788 Ph: 432-552-2447

Midland, TX Fax: 432-552-2433

## **CRMWD WORKING DIRECTORY**

### **WALSH & WATTS, INC.**

Field Office  
P.O. Box 380  
Coahoma, TX 79511-0380 Ph: 432-394-4435  
Responsible Personnel:  
Chuck Breyman, Supt. M: 432-270-2436  
Paul Bedwell, Asst. Supt.  
District Office  
1111 7th Street  
Wichita Falls, TX 76301  
Ph: 940-723-2104  
Responsible Personnel:  
Bill Womble  
(Night) Ph: 940-691-3676  
Ernie Monteiro  
(Night) Ph: 325-691-6139  
Mark Hedges M: 432-270-4605

### **WEST CENTRAL TX MUNICIPAL WATER DISTRICT**

P.O. Box 2362 Ph: 325-673-8254  
Abilene, TX 79604-2362 Fax: 325-673-8272  
David E. Bell, General Manager  
Richard Beck, Rec. Supt.

### **WEST TEXAS STATE SCHOOL (WTSS)**

Pyote Office  
P.O. Box 415  
Pyote, TX 79777  
(24 Hour) Ph: 432-389-5555  
Monahans Office  
Arturo Subia, Maintenance Mgr (8am - 5pm) Ph: 432-943-4373  
W.R. Bridges, Maint. Foreman (Night) Ph: 432-389-5567  
Joe Ozuna (Night) Ph: 432-389-5671  
District Office (Same Address)  
Business Manager Ph: 432-389-5611  
Superintendent - Wallace Brown Ph: 432-389-5681

### **WEST TEXAS UTILITIES COMPANY (See AEP Company)**

### **WES-TEX TELEPHONE COOPERATIVE**

P.O. Box 280 Ph: 432-756-3393  
Stanton, TX 79782 Fax: 432-756-2659  
Locator: Russell Shanks M: 432-270-7779  
Todd Smith M: 432-270-7718

[illegible]



**COLORADO RIVER MUNICIPAL WATER DISTRICT**

400 East 24th Street

P.O. Box 869

Big Spring, TX 79721-0869

Phone: 432-267-6341

Fax: 432-267-3121

[www.crmwd.org](http://www.crmwd.org)

|                                                                                              |                                                              |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>COLORADO RIVER MUNICIPAL WATER DISTRICT</b><br>RAW WATER PRODUCTION FACILITY – BIG SPRING | <b>OPERATION AND MAINTENANCE MANUAL</b><br><b>APPENDICES</b> |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|

## **APPENDIX B LIST OF MANUFACTURERS**

## Equipment Manufacturers and Representatives

| Company                                                  | Contact           | Address                                                     | Phone        | Email                                                                          | Fax          |
|----------------------------------------------------------|-------------------|-------------------------------------------------------------|--------------|--------------------------------------------------------------------------------|--------------|
| <b>Microfiltration System and Reverse Osmosis System</b> |                   |                                                             |              |                                                                                |              |
| Pall Corporation                                         | Technical Support | P.O. Box 5630<br>Cortland, NY 13045                         | 866-475-0115 | <a href="mailto:Pall_technology_csc@pall.com">Pall_technology_csc@pall.com</a> | 607-758-4526 |
| Pall Corporation                                         | Paula Stapf       |                                                             | 607-753-6041 | <a href="mailto:Paula_stapf@pall.com">Paula_stapf@pall.com</a>                 |              |
| Environmental Improvements                               | Eric Fields       | 517 N. Kealy<br>P.O. Box 915<br>Lewisville, TX 75067        | 972-436-2536 | <a href="mailto:ericfields@ei2dallas.com">ericfields@ei2dallas.com</a>         | 972-436-8670 |
| <b>UV Disinfection/AOP System</b>                        |                   |                                                             |              |                                                                                |              |
| Trojan UV                                                | Neil Brown        | 3020 Gore Road<br>London, Ontario,<br>Canada, N5V 4T7       | 519-457-3400 | <a href="mailto:nbrown@trojanuv.com">nbrown@trojanuv.com</a>                   | 800-291-0205 |
| Newman Regency                                           | Gregory Bonefas   | 12705 S. Kirkwood Rd.<br>Suite 140<br>Stafford, Texas 77477 | 281-980-7448 | <a href="mailto:gregb@newmanregency.com">gregb@newmanregency.com</a>           | 281-980-7447 |
| <b>Chemical Tanks</b>                                    |                   |                                                             |              |                                                                                |              |
| Snyder Industries                                        | Customer Service  | P.O. Box 4583<br>Lincoln, NE                                | 402-467-5221 | <a href="mailto:sales@snydernet.com">sales@snydernet.com</a>                   | 402-467-6493 |
| WIPCO, Inc.                                              | Joey Zemler       |                                                             | 972-484-9031 | <a href="mailto:jzemler@wipcoinc.com">jzemler@wipcoinc.com</a>                 | 972-620-1146 |
| <b>Source Water Pump Station</b>                         |                   |                                                             |              |                                                                                |              |
| Barnes Pumps (large)                                     |                   | 420 Third Street<br>Piqua, OH 45356                         | 937-778-8947 |                                                                                | 937-773-7157 |
| KSB Inc. (small)                                         |                   | 4415 Sarellen Road<br>Richmond, VA 23231                    | 804-222-1818 |                                                                                | 804-226-8961 |
| Pump Solutions, Inc.                                     | Charles Norman    | 1110 South Airport Circle<br>Suite 135<br>Euless, TX 76040  | 817-684-0900 | <a href="mailto:charles@pumpsolutions.net">charles@pumpsolutions.net</a>       | 817-684-0905 |

| Product Water Pump Station |                     |                                                            |                             |                                                                          |              |
|----------------------------|---------------------|------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------|--------------|
| Flowtronex<br>(Xylem)      |                     | 10661 Newkirk Street<br>Dallas, TX 75220                   | 800-786-7480                |                                                                          | 214-574-7867 |
| Pump Solutions,<br>Inc.    | Charles<br>Norman   | 1110 South Airport Circle<br>Suite 135<br>Euless, TX 76040 | 817-684-0900                | <a href="mailto:charles@pumpsolutions.net">charles@pumpsolutions.net</a> | 817-684-0905 |
| Electrical Switchgear      |                     |                                                            |                             |                                                                          |              |
| Eaton<br>Corporation       | Warranty<br>Support |                                                            | 877-ETNCARE<br>800-498-2678 | <a href="http://www.eatonelectrical.com">www.eatonelectrical.com</a>     |              |

|                                                                                              |                                                              |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>COLORADO RIVER MUNICIPAL WATER DISTRICT</b><br>RAW WATER PRODUCTION FACILITY – BIG SPRING | <b>OPERATION AND MAINTENANCE MANUAL</b><br><b>APPENDICES</b> |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------|

## **APPENDIX C   CHEMICAL MSDS FORMS**

☒ Close this window

MSDS

**Common Name:** MEAN GREEN**Manufacturer:** AMREP**MSDS Revision Date:** 8/13/2009**Grainger Item Number(s):** 22C661**Manufacturer Model Number(s):**

## MSDS Table of Contents

Click the desired link below to jump directly to that section in the MSDS.

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MATERIAL SAFETY DATA SHEET

MEAN GREEN

## SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

top

PRODUCT NAME: MEAN GREEN

PRODUCT NUMBER: BL0704

PRODUCT USE: NATURAL CITRUS CLEANER/DEGREASE

MANUFACTURER/SUPPLIER:

AMREP, INC.

790 INDUSTRIAL PARK DRIVE

ARIETTA, GA 30062

PHONE NUMBER: (770) 422-2071 (MON-FRI/8AM-5PM ET)

D.O.T. EMERGENCY PHONE:

CHEM TEL: (800) 255-3924

116

INTERNATIONAL: +01-813-248-0584

DATE OF PREPARATION: AUGUST 13 2009

REVISION NUMBER: 2.0

**SECTION 2. HAZARDS IDENTIFICATION**

## EMERGENCY OVERVIEW:

THIS PRODUCT IS A "HAZARDOUS CHEMICAL" AS DEFINED BY THE OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200.

DANGER!

KEEP OUT OF REACH OF CHILDREN.

KEEP CONTAINER CLOSED DURING STORAGE.

## POTENTIAL ACUTE HEALTH EFFECTS:

CORROSIVE TO SKIN AND EYES ON CONTACT. SKIN CONTACT MAY PRODUCE BURNS. MAY BE IRRITATING TO THE MUCOUS MEMBRANES OF THE NOSE, THROAT AND LUNGS.

ROUTES OF ENTRY: EYE CONTACT INGESTION. INHALATION SKIN CONTACT.

## EYES:

CORROSIVE TO SKIN AND EYES ON CONTACT. EYE CONTACT CAN RESULT IN CORNEAL DAMAGE.

SKIN: SKIN CONTACT MAY PRODUCE BURNS.

INHALATION: SLIGHTLY IRRITATING TO THE RESPIRATORY SYSTEM.

## INGESTION:

IRRITATING TO THE MOUTH, THROAT, AND GASTROINTESTINAL SYSTEM. LARGE DOSES MAY CAUSE VOMITING AND DIARRHEA. IRRITATING TO MOUTH, THROAT AND STOMACH. MAY CAUSE BURNS TO MOUTH, THROAT AND STOMACH. MAY CAUSE HEADACHE, DIZZINESS, NAUSEA, VOMITING AND DIARRHEA.

## MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

OVER-EXPOSURE BY INHALATION MAY CAUSE RESPIRATORY IRRITATION. PROLONGED EXPOSURE MAY RESULT IN SKIN BURNS AND ULCERATIONS.

## POTENTIAL CHRONIC HEALTH EFFECTS:

OVER-EXPOSURE BY INHALATION MAY CAUSE RESPIRATORY IRRITATION. PROLONGED EXPOSURE MAY RESULT IN SKIN BURNS AND ULCERATIONS.

## CARCINOGENIC EFFECTS:

NOT CLASSIFIED OR LISTED BY IARC, NTP, OSHA, EU AND ACGIH.

TARGET ORGANS: NOT AVAILABLE.

ENVIRONMENTAL EFFECTS: NOT AVAILABLE.

**SECTION 3. COMPOSITION AND INFORMATION ON INGREDIENTS**

| NAME            | CAS #     | % BY WEIGHT | EXPOSURE LIMITS | LC50/LD50      |
|-----------------|-----------|-------------|-----------------|----------------|
| SODIUM SILICATE | 1344-09-8 | <10         | NOT AVAILABLE.  | NOT AVAILABLE. |

|                                                                       |           |       |                                       |                                                                                                         |
|-----------------------------------------------------------------------|-----------|-------|---------------------------------------|---------------------------------------------------------------------------------------------------------|
| ALCOHOL<br>ETHOXYLATE                                                 | N/A       | 1 - 5 | NOT AVAILABLE.                        | NOT AVAILABLE.                                                                                          |
| SODIUM<br>HYDROXIDE                                                   | 1310-73-2 | 1 - 5 | OSHA (UNITED STATES).<br>TWA: 2 MG/M3 | ORAL (LD50):<br><br>ACUTE:<br>300 MG/KG [RAT].<br><br>DERMAL (LD50):<br><br>ACUTE:<br>2 MG/KG [RABBIT]. |
| TETRASODIUM<br>SALT OF<br>ETHYLEN-<br>DIAMINE-<br>TETRAACETIC<br>ACID | 64-02-8   | 1 - 5 | NOT AVAILABLE.                        | ORAL (LD50):<br><br>ACUTE:<br>3030 MG/KG [RAT].                                                         |
| CATIONIC<br>SURFACTANT                                                | 5197-80-8 | <2    | NOT AVAILABLE.                        | NOT AVAILABLE.                                                                                          |

**SECTION 4. FIRST AID MEASURES**

top

**EYE CONTACT:**

CORROSIVE TO EYES AND SKIN. CALL A POISON CONTROL CENTER OR DOCTOR IMMEDIATELY FOR TREATMENT ADVICE. HOLD EYE OPEN AND RINSE SLOWLY AND THOROUGHLY WITH WATER FOR 15 TO 20 MINUTES. REMOVE CONTACT LENSES, IF PRESENT, AFTER THE FIRST 5 MINUTES, THEN CONTINUE RINSING EYE.

**SKIN CONTACT:**

REMOVE CONTAMINATED CLOTHING AND SHOES. RINSE SKIN WITH PLENTY OF WATER FOR 15 TO 20 MINUTES. CALL A POISON CONTROL CENTER OR DOCTOR FOR FURTHER TREATMENT ADVICE.

**INHALATION:**

MOVE PERSON TO FRESH AIR. IF PERSON IS NOT BREATHING, CALL 911 OR AN AMBULANCE, THEN GIVE ARTIFICIAL RESPIRATION., PREFERABLY MOUTH TO MOUTH IF POSSIBLE. CALL A POISON CONTROL CENTER OR DOCTOR FOR FURTHER TREATMENT ADVICE.

**INGESTION:**

CALL A POISON CONTROL CENTER IMMEDIATELY FOR TREATMENT ADVICE. HAVE PERSON SIP A GLASS OF WATER IF ABLE TO SWALLOW. DO NOT INDUCE VOMITING UNLESS INSTRUCTED TO DO SO BY A POISON CONTROL CENTER OR DOCTOR. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON

**GENERAL ADVICE:**

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW LABEL OR MSDS WHERE POSSIBLE).

NOTES TO PHYSICIAN: NOT AVAILABLE.

**SECTION 5. FIRE FIGHTING MEASURES**

top

FLAMMABILITY: NON-FLAMMABLE.

FIRE FIGHTING MEDIA AND INSTRUCTIONS: NON-FLAMMABLE SUBSTANCE.

<http://complyplus.grainger.com/granger/msds.asp?sheetid=3945535>

PRODUCTS OF COMBUSTION: NOT AVAILABLE.

SPECIAL REMARKS ON FIRE HAZARDS: NOT AVAILABLE.

SPECIAL REMARKS ON EXPLOSION HAZARDS:

SENSITIVITY TO MECHANICAL IMPACT: N/A

SENSITIVITY TO STATIC DISCHARGE: N/A

NO ADDITIONAL REMARK.

PROTECTION OF FIRE FIGHTERS: SEE SPECIAL REMARKS ON FIRE HAZARDS

## SECTION 6. ACCIDENTAL RELEASE MEASURES

 top

PERSONAL PRECAUTIONS: SPLASH GOGGLES. FULL SUIT. BOOTS. GLOVES.

METHODS FOR CONTAINMENT:

ABSORB WITH AN INERT MATERIAL AND PUT THE SPILLED MATERIAL IN AN APPROPRIATE WASTE DISPOSAL.

ENVIRONMENTAL PRECAUTIONS: SEE METHODS FOR CONTAINMENT

METHODS FOR CLEAN UP: SEE METHODS FOR CONTAINMENT

## SECTION 7. HANDLING AND STORAGE

 top

PRECAUTIONS:

KEEP LOCKED UP. KEEP CONTAINER DRY. DO NOT INGEST. DO NOT BREATHE GAS, FUMES, VAPOR OR SPRAY. WEAR SUITABLE PROTECTIVE CLOTHING. IF INGESTED, SEEK MEDICAL ADVICE IMMEDIATELY AND SHOW THE CONTAINER OR THE LABEL. AVOID BREATHING VAPORS OR SPRAY MISTS. KEEP OUT OF REACH OF CHILDREN. FOR INSTITUTIONAL AND COMMERCIAL USE

INCOMPATIBILITY: STRONG ACIDS. ACIDS

STORAGE:

KEEP OUT OF REACH OF CHILDREN. CORROSIVE MATERIALS SHOULD BE STORED IN A SEPARATE SAFETY STORAGE CABINET OR ROOM. FOR INSTITUTIONAL AND COMMERCIAL USE NOT FOR USE OR STORAGE IN OR AROUND THE HOME.

KEEP OUT OF REACH OF CHILDREN.

KEEP CONTAINER CLOSED DURING STORAGE.

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

 top

ENGINEERING CONTROLS:

PERSONAL PROTECTION:

GOOD GENERAL VENTILATION SHOULD BE SUFFICIENT TO CONTROL AIRBORNE LEVELS.

EYES: SPLASH GOGGLES.

BODY: WORK UNIFORM OR LABORATORY COAT.

RESPIRATORY: WEAR APPROPRIATE RESPIRATOR WHEN VENTILATION IS INADEQUATE.

HANDS: GLOVES (IMPERVIOUS).

PROTECTIVE CLOTHING (PICTOGRAMS):

GLOVES

CHEMICAL GOGGLES

EXPOSURE LIMITS: SEE SECTION 2 FOR APPLICABLE EXPOSURE LIMITS

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES



PHYSICAL STATE AND APPEARANCE: LIQUID.

ODOR: PLEASANT.

COLOR: ORANGE.

MOLECULAR WEIGHT: NOT APPLICABLE.

PH: 13 TO 14 [BASIC.]

BOILING/CONDENSATION POINT: 214 DEG. F INITIAL

MELTING/FREEZING POINT: NOT AVAILABLE.

CRITICAL TEMPERATURE: NOT AVAILABLE.

STABILITY TEMPERATURE: NOT AVAILABLE.

SPECIFIC GRAVITY: 1.04269 (WATER = 1)

VAPOR PRESSURE: NOT DETERMINED.

VAPOR DENSITY: >1 (AIR = 1)

VOLATILITY: 85

VOC:

% BY WEIGHT: 0.14%

G/LITER: 1.45

LBS/GALLON: 0.012

EVAPORATION RATE: <1 COMPARED TO WATER

DISPERSION PROPERTIES: SEE SOLUBILITY IN WATER.

SOLUBILITY: EASILY SOLUBLE IN COLD WATER.

THE PRODUCT IS: NON-FLAMMABLE.

AUTO-IGNITION TEMPERATURE: NOT AVAILABLE.

FLASH POINTS: NONE TO BOILING (TCC)

FLAMMABLE LIMITS: NOT APPLICABLE

FIRE HAZARDS IN PRESENCE OF VARIOUS SUBSTANCES: NON-FLAMMABLE.

EXPLOSION HAZARDS IN PRESENCE OF VARIOUS SUBSTANCES:

RISKS OF EXPLOSION OF THE PRODUCT IN PRESENCE OF STATIC DISCHARGE:  
NOT AVAILABLE.

RISKS OF EXPLOSION OF THE PRODUCT IN PRESENCE OF MECHANICAL IMPACT:  
NOT AVAILABLE.

## SECTION 10. STABILITY AND REACTIVITY DATA



STABILITY: THE PRODUCT IS STABLE.

INCOMPATIBILITY WITH VARIOUS SUBSTANCES: STRONG ACIDS. ACIDS

HAZARDOUS DECOMPOSITION PRODUCTS: NOT AVAILABLE.

## SECTION 11. TOXICOLOGICAL INFORMATION



ROUTES OF ENTRY:

TOXICITY TO ANIMALS: EYE CONTACT INGESTION. INHALATION SKIN CONTACT.

ACUTE EFFECTS ON HUMANS:  
ACUTE ORAL TOXICITY (LD50): 3030 MG/KG [RAT]. (TETRASODIUM EDTA).

EYES:  
CORROSIVE TO SKIN AND EYES ON CONTACT. EYE CONTACT CAN RESULT IN CORNEAL DAMAGE.

SKIN: SKIN CONTACT MAY PRODUCE BURNS.

INHALATION: SLIGHTLY IRRITATING TO THE RESPIRATORY SYSTEM.

INGESTION:  
IRRITATING TO THE MOUTH, THROAT, AND GASTROINTESTINAL SYSTEM. LARGE DOSES MAY CAUSE VOMITING AND DIARRHEA. IRRITATING TO MOUTH, THROAT AND STOMACH. MAY CAUSE BURNS TO MOUTH, THROAT AND STOMACH. MAY CAUSE HEADACHE, DIZZINESS, NAUSEA, VOMITING AND DIARRHEA.

CHRONIC EFFECTS ON HUMANS:  
OVER-EXPOSURE BY INHALATION MAY CAUSE RESPIRATORY IRRITATION. PROLONGED EXPOSURE MAY RESULT IN SKIN BURNS AND ULCERATIONS.

SPECIAL REMARKS ON TOXICITY TO ANIMALS: NO ADDITIONAL REMARK.

SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS: NO ADDITIONAL REMARK.

## SECTION 12. ECOLOGICAL INFORMATION



ECOTOXICITY: NOT AVAILABLE.

BOD5 AND COD: NOT AVAILABLE.

PRODUCTS OF BIODEGRADATION:  
POSSIBLY HAZARDOUS SHORT TERM DEGRADATION PRODUCTS ARE NOT LIKELY. HOWEVER, LONG TERM DEGRADATION PRODUCTS MAY ARISE.

TOXICITY OF THE PRODUCTS OF BIODEGRADATION: NOT AVAILABLE.

SPECIAL REMARKS ON THE PRODUCTS OF BIODEGRADATION: NO ADDITIONAL REMARK.

### SECTION 13. DISPOSAL CONSIDERATIONS

 top

#### WASTE INFORMATION:

WASTE MUST BE DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL ENVIRONMENTAL CONTROL REGULATIONS.

WASTE STREAM: NOT AVAILABLE.

### SECTION 14. TRANSPORT INFORMATION

 top

DOT (U.S.A) (PICTOGRAMS): CORROSIVE, CLASS/DIVISION 8

TDG CLASSIFICATION: 8  
CLASS 8, CORROSIVES

PIN UN, PROPER SHIPPING NAME, PG:  
SHIPPING NAME: CORROSIVE LIQUIDS N.O.S.  
UNNA: UN1760  
PG: II

MARITIME TRANSPORTATION: NOT AVAILABLE.

SPECIAL PROVISIONS FOR TRANSPORT: NOT AVAILABLE.

### SECTION 15. OTHER REGULATORY INFORMATION AND PICTOGRAMS

 top

REGULATORY LISTS: NO PRODUCTS WERE FOUND.

OTHER REGULATIONS:

OSHA:  
HAZARDOUS BY DEFINITION OF HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

OTHER CLASSIFICATIONS:

HCS (U.S.A.):  
HCS CLASS: CORROSIVE LIQUID.

USA REGULATORY LISTS:  
THIS PRODUCT DOES NOT CONTAIN A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM AT OR ABOVE SAFE HARBOR LEVELS UNLESS SPECIFICALLY NOTED BELOW.

SARA 311/312: SODIUM METASILICATE

SARA 313: NO COMPONENTS WERE FOUND.

OSD (EEC):  
35: CAUSES SEVERE BURNS.

INTERNATIONAL REGULATIONS LISTS: NO PRODUCTS WERE FOUND.

HAZARDOUS MATERIAL INFORMATION SYSTEM (U.S.A.):  
HEALTH 3

FLAMMABILITY 0  
PHYSICAL HAZARD 0

## NATIONAL FIRE PROTECTION ASSOCIATION (U.S.A.):

HEALTH 3  
FLAMMABILITY 0  
INSTABILITY 0  
SPECIFIC HAZARD

## WHMIS (CLASSIFICATION):

E - CORROSIVE MATERIAL

THE HAZARD RANKING SYSTEMS PRESENTED ON THIS MSDS PROVIDE ONLY A QUICK REFERENCE FOR HAZARD INFORMATION. THE ENTIRE MSDS MUST BE CONSULTED TO DETERMINE ANY SPECIFIC HAZARDS, FIRST AID MEASURES, AND PPE ASSOCIATED WITH THIS PRODUCT.

**SECTION 16. OTHER INFORMATION**

## EXPIRY DATE:

3 (THREE YEARS) FROM THE DATE OF PREPARATION INDICATED IN SECTION 1

VALIDATED BY CRUSHTON ON: 8/13/2009.

VERIFIED BY CRUSHTON.

PRINTED: 8/13/2009.

## INFORMATION CONTACT:

REP, INC.  
90 INDUSTRIAL PARK DRIVE  
MARIETTA, GA 30062

## NOTICE TO READER:

TO THE BEST OF OUR KNOWLEDGE, THE INFORMATION CONTAINED HEREIN IS ACCURATE. HOWEVER, NEITHER THE ABOVE NAMED SUPPLIER NOR ANY OF ITS SUBSIDIARIES ASSUMES ANY LIABILITY WHATSOEVER FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION CONTAINED HEREIN.

FINAL DETERMINATION OF SUITABILITY OF ANY MATERIAL IS THE SOLE RESPONSIBILITY OF THE USER. ALL MATERIALS MAY PRESENT UNKNOWN HAZARDS AND SHOULD BE USED WITH CAUTION. ALTHOUGH CERTAIN HAZARDS ARE DESCRIBED HEREIN, WE CANNOT GUARANTEE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

VALIDATED ON: 8/13/2009.



# Material Safety Data Sheet

## SULFURIC ACID 93%

Date Prepared: 1/14/09

Supersedes Date: 0/00/00

### 1. PRODUCT AND COMPANY DESCRIPTION

RHODIA INC.  
ECO SERVICES  
CN 7500  
Cranbury NJ 08512

**Emergency Phone Numbers:**

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CONTACT: CHEMTREC (800-424-9300 within the United States or 703-527-3887 for international collect calls) or Rhodia CAERS (Communication and Emergency Response System) at 800-916-3232.

**For Product Information:**

(800) 642-4200

**Chemical Name or Synonym:**

SULFURIC ACID

**Molecular Formula:**

H<sub>2</sub>SO<sub>4</sub>

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

| Component     | CAS Reg Number | OSHA Hazard | Percentage |
|---------------|----------------|-------------|------------|
| SULFURIC ACID | 7664-93-9      | Y           | 93         |
| WATER         | 7732-18-5      | N           | 7          |

### 3. HAZARDS IDENTIFICATION

**A. EMERGENCY OVERVIEW:****Physical Appearance and Odor:**

colorless oily liquid, odorless.

**Warning Statements:**

DANGER! CAUSES SEVERE BURNS. REACTS VIOLENTLY WITH WATER. CONTENTS MAY BE UNDER PRESSURE OF EXTENSIVE, FLAMMABLE HYDROGEN GAS. HIGHLY REACTIVE AND CAPABLE OF IGNITING COMBUSTIBLE MATERIAL ON CONTACT.

**B. POTENTIAL HEALTH EFFECTS:**

Acute Eye:

Corrosive. Causes burns, tissue destruction, Can cause blindness.

**Acute Skin:**

Corrosive. Causes redness, inflammation, burns.

**Acute Inhalation:**

Harmful if inhaled. Causes upper respiratory tract irritation, lung irritation, chest pain, wheezing, shortness of breath, a burning sensation, tickling of the nose and throat, sneezing. Repeated exposure to high levels of sulfuric acid mist may cause etching of tooth enamel in persons who breathe through their mouths.

**Acute Ingestion:**

Harmful if ingested. Can cause irritation, abdominal pain, corrosion, burns to mouth and esophagus, death.

**Chronic Effects:**

When mists are released from this product they are considered to be probable or suspected human carcinogens (see Section 11 - Chronic).

## 4. FIRST AID MEASURES

**FIRST AID MEASURES FOR ACCIDENTAL:****Eye Exposure:**

Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek immediate medical attention.

**Skin Exposure:**

In case of contact, immediately wash with plenty of water for at least 15 minutes. Seek medical attention if irritation develops or persists. Remove contaminated clothing and shoes. Clean contaminated clothing and shoes before re-use.

**Inhalation:**

Remove victim from immediate source of exposure and assure that the victim is breathing. If breathing is difficult, administer oxygen, if available. If victim is not breathing, administer CPR (cardio-pulmonary resuscitation). Seek medical attention.

**Ingestion:**

DO NOT INDUCE VOMITING. If the person is conscious and has no trouble breathing a small (no more than one glass) amount of water may be given. Do not leave victim unattended. To prevent aspiration of the swallowed product, lay victim on side with head lower than waist. If vomiting occurs do not re-administer water. Do not give anything by mouth to an unconscious person. IMMEDIATELY obtain medical attention.

**MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:**

Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. Skin contact may aggravate existing skin disease.

**NOTES TO PHYSICIAN:**

All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

This material is an acid. The primary toxicity of this product is due to its irritant effects on mucous membranes.

**INHALATION:** If cough or shortness of breath occurs, evaluate the possibility of bronchitis or pneumonitis. Chest x-ray and arterial blood gases can be used to determine the presence of pulmonary edema. In severe cases, use of humidified oxygen and assisted ventilation including positive end expiratory pressure (PEEP) may be needed. Parenteral steroids may be useful in limiting the extent of pulmonary damage.

**SKIN:** Wash exposed area thoroughly with soap and water. Chemical burns from strong acids are generally treated the same as thermal burns.

**EYES:** Irrigate eyes for 15 minutes with sterile saline. If irritation, pain, swelling, photophobia or lacrimation persist, examination by an ophthalmologist is recommended.

**INGESTION:** If not already performed by first aid personnel, irrigate mouth with large amounts of water and dilute the acid by

**SULFURIC ACID 75%**

having victim drink 4 to 8 ounces of water or milk. DO NOT induce vomiting. Use of gastric lavage is controversial. The advantage of removal of acid must be weighted against the risk of perforation or bleeding. If a large amount of acid (> 1 ml/kg body weight) has been recently ingested, cautious gastric lavage is generally advised if the patient is alert and there is little risk of convulsions. Consultation with a gastroenterologist and/or surgeon is advised. Serious complications such as perforation or stricture of the esophagus may occur requiring care by specialists. Laryngeal edema may develop requiring intubation or tracheostomy.

## 5. FIRE FIGHTING MEASURES

### FIRE HAZARD DATA:

#### Flash Point:

Not Applicable

#### Extinguishing Media:

Not combustible. Use extinguishing method suitable for surrounding fire. Recommended (small fires): dry chemical.

#### Special Fire Fighting Procedures:

Firefighters should wear NIOSH/MSHA approved positive pressure breathing apparatus with full face-piece and full acid-resistant protective clothing. Fight fire from maximum distance.

#### Unusual Fire and Explosion Hazards:

Not combustible. Strong oxidizers can react with reducing agents or combustibles producing heat and causing ignition. Reacts violently with water releasing heat and corrosive material.

#### Hazardous Decomposition Materials (Under Fire Conditions):

oxides of sulfur

## 6. ACCIDENTAL RELEASE MEASURES

### Evacuation Procedures and Safety:

Personnel handling this material should be thoroughly trained to handle spills and releases. Do not direct hose streams into an unignited transportation spill (tank truck or tank car).

### Containment of Spill:

Stop leak if it can be done without risk. Dike spill using absorbent or impervious materials such as earth, sand or clay. Dike or retain dilution water or water from firefighting for later disposal.

### Cleanup and Disposal of Spill:

Pump any free liquid into an appropriate closed container (see Section 7: Handling and Storage). Exercise caution during neutralization as considerable heat may be generated. Carefully neutralize spill with soda ash. Absorb neutralized spill with an inert absorbent. Scrape up and place in appropriate closed container (see Section 7: Handling and Storage).

### Environmental and Regulatory Reporting:

Do not flush to drain. Runoff from fire control or dilution water may cause pollution. Dispose of as a hazardous waste. Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies. Large spills should be handled according to a predetermined plan. For assistance in developing a plan contact the Technical Service Department using the Product Information phone number in Section 1.

## 7. HANDLING AND STORAGE

### Minimum/Maximum Storage Temperatures:

Not Available

**Handling:**

Do not breathe vapors and mists. Do not get on skin or in eyes. This product reacts violently with bases liberating heat and causing spattering.

When diluting an acid, ALWAYS add the acid slowly to water and stir well to avoid spattering. NEVER ADD WATER TO ACID.

**Storage:**

Store in tightly closed containers. Store in an area that is dry, well-ventilated, diked with impermeable material, Freezing point varies with concentration. Maximum recommended storage temperature = 104F (40C). Corrosion rates increase at elevated temperatures.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Introductory Remarks:**

These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. While developing safe handling procedures, do not overlook the need to clean equipment and piping systems for maintenance and repairs. Waste resulting from these procedures should be handled in accordance with Section 13: Disposal Considerations.

Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

**Exposure Guidelines:**

Exposure limits represent regulated or recommended worker breathing zone concentrations measured by validated sampling and analytical methods, meeting the regulatory requirements. The following limits apply to this material, where, if indicated, S=skin and C=ceiling limit:

**SULFURIC ACID**

|        | Notes | TWA         | STEL |
|--------|-------|-------------|------|
| ACGIH  |       | 0.2 mg/cu m |      |
| OSHA   |       | 1 mg/cu m   |      |
| RHODIA |       | 0.3 mg/cu m |      |

**Engineering Controls:**

Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures: local exhaust ventilation at the point of generation.

**Respiratory Protection:**

When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

**Eye/Face Protection:**

Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material. Contact to face and eyes should be prevented through use of a face shield and splash proof goggles. An emergency eye wash must be readily accessible to the work area.

**Skin Protection:**

Skin contact must be prevented through the use of permeation resistant clothing, gloves and footwear, selected with regard for use conditions and exposure potential. An emergency shower must be readily accessible to the work area. Consideration must be given both to durability as well as permeation resistance.

**Work Practice Controls:**

Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material:

- (1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- (2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
- (3) Wash exposed skin promptly to remove accidental splashes or contact with this material.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product Information phone number in Section 1 for its exact specifications.

**Physical Appearance:**

colorless oily liquid.

**Odor:**

odorless.

**pH:**

1 at 1 wt/wt%.

**Specific Gravity:**

1.836 at 16 C (61 F).

**Water Solubility:**

miscible

**Melting Point Range:**

-32 C (-26 F)

**Boiling Point Range:**

276 C (529 F) at 760 mmHg

**Vapor Pressure:**

< 1 mmHg at 40 C (104 F)

**Vapor Density:**

3.4

**Molecular Weight:**

98.08

## 10. STABILITY AND REACTIVITY

**Chemical Stability:**

This material is stable under normal handling and storage conditions described in Section 7.

**Conditions To Be Avoided:**

none known

**Materials/Chemicals To Be Avoided:**

water

strong reducing agents

halogens  
bases  
metals  
nitrogen compounds

#### Following Hazardous Decomposition Products Might Be Expected:

**Decomposition Type:** thermal  
oxides of sulfur

**Hazardous Polymerization Will Not Occur.**

**Avoid The Following To Inhibit Hazardous Polymerization:**  
not applicable

## 11. TOXICOLOGICAL INFORMATION

#### Acute Eye Irritation:

##### Toxicological Information and Interpretation:

eye - eye irritation, 250 ug/24 hr, rabbit. Severely irritating.

#### Acute Skin Irritation:

No test data found for product. This product was not tested because strong acids are known to be corrosive and to cause severe tissue destruction.

#### Acute Dermal Toxicity:

No test data found for product. This product was not tested because strong acids are known to be corrosive and to cause severe tissue destruction.

#### Acute Respiratory Irritation:

##### Toxicological Information and Interpretation:

lung - lung irritation, < 5 mg/cu m, human. Mildly irritating.

#### Acute Inhalation Toxicity:

##### Toxicological Information and Interpretation:

LC50 - lethal concentration 50% of test species, 347 ppm/1 hr, rat.

LC50 - lethal concentration 50% of test species, 510 mg/cu m/2 hr, rat.

#### Acute Oral Toxicity:

##### Toxicological Information and Interpretation:

LD50 - lethal dose 50% of test species, 2140 mg/kg, rat.

#### Chronic Toxicity:

This product contains the substances that are considered to be "probable" or "suspected" human carcinogens as follows:

The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have classified "occupational exposure to strong inorganic acid mists containing sulfuric acid" as a known human carcinogen (IARC Category 1). This classification applies only to sulfuric acid when generated as a mist. There is still debate in the scientific community whether the studies reviewed by IARC and NTP adequately controlled for confounding occupational exposures and personal habits such as cigarette smoking and alcohol consumption. A few epidemiology studies have suggested a possible association between sulfuric acid exposure and laryngeal or lung cancer; however, in all these studies, workers were exposed to many other chemicals, some of which are recognized carcinogens, such as diethylsulfate and nickel. Considering the multiple chemical exposures and other limitations of the studies, we disagree with IARC's conclusion that a cause and effect relationship between cancer and "occupational exposure to strong inorganic acid mist containing sulfuric acid" has been demonstrated. Also more recent epidemiological studies have failed to find any association between "occupational exposure to strong inorganic acid mist containing sulfuric acid" and laryngeal or lung cancer. ACGIH has classified "sulfuric acid as contained in strong inorganic acid mists" as a suspect human carcinogen. This classification does not apply to sulfuric acid per se. Lifetime animal studies in hamsters, rats and guinea pigs were conducted in the 1970's under sponsorship of the Environmental Protection Agency (EPA) or the National Institutes of Environmental Health Sciences (NIEHS). All three lifetime studies were negative for carcinogenic

effects. These studies were not formally published by the government agencies because they were satisfied that sulfuric acid mist was not a carcinogenic problem. Because these studies were not published, IARC or NTP did not consider them in their deliberations.

| Ingredient Name                                                  | Regulatory Agency Listing Carcinogen |      |     |       |
|------------------------------------------------------------------|--------------------------------------|------|-----|-------|
|                                                                  | OSHA                                 | IARC | NTP | ACGIH |
| OCCUPATIONAL EXPOSURES TO STRONG-INORGANIC-ACID MISTS CONTAINING | No                                   | 1    | Yes | A2    |

## 12. ECOLOGICAL INFORMATION

### Ecotoxicological Information:

#### Ecotoxicological Information and Interpretation:

The toxicity of sulfuric acid to fish is dependent on the resulting pH of the water. lethality at a pH of 5.0 or below. required to cause lethality varies depending on the hardness of the water (hard water has some buffering capacity) and the species of fish (some fish are more resistant to the effects of acidity). McKee, JE, and Wolf, HA (Editors), Water Quality Criteria, 2nd ed., Publication No. 3-A, p. 279, California State Water Resources Control Board, Sacramento, CA (rev. 1963).

### Chemical Fate Information:

No data found for product.

## 13. DISPOSAL CONSIDERATIONS

### Waste Disposal Method:

Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.

### EPA Hazardous Waste - YES

### EPA RCRA HAZARDOUS WASTE CODES:

"C" Corrosive; "R" Reactive.

## 14. TRANSPORTATION INFORMATION

### Transportation Status: IMPORTANT! Statements below provide additional data on listed DOT classification.

The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

### US Department of Transportation

Hazard Class..... 8

Shipping Name:

SULFURIC ACID

ID Number..... UN1830

Packing Group.... II

Labels..... CORROSIVE

Emergency Guide #.... 137

## 15. REGULATORY INFORMATION

### Inventory Status

| Inventory              | Status |
|------------------------|--------|
| U. S. ED STATES (TSCA) | Y      |
| CANADA (DSL)           | Y      |
| EUROPE (EINECS/ELINCS) | Y      |
| AUSTRALIA (AICS)       | Y      |
| JAPAN (MITI)           | Y      |
| SOUTH KOREA (KECL)     | Y      |

Y = All ingredients are on the inventory.

E = All ingredients are on the inventory or exempt from listing.

P = One or more ingredients fall under the polymer exemption or are on the no longer polymer list. All other ingredients are on the inventory or exempt from listing.

N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing.

### FEDERAL REGULATIONS

#### Inventory Issues:

All functional components of this product are listed on the TSCA Inventory.

#### SARA Title III Hazard Classes:

|                       |       |
|-----------------------|-------|
| Fire Hazard           | - NO  |
| Reactive Hazard       | - YES |
| Release of Pressure   | - NO  |
| Acute Health Hazard   | - YES |
| Chronic Health Hazard | - NO  |

#### SARA 313 Chemicals

SULFURIC ACID (93%)

#### SARA Extremely Hazardous Substances (EHS)/CERCLA Hazardous Substances

| Ingredient                                                | CERCLA/SARA RQ | SARA EHS TPQ |
|-----------------------------------------------------------|----------------|--------------|
| SULFURIC ACID                                             | 1000 lbs       | 1000 lbs     |
| UNLISTED HAZARDOUS WASTES - CHARACTERISTIC OF CORROSIVITY | 100 lbs        |              |
| UNLISTED HAZARDOUS WASTES - CHARACTERISTIC OF REACTIVITY  | 100 lbs        |              |

#### STATE REGULATIONS:

This product contains the following components that are regulated under California Proposition 65:

| Ingredient Name                                                         | Cancer List | Reprod. List | No Sign. Risk Lvl (ug/day) California | RPI |
|-------------------------------------------------------------------------|-------------|--------------|---------------------------------------|-----|
| OCCUPATIONAL EXPOSURES TO STRONG-INORGANIC-AC ID MISTS CONTAINING SULFU | Y           | N            | ND                                    | ND  |

## 16. OTHER INFORMATION

#### National Fire Protection Association Hazard Ratings--NFPA(R):

|   |                               |
|---|-------------------------------|
| 3 | Health Hazard Rating--Serious |
| 0 | Flammability Rating--Minimal  |
| 2 | Instability Rating--Moderate  |
| 0 | * NO WATER                    |

**National Paint & Coating Hazardous Materials Identification System--HMIS(R):**

**3** Health Hazard Rating--Serious  
**0** Flammability Rating--Minimal  
**2** Reactivity Rating--Moderate

**Reason for Revisions:**

New product MSDS.

**Key Legend Information:**

ACGIH - American Conference of Governmental Industrial Hygienists  
OSHA - Occupational Safety and Health Administration  
TLV - Threshold Limit Value  
PEL - Permissible Exposure Limit  
TWA - Time Weighted Average  
STEL - Short Term Exposure Limit  
NTP - National Toxicology Program  
IARC - International Agency for Research on Cancer  
ND - Not determined  
RHODIA - Rhodia Established Exposure Limits

**Disclaimer:**

The information herein is given in good faith but no warranty, expressed or implied, is made.

**\*\* End of MSDS Document \*\***

# Material Safety Data Sheet

## Provided by:

DPC Industries, Inc. DX Systems Company  
DPC Enterprises, LP DX Terminals  
DXI Industries, Inc.

PO Box 24600  
Houston, TX 77229-4600  
281-457-4888  
888-647-7717  
www.dxgroup.com

## SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name** CAUSTIC SODA LIQUID (ALL GRADES)

**Synonyms** SODIUM HYDROXIDE SOLUTION

**Chemical Name** CAUSTIC SODA LIQUID

**Date of Issue:** 3/19/2003

**Emergency phone:** 281-457-4888

**Reviewed / Revision Date:** 7/01/2008

**Chemtrec:** 800-424-9300

## SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

| COMPONENTS       | PERCENT   | CAS NO.   |
|------------------|-----------|-----------|
| SODIUM HYDROXIDE | 10% - 52% | 1310-73-2 |
| SODIUM CARBONATE | <0.2      | 497-19-8  |
| SODIUM CHLORIDE  | <1.0      | 7647-14-5 |
| WATER            | BALANCE   | 7732-18-5 |

## SECTION 3 - HAZARDS IDENTIFICATION

### Potential Health Effects

**ACGIH - TLV:** 2 mg/cu. M

**Eye Contact** CONTACT MAY CAUSE SEVERE DAMAGE INCLUDING BURNS AND BLINDNESS.

**Skin Contact** CONTACT CAUSES SEVERE SKIN IRRITATION AND POSSIBLE BURNS.

**Ingestion** CORROSIVE AND MAY CAUSE SEVERE AND PERMANENT DAMAGE TO MOUTH, THROAT AND STOMACH.

**Inhalation** EXPOSURE TO VAPOR, MIST, OR LIQUID CAN PRODUCT BURNS OF THE RESPIRATORY TRACT.

**Carcinogenicity:** NTP NO IARC NO OSHA NO

## SECTION 4 - FIRST AID PROCEDURES

**Eye Contact:** IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

**Skin Contact:** IMMEDIATELY REMOVE CONTAMINATED CLOTHING OR SHOES, WIPE EXCESS FROM SKIN AND FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. USE SOAP IF AVAILABLE OR FOLLOW BY WASHING WITH SOAP AND WATER. DO NOT REUSE CLOTHING UNTIL THOROUGHLY CLEANED. GET MEDICAL ATTENTION.

**Inhalation:** REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

**Ingestion:** DO NOT INDUCE VOMITING. RINSE MOUTH WITH WATER. IF CONSCIOUS, GIVE LARGE QUANTITIES OF WATER OR MILK AND GET IMMEDIATE MEDICAL ATTENTION. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON!

## SECTION 5 - FIRE FIGHTING MEASURES

**Flash Point (°F)** NOT APPLICABLE

**Extinguishing Media**

DOES NOT BURN. USE MEDIA APPROPRIATE FOR SURROUNDING MATERIALS.  
USE WATER SPRAY TO KEEP FIRE-EXPOSED CONTAINERS COOL.

**Special Firefighting  
Procedures/Precautions**

WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE  
GEAR. USE WATER TO COOL CONTAINERS BUT AVOID GETTING WATER INTO  
CONTAINERS.

**SECTION 6 - ACCIDENTAL RELEASE MEASURES****For Spill:**

EVACUATE UNNECESSARY PERSONNEL. CONTAIN LIQUIDS AND PREVENT DISCHARGES INTO  
WATERWAYS AND SEWERS. DO NOT APPLY WATER TO THE LEAK. COLLECT AND PLACE IN CONTAINERS  
FOR DISPOSAL. NEUTRALIZE REMAINING TRACES WITH ANY DILUTE INORGANIC ACID.

**SECTION 7 - HANDLING AND STORAGE**

Keep container tightly closed when not in use. Store in a cool, dry, well-ventilated area, away from heat and  
incompatible materials. Protect containers from physical damage.

AVOID STORING NEXT TO STRONG ACIDS. IF PRODUCT IS ADDED TOO RAPIDLY, OR WITHOUT STIRRING, AND BECOMES  
CONCENTRATED AT BOTTOM OF MIXING VESSEL, EXCESSIVE HEAT MAY BE GENERATED, RESULTING IN DANGEROUS BOILING AND  
SPLATTERING, AND A POSSIBLE IMMEDIATE AND Violent reaction

**SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION****Respiratory Protection**

USE A NIOSH/MSHA APPROVED RESPIRATOR FOLLOWING MANUFACTURER'S  
RECOMMENDATIONS WHERE DUST OR MIST MAY BE GENERATED.

**Ventilation**

LOCAL AND MECHANICAL RECOMMENDED.

**Protective Gloves**

CHEMICAL IMPERVIOUS GLOVES.

**Eye/Face Protection**

CHEMICAL SAFETY GOGGLES AND/OR FULL-FACE SHIELD.

**Other Protection**

CHEMICAL RESISTANT CLOTHING SUCH AS COVERALLS/APRON, BOOTS, ETC. EMERGENCY  
SHOWER AND EYEWASH FACILITY SHOULD BE IN CLOSE PROXIMITY.

**Work Practices**

USE GOOD PERSONAL HYGIENE PRACTICES. WASH HANDS BEFORE EATING, DRINKING,  
SMOKING, OR USING TOILET FACILITIES. PROMPTLY REMOVE SOILED CLOTHING AND WASH  
THOROUGHLY BEFORE REUSE. SHOWER AFTER WORK USING PLENTY OF SOAP AND WATER.

**SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES**

**Boiling Point (°F):** 50- 291

**Vapor Pressure (mmHg):** 13-135 (@60 C)

**Freezing Point (°F):** -230 - 54

**Vapor Density (Air=1):** NOT ESTABLISHED

**Solubility (H<sub>2</sub>O):** COMPLETE

**Specific Gravity (H<sub>2</sub>O=1):** 1.11 - 1.53

**pH** 14

**Evaporation Rate:** NOT DETERMINED

**Appearance/Odor:** COLORLESS TO SLIGHTLY HAZY LIQUID WITH NO APPRECIABLE ODOR.

**SECTION 10 - STABILITY AND REACTIVITY**

**Chemical Stability:** YES

**Incompatible Material:** REACTS WITH WATER, ACIDS, METALS, AND REDUCING SUGARS (FRUCTOSE).

**Hazardous Polymerization:** WILL NOT OCCUR.

**Decomposition Products:** NONE KNOWN.

**SECTION 11 - TOXICITY INFORMATION**

ACUTE ORAL LD50 (rat) = 1200 mg/kg ACUTE DERMAL LD50 (rabbit) = 1350 mg/kg

**SECTION 12 - ECOLOGICAL INFORMATION**

LC50/96HR/FATHEAD MINNOW/179 MG/L EC50/96HR/WATER FLEA/42 MG/L EC50/96HR/GREEN ALGAE/41 MG/L LD50 (IP)/MOUSE/40 MG/KG

**SECTION 13 - DISPOSAL CONSIDERATIONS**

DO NOT DISCHARGE INTO WATERWAYS OR SEWER SYSTEMS WITHOUT PRIOR APPROVAL.  
DISPOSE OF WASTE MATERIALS ACCORDING TO ALL FEDERAL, STATE AND LOCAL REGULATIONS.

**SECTION 14 - TRANSPORT INFORMATION**

**USA DOT Shipping Name:** SODIUM HYDROXIDE, SOLUTION

**Hazard Class:** 8

**UN/NA Number:** UN1824

**Packing Group:** II

**Subsidiary Hazard:**

**Marine Pollutant:** NO

**SECTION 15 - REGULATORY INFORMATION**

**CERCLA RQ (lbs):** 1000

**SARA Title III Section 312:**

☒ **Acute**    ☐ **Chronic**    ☐ **Flammable**    ☐ **Sudden Release of Pressure**    ☒ **Reactive**

**SARA Title III Section 313:** No

**SARA Extremely Hazardous Substance:** No

**HMIS HAZARD RATING**

|                |            |              |          |                    |   |
|----------------|------------|--------------|----------|--------------------|---|
| <b>Health:</b> | 3          | <b>Fire:</b> | 0        | <b>Reactivity:</b> | 2 |
| 0 - Least      | 1 - Slight | 2 - Moderate | 3 - High | 4 - Extreme        |   |

**SECTION 16 - OTHER INFORMATION**

**EPA Pesticide Registration Number:** NOT APPLICABLE

**NSF Maximum Use Level for Potable Water (Standard 60):** 100 mg/l (50%) 200 mg/l (25%)

**TSCA (Toxic Substance Control Act), 40 CFR 710:**

Sources of the raw materials used in this mixture assure that all chemical ingredients present are in compliance with Section 8(b) Chemical Substance Inventory, or are otherwise in compliance with TSCA.

**DISCLAIMER**

THE DATA PRESENTED IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF; HOWEVER, NEITHER SELLER NOR PREPARER MAKES ANY WARRANTIES, EXPRESSED OR IMPLIED, CONCERNING THE INFORMATION PRESENTED. THE USER IS CAUTIONED TO PERFORM HIS OWN HAZARD EVALUATION AND TO RELY UPON HIS OWN DETERMINATIONS.



## DIMMITT SULFUR PRODUCTS

P.O. Box 1008  
Telephone (806) 647-2121

Dimmitt, TX 79027  
Fax (806) 647-2126



CERTIFIED TO NSF/ANSI 60  
MAXIMUM USE LEVEL FOR  
POTABLE WATER - 46 mg/l

### MATERIAL SAFETY DATA SHEET SODIUM BISULPHITE, SOLUTION

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#### SECTION I\*\*\*CHEMICAL PRODUCT AND COMPANY IDENTIFICATION\*\*\*

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(Issue Date 09/01/03)  
(Updated 01/21/09)

**PRODUCT NAME:** SODIUM BISULPHITE, SOLUTION

**CHEMICAL FORMULA:** NaHSO<sub>3</sub>

**CHEMICAL SYNONYMS / COMMON NAMES:** Sodium Hydrogen Sulphite  
Sodium Bisulphite, Solution

**CHEMICAL FAMILY:** Inorganic Salt

**MANUFACTURER'S Name and Address:** Dimmitt Sulfur Products, LTD  
PO Box 10  
Texline, TX 79087

**Telephone:** 1-800-692-1393

**Emergency Number:** 1-806-647-2121

**CHEMTREC:** 1-800-424-9300

---

#### SECTION II\*\*\*COMPOSITION, INFORMATION ON INGREDIENTS\*\*\*

---

| CAS#      | CHEMICAL NAME                           | %     | Toxicity Data            |
|-----------|-----------------------------------------|-------|--------------------------|
| 7631-90-5 | Sodium Bisulphite (NaHSO <sub>3</sub> ) | 20-43 | No information available |
| 7732-18-5 | Water                                   | 57-70 | No information available |

#### LIST LEGEND:

00 TSCA INVENTORY

19 PA REQUIREMENT - 3% or Greater

22 CANADIAN DOMESTIC SUB LIST

23 NJ REQUIREMENT - 1% or Greater

50 PHILIPPINES INVENTORY (PICCS)

---

### SECTION III\*\*\*HAZARDS IDENTIFICATION\*\*\*

---

#### **EMERGENCY OVERVIEW**

LIQUID, VAPORS OR MIST MAY BE IRRITATING TO EYES, SKIN AND RESPIRATORY TRACT. STRONG REDUCING AGENT MAY CAUSE PERMANENT EYE DAMAGE.

Clear to pale - yellow solution with a slight sulfur odor.

#### **POTENTIAL HEALTH EFFECTS**

**ROUTES OF ENTRY:** Absorption, Inhalation, and Ingestion.

**TARGET ORGANS:** Eyes, Skin, Respiratory Tract, Gastrointestinal Tract, and Lungs.

**IRRITANCY:** Extremely irritating to skin, eyes and mucous membranes. Permanent eye damage may result from eye contact.

**SENSITIZING CAPABILITY:** None Known.

**REPRODUCTIVE EFFECTS:** None Known.

**CANCER INFORMATION:** None Known.

#### **SHORT TERM EXPOSURE (ACUTE)**

**INHALATION:** Exposure to vapor, mist or liquid can produce irritation of the respiratory tract.

**EYES:** Strongly irritating to eyes. Exposure to vapor can cause tearing, conjunctivitis and burning of the eyes. Eye contact may cause corneal injury.

**SKIN:** Contact may cause burns and tissue destruction.

**INGESTION:** Strongly irritating to mucous membranes. Can cause severe burns to the mucous membranes of the digestive tract.

**REPEATED EXPOSURE (CHRONIC):** None Known.

**SYNERGISTIC MATERIALS:** None Known.

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** None Known.

---

### SECTION IV\*\*\*FIRST AID MEASURES\*\*\*

---

**EYES:** IMMEDIATELY flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. IF IRRITATION PERSISTS GET MEDICAL ATTENTION.

**SKIN:** Wash thoroughly with soap and water. Wash clothing before reuse. IF IRRITATION OCCURS, GET MEDICAL ATTENTION.

**INHALATION:** Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, give mouth - to - mouth resuscitation. GET MEDICAL ATTENTION IMMEDIATELY.

**INGESTION:** May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals. IF CONSCIOUS, GIVE PLENTY OF WATER OR MILK. INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET IMMEDIATE MEDICAL ATTENTION.

---

### SECTION V\*\*\*FIRE FIGHTING MEASURES\*\*\*

---

Flash Point: Non - Flammable

Method: Not Applicable

Auto-Ignition: Not Applicable

**FLAMMABLE LIMITS IN AIR, BY % VOLUME:**

Upper: Non - Flammable

Lower: Non - Flammable

**EXTINGUISHING MEDIA:** Use agents appropriate for surrounding fire.

**FIRE FIGHTING PROCEDURES:** Wear NIOSH / MSHA approved positive pressure self - contained breathing apparatus and full protective clothing.

**FIRE AND EXPLOSION HAZARD:** This product is non - flammable and non - explosive under normal conditions of use. At high temperatures this product can decompose to give off toxic fumes.

**SENSITIVITY TO MECHANICAL IMPACT:** Not sensitive

**SENSITIVITY TO STATIC DISCHARGE:** Not sensitive

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**SECTION VI\*\*\*ACCIDENTAL RELEASE MEASURES\*\*\***

---

**PERSONAL PRECAUTIONS:** People performing the clean - up should have full protective equipment including NIOSH / MSHA approved positive pressure self - contained breathing apparatus.  
Follow protective measures provided under Personal Protection in Section VIII.

**ENVIRONMENTAL PRECAUTIONS:** Contain spill with dike to prevent entry into sewers or waterways. Spills or releases should be reported, if required, to the appropriate local, state and federal agencies.

**WASTE DISPOSAL:** Consult Dimmitt Sulfur Products, LTD, for assistance in disposing of excess material.

**METHODS OF CLEANING UP:** Large spills should be removed by vacuum truck. Smaller spills may be soaked up and neutralized with soda ash which should be placed in closed containers, labeled and stored in a safe place outdoors to await proper disposal. Spills on areas other than pavement, e.g., dirt or sand, may be handled by removing the affected soils and placing in approved containers.

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**SECTION VII\*\*\*HANDLING AND STORAGE\*\*\***

---

**HANDLING:** Do not get in eyes, on skin or clothing. Do not take internally. Wear personal protective equipment as describe in Exposure Controls Personal Protection (Section VIII) of the MSDS. Avoid breathing airborne particulate, wear respiratory protection when exposure is possible.

Use with adequate ventilation.

Keep container tightly closed and properly labeled.

Wash contaminated clothing before reuse.

Wash thoroughly after handling.

Wear goggles or face shield and rubber gloves when handling.

**SPECIAL MIXING AND HANDLING INSTRUCTIONS:**Not Applicable.

**STORAGE:** Keep container tightly closed and properly labeled.  
Store in a cool, ventilated area away from incompatible materials  
(See Section X).

---

**SECTION VIII\*\*\*EXPOSURE CONTROLS / PERSONAL PROTECTION\*\*\***

---

**ENGINEERING CONTROLS:** There are no occupational exposure limits established at this time. Since this material may be irritating to skin and mucous membranes, general room ventilation plus local exhaust at points of emission should be used to maintain levels of airborne contaminants as low as feasibly possible.

## **PERSONAL PROTECTION**

**RESPIRATORY:** Respiratory protection is not required under normal use. Wear a NIOSH / MSHA approved respirator following manufacturer's recommendations, when airborne contaminants may occur.

**EYE / FACE:** Wear chemical safety goggles plus full-face shields to protect against splashing when appropriate (ANSI Z87.1).

**SKIN:** Wear chemical resistant arm length or gauntlet gloves.  
Wear protective clothing to minimize skin contact.

**OTHER:** Standard work clothing closed at the neck and wrists. Emergency shower and eyewash facility should be in close proximity (ANSI Z358.1).

---

## **SECTION IX\*\*\*PHYSICAL AND CHEMICAL PROPERTIES\*\*\***

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**APPEARANCE AND ODOR:** Clear to pale - yellow solution with a slight sulfur odor.

**ODOR THRESHOLD:** Not Available

**BOILING POINT:** >104° C

**MELTING POINT:** Not Determined

**VAPOR PRESSURE:** Not Determined

**SPECIFIC GRAVITY:** 1.320 - 1.3450

**% VOLATILE BY VOLUME:** Not Determined

**VAPOR DENSITY:** Not Determined

**EVAPORATION RATE:** Not Determined

**pH:** 3.0 - 5.0

**SOLUBILITY IN WATER, % by wt.:** 45% @ 20 °C

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## **SECTION X\*\*\*STABILITY AND REACTIVITY\*\*\***

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**CHEMICAL STABILITY:** Stable

**REACTS WITH:** Heat, Oxidizers, Acids, Alkalis

**HAZARDOUS POLYMERIZATION:** Will not occur

**COMMENTS:** Avoid contact with oxidizing agents.  
Avoid heat, sparks and open flames

**HAZARDOUS DECOMPOSITION PRODUCTS:** Generates toxic and irritating gases at high temperatures.

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## **SECTION XI\*\*\*TOXICOLOGICAL INFORMATION\*\*\***

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**7631-90-5 SODIUM BISULPHITE**

Sulphite salts cause gastric irritation by liberation of sulfurous acid. The sodium salt is basic and may be irritating to corrosive tissues depending on the concentration.

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## SECTION XII\*\*\*ECOLOGICAL INFORMATION\*\*\*

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7631-90-5      SODIUM BISULPHITE

**AQUATIC ECOTOX DATA:** 240 ppm/24,48 & 96 hr. / mosquito fish / TL<sub>m</sub> / fresh water (100 % basis).

**TERRESTRIAL ECOTOX DATA:** No Data Available

**OCTANOL / WATER PARTITION COEFFICIENT:** No Data Available

**ENVIRONMENTAL FATE DATA:** No Data Available

There is no specific information available on the environmental fate and effects of SODIUM HYDROGEN SULFITE (sodium bisulfite). Due caution should be exercised to avoid accidental release of this material to aquatic or terrestrial environments.

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## SECTION XIII\*\*\*DISPOSAL CONSIDERATIONS\*\*\*

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Dispose of all waste and contaminated equipment in accordance with all applicable Local, State and Federal Health and Environmental regulations.

The materials resulting from clean - up operations may be hazardous wastes and, therefore, subject to specific regulations. Package, store, transport and dispose of all (clean - up) materials and any contaminated equipment in accordance with all applicable Local, State and Federal regulations.

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## SECTION XIV\*\*\*TRANSPORT INFORMATION\*\*\*

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**DOT ID NUMBER:** UN 2693

**DOT CLASSIFICATION:** Corrosive Material

**DOT SHIPPING NAME:** Bisulphites, aqueous solutions, n.o.s., 8, PG III, (Sodium bisulphite).

**OTHER REQUIREMENTS:** Corrosive Placards are required on containers over 119 gallons (450L). Corrosive labels are required on smaller containers. Reportable Quantity (RQ) is 5,000 lbs. (100% basis).

---

## SECTION XV\*\*\*REGULATORY INFORMATION\*\*\*

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**U.S. FEDERAL REGULATIONS:** OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, material safety data sheets, training and access to written records. We request that you and it is your legal duty to make all information in the Material Safety Data Sheet available to your employees.

To aid our customers in complying with regulatory requirements, SARA Title III Hazard Categories for this product are indicated below. If the word "YES" appears next to any category, this product may be reportable by you under the requirements of 40.CFR.370. Please consult those regulations for details.

**TSCA:** All components of this product that are required to be on the TSCA inventory are listed on the inventory.

**SARA / TITLE III HAZARD CATEGORIES:**

**Immediate (Acute) Health:** YES

**Delayed (Chronic) Health:** NO

**Fire Hazard:** NO

**Reactive Hazard:** NO

**Sudden Release of Pressure:** NO

**HMIS HAZARD RATINGS:**

**Least = 0      Slight = 1      Moderate = 2      High = 3      Extreme = 4**

**Health Hazard = 3**

**Fire Hazard = 0**

**Reactivity = 1**

**STATE REGULATIONS:** See Section II, COMPOSITION / INFORMATION ON INGREDIENTS list legend for applicable state regulation.

**INTERNATIONAL REGULATIONS:** Consult the regulations of the importing country.

**CANADA, WHMIS Hazard Class:** Not Classifiable

**MSDS LEGEND:**

**ACGIH** = American Conference of Governmental Industrial Hygienists

**CAS** = Chemical Abstracts Service Registry Number

**CEILING** = Ceiling Limit (15 minutes)

**CEL** = Corporate Exposure Limit

**OSHA** = Occupational Safety Health Administration

**PEL** = Permissible Exposure Limit (OSHA)

**STEL** = Short Term Exposure Limit (15 minutes)

**TDG** = Transportation of Dangerous Goods (Canada)

**TLV** = Threshold Limit Value

**TWA** = Time Weighted Average (8 hours)

**WHMIS** = Worker Hazardous Materials Information System (Canada)

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**SECTION XVI\*\*\*WARNING LABEL INFORMATION\*\*\***

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**SIGNAL WORD:** CORROSIVE

**HAZARD WARNINGS:** Flash Point / Non Flammable

LIQUID, VAPOR OR MIST MAY BE IRRITATING TO EYES, SKIN AND RESPIRATORY TRACT. STRONG REDUCING AGENT MAY CAUSE PERMANENT EYE DAMAGE.

**PRECAUTIONS:** Use with adequate ventilation and wear respiratory protection when exposure to dust, mist or spray is possible.

Avoid breathing dust, vapors or mist.

Wear safety goggles with side shields or chemical splash goggles, protective clothing and chemical resistant gloves.

Avoid contact with eyes, skin and clothing.

Avoid contact with oxidizers, strong acids and alkalis.

Do Not Swallow. Wash thoroughly after handling.

**FIRST AID:**

**EYES:** IMMEDIATELY flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. IF IRRITATION PERSIST GET MEDICAL ATTENTION.

**SKIN:** Wash thoroughly with soap and water. Wash clothing before reuse. IF IRRITATION OCCURS, GET MEDICAL ATTENTION.

**INHALATION:** Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, give mouth - to mouth resuscitation. GET MEDICAL ATTENTION IMMEDIATELY.

**INGESTION:** May irritate gastrointestinal tract. Very large doses cause violent colic, diarrhea, depression and death. May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals. IF CONSCIOUS, GIVE PLENTY OF WATER OR MILK. INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT. GET IMMEDIATE MEDICAL ATTENTION.

### **IN CASE OF SPILL OR LEAK:**

Contain liquids and prevent discharges to streams or sewer systems.

For large spills, dike and pump into properly labeled containers for reclamation or disposal.

For small spills, soak up with absorbent material and place in properly labeled containers for disposal.

Wear full protective equipment and clothing.

**FIRE:** Fire will liberate toxic gases. Use extinguishing medium as appropriate for surrounding fire. Use NIOSH / MSHA self - contained breathing apparatus and full protective equipment.

**HANDLING AND STORAGE:** Keep container tightly closed and properly labeled. Material is damaged by moisture. Store in a cool, dry, well ventilated area away from acids, alkalis and strong oxidizing agents. Wear personal protective equipment as described in Exposure Controls / Personal Protection (Section VIII) of the MSDS.

**DISPOSAL:** Material that cannot be reused or chemically reprocessed should be disposed of in a manner meeting government regulations. Always package, store, transport and dispose of all waste and contaminated equipment in accordance with all applicable Local, State and Federal regulations.

### **INFORMATION REQUIRED BY LOCAL, STATE AND FEDERAL REGULATIONS:**

This product contains:

| <b>CAS #</b> | <b>NAME</b>                                           |
|--------------|-------------------------------------------------------|
| 7631-90-5    | SODIUM HYDROGEN SULPHITE (SODIUM BISULPHITE)<br>WATER |

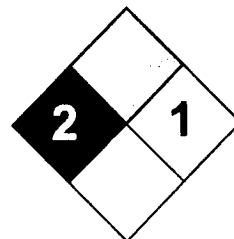
**HMIS RATING: HEALTH = 3      FLAMMABILITY = 0      REACTIVITY = 1**

**IMPORTANT:** The information presented herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY IS MADE REGARDING PERFORMANCE, STABILITY OR OTHERWISE. This information is not intended to be all - inclusive as to the manner and conditions of use, handling and storage. Other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as a recommendation to infringe any existing patents or violate any local, state or federal laws, rules, regulations or ordinances.

For additional non - emergency health, safety or environmental information, please call (806) 362-4261 or write to:

**Dimmitt Sulfur Products, LTD  
PO Box 10  
Texline, TX 79087**

**Not for use as a direct food or drug additive, unless labeled "FOOD and / or DRUG" GRADE.**



|                     |   |
|---------------------|---|
| Health              | 3 |
|                     | 0 |
| Reactivity          | 1 |
| Personal Protection |   |

## Material Safety Data Sheet

### Hydrogen Peroxide, 50% MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Hydrogen Peroxide, 50%

**Catalog Codes:** SLH1453

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Water; Hydrogen Peroxide

**CI#:** Not applicable.

**Synonym:** Hydrogen Peroxide, 50% Solution

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

#### Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

**CHEMTREC (24HR Emergency Telephone), call:**

1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

#### Section 2: Composition and Information on Ingredients

##### Composition:

| Name              | CAS #     | % by Weight |
|-------------------|-----------|-------------|
| Water             | 7732-18-5 | 50          |
| Hydrogen Peroxide | 7722-84-1 | 50          |

**Toxicological Data on Ingredients:** Hydrogen Peroxide: ORAL (LD50): Acute: 2000 mg/kg [Mouse]. DERMAL (LD50): Acute: 4060 mg/kg [Rat]. 2000 mg/kg [pig]. VAPOR (LC50): Acute: 2000 mg/m 4 hours [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant). Hazardous in case of skin contact (corrosive, permeator), of eye contact (corrosive), of ingestion. Slightly hazardous in case of inhalation (lung sensitizer). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified A3 (Proven for animal.) by ACGIH [Hydrogen Peroxide]. Classified 3 (Not classifiable for human.) by IARC [Hydrogen Peroxide]. **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells.

[Hydrogen Peroxide]. Mutagenic for bacteria and/or yeast. [Hydrogen Peroxide]. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, upper respiratory tract, skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

#### Section 4: First Aid Measures

**Eye Contact:**

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

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

**Serious Inhalation:**

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** of combustible materials

**Explosion Hazards in Presence of Various Substances:** Explosive in presence of open flames and sparks, of heat, of organic materials, of metals, of acids.

**Fire Fighting Media and Instructions:**

Fire: Small fires: Use water. Do not use dry chemicals or foams. CO<sub>2</sub>, or Halon may provide limited control. Large fires: Flood fire area with water from a distance. Move containers from fire area if you can do it without risk. Do not move cargo or vehicle if cargo has been exposed to heat. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. / Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide,

aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary)/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-140]

**Special Remarks on Fire Hazards:**

Most cellulose (wood, cotton) materials contain enough catalyst to cause spontaneous ignition with 90% Hydrogen Peroxide. Hydrogen Peroxide is a strong oxidizer. It is not flammable itself, but it can cause spontaneous combustion of flammable materials and continued support of the combustion because it liberates oxygen as it decomposes. Hydrogen peroxide mixed with magnesium and a trace of magnesium dioxide will ignite immediately.

**Special Remarks on Explosion Hazards:**

Soluble fuels (acetone, ethanol, glycerol) will detonate on a mixture with peroxide over 30% concentration, the violence increasing with concentration. Explosive with acetic acid, acetic anhydride, acetone, alcohols, carboxylic acids, nitrogen containing bases, As<sub>2</sub>S<sub>3</sub>, Cl<sub>2</sub> + KOH, FeS, FeSO<sub>4</sub> + 2 methylpyridine + H<sub>2</sub>SO<sub>4</sub>, nitric acid, potassium permanganate, P<sub>2</sub>O<sub>5</sub>, H<sub>2</sub>Se, Alcohols + H<sub>2</sub>SO<sub>4</sub>, Alcohols + tin chloride, Antimony trisulfide, chlorosulfonic acid, Aromatic hydrocarbons + trifluoroacetic acid, Azelaic acid + sulfuric acid (above 45 C), Benzenesulfonic anhydride, tert-butanol + sulfuric acid, Hydrazine, Sulfuric acid, Sodium iodate, Tetrahydrothiophene, Thiodiglycol, Mercurous oxide, mercuric oxide, Lead dioxide, Lead oxide, Manganese dioxide, Lead sulfide, Gallium + HCl, Ketenes + nitric acid, Iron (II) sulfate + 2-methylpyridine + sulfuric acid, Iron (II) sulfate + nitric acid, + sodium carboxymethylcellulose (when evaporated), Vinyl acetate, trioxane, water + oxygenated compounds (eg: acetaldehyde, acetic acid, acetone, ethanol, formaldehyde, formic acid, methanol, 2-propanol, propionaldehyde), organic compounds. Beware: Many mixtures of hydrogen peroxide and organic materials may not explode upon contact. However, the resulting combination is detonatable either upon catching fire or by impact. **EXPLOSION HAZARD: SEVERE, WHEN HIGHLY CONCENTRATED OR PURE H<sub>2</sub>O<sub>2</sub> IS EXPOSED TO HEAT, MECHANICAL IMPACT, OR CAUSED TO DECOMPOSE CATALYTICALLY BY METALS & THEIR SALTS, DUSTS & ALKALIES. ANOTHER SOURCE OF HYDROGEN PEROXIDE EXPLOSIONS IS FROM SEALING THE MATERIAL IN STRONG CONTAINERS. UNDER SUCH CONDITIONS EVEN GRADUAL DECOMPOSITION OF HYDROGEN PEROXIDE TO WATER + 1/2 OXYGEN CAN CAUSE LARGE PRESSURES TO BUILD UP IN THE CONTAINERS WHICH MAY BURST EXPLOSIVELY.** Fire or explosion: May explode from friction, heat or contamination. These substances will accelerate burning when involved in a fire. May ignite combustibles (wood, paper, oil, clothing, etc.). Some will react explosively with hydrocarbons (fuels). Containers may explode when heated. Runoff may create fire or explosion hazard. /Hydrogen peroxide, aqueous solution, stabilized, more than 60% Hydrogen peroxide; Hydrogen peroxide, stabilized/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-143] . Fire or explosion: These substances will accelerate burning when involved in a fire. Some may decompose explosively when heated or involved in a fire. May explode from heat or contamination. Some will react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.). Containers may explode when heated. Runoff may create fire or explosion hazard. /Hydrogen peroxide, aqueous solution, with not less than 8% but less than 20% Hydrogen peroxide; Hydrogen peroxide, aqueous solution, with not less than 20% but not more than 60% Hydrogen peroxide (stabilized as necessary)/ [QC Reviewed] [U.S. Department of Transportation. 2000 Emergency Response Guidebook. RSPA P 5800.8 Edition. Washington, D.C: U.S. Government Printing Office, 2000,p. G-140] (Hydrogen Peroxide)

## Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**Large Spill:**

Corrosive liquid. Oxidizing material. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient