EXHIBIT A

CAPE FEAR water solutions

Odor Control Proposal for Apex, NC

Cape Fear Water Solutions will provide the Town of Apex, NC sewer collection system with odor and corrosion control per the RFP titled "Full-Service Odor Control Program".

Proposal Costs

Item	Equivalent To	Unit Cost
Sulphatrox	Bioxide	$2.32/gal
Sulphatrox EX	Bioxide 71	$3.78/gal
Ferrotrox	Odophos	$0.99/gal
Routine Service	Bi-Monthly Routine Service	$0 – Routine Service is included with chemical purchase from Cape Fear Water Solutions
Chemical Control Panel Installation	VDLT Dosing Upgrade	$550 (Monthly)
Vapor Phase System Service	Vapor Phase System Service	$100 (Monthly)
Service and H2S Monitoring	Service and H2S Monitoring	$0 – Continuous Atmospheric H2S monitoring is provided at the specified sites

The following pages outline the chemical specifications, scope of services, and equipment specifications offered by Cape Fear Water Solutions.

Regards,

Maurice Hester
Vice President, COO
Cape Fear Water Solutions Inc.

Scope of Routine Service

- **Monthly** site visit to monitor chemical inventory level and perform routine preventative maintenance to dosing pump system.
- Dosing pump system corrective maintenance.
- 24/7/365 on-call technical assistance.
- Commitment of 2-hour response time to odor complaints, reports of chemical pump malfunctions, etc.
- Monthly measurement of product residuals, dissolved sulfide, and other key parameters to achieve cost-efficient odor and H2S control.
- Adjust chemical feed rates based on atmospheric H2S and dissolved sulfide results.
- At no extra cost, Cape Fear Water Solutions will provide any investigative odor/H2S detection studies.
- Monthly report of chemical deliveries, maintenance findings, atmospheric H2S results, and water sample results.

Chemical Control Panel Installation

- Attached to this proposal is the specification in which Cape Fear Water Solutions will provide a PLC controlled chemical feed system that includes alarms for tank levels, pump failures, etc.

Scope of H2S Monitoring

- Continuous atmospheric H2S monitoring at specified locations
- Access to Cape Fear Water Solutions' web-based portal to view H2S levels

Vapor Phase System Service

- Monthly inspection of key operating parameters
- Deliver and provide nutrient for biofiltration
- Inspection of mechanical equipment
- Optimization of water and nutrient flow rates

Product Data Sheet

Calcium Nitrate Solution

Description

Concrete Admixture:

The addition of Calcium Nitrate to Concrete shortens the time needed to reach maximum hydration temperature of a mix, and thus reduces the overall set time. Its use is especially important in cold temperature concrete placement where lower temps can prolong curing and reduce compressive strength. It is also useful in circumstance where a deadline requires concrete set time to be sped up in order to complete a job.

Water Treatment:

Calcium Nitrate is an inorganic salt that is produced by reacting nitric acid with treated limestone. Calcium Nitrate is commonly used in municipal wastewater facilities to remove unwanted H2S odors during treatment. Odor becomes a problem when sulfates reduce to sulfides under anaerobic conditions (lack of oxygen present). During the treatment of wastewater, bacteria are biochemically oxidizing organic matter in the wastewater and producing hydrogen. If free oxygen is not available for the hydrogen to react with and form water, then the bacteria will begin to breakdown other oxygen bearing compounds to sustain the reaction. If other oxygen bearing compounds are not available in the wastewater, then sulfates will supply the oxygen needed and form H2S as a by-product. Calcium Nitrate serves as a preferential "receptor" for the hydrogen ion over sulfate.

This process is carried out via two separate processes, the stoichiometry for each are below:
Prevention (Adding Calcium Nitrate before H2S formation):

$$6NO_3^- + 5CH_3OH \rightarrow 5CO_2 + 3N_2 + 7H_2O + 6OH^-$$

Removal (Adding Calcium Nitrate after H2S formation):

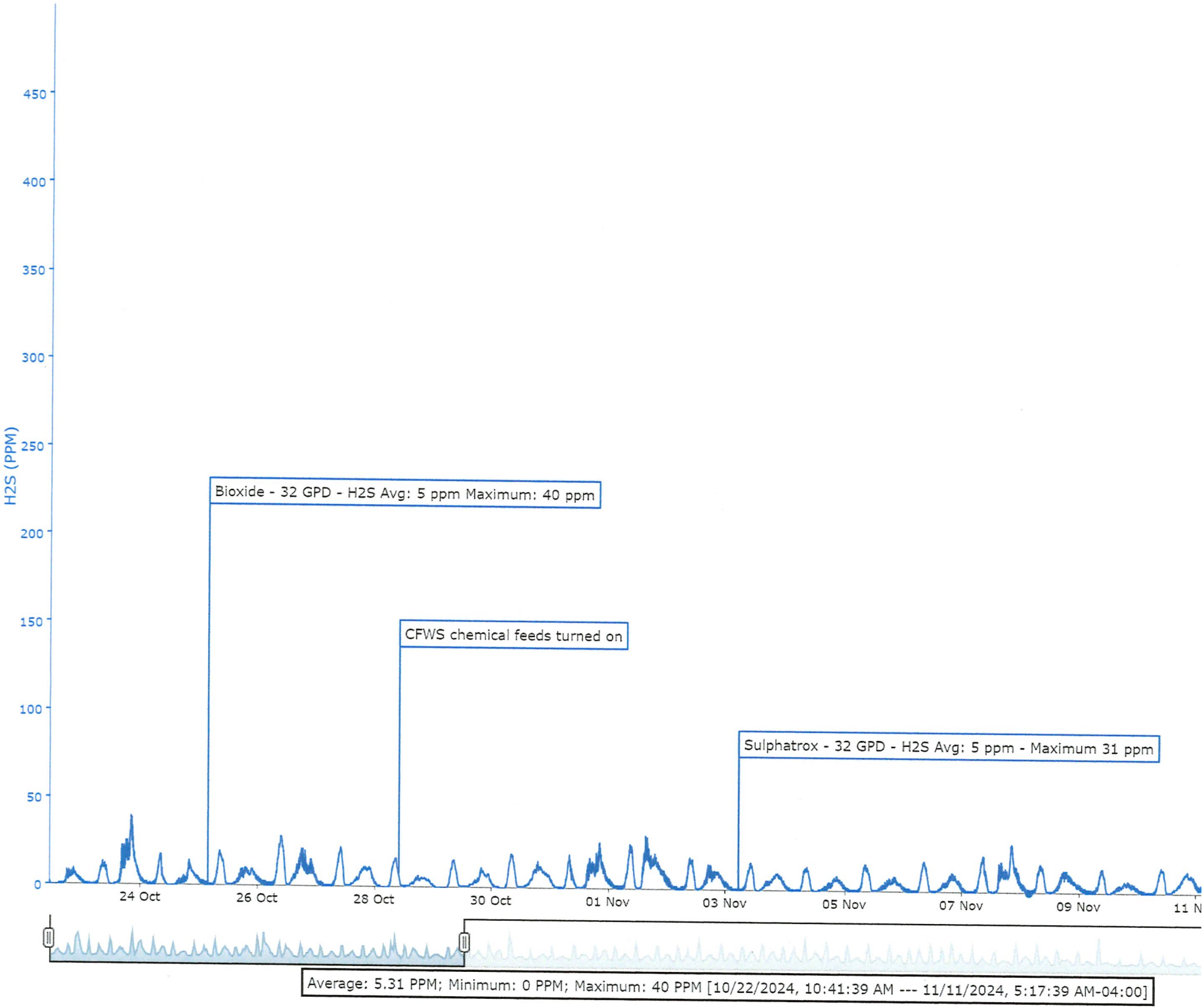
$$8NO_3^- + 5H_2S \rightarrow 5SO_4^{=} + 4N_2 + 4H_2O + 2H^+$$

Calcium Nitrate can be used to prevent the formation of H2S odors or eliminate odors in applications where H2S is already present. By effectively eliminating dissolved H2S from the system, Calcium Nitrate can help reduce the potential for corrosion by preventing the formation of sulfuric acid. It can also be used to prevent oxygen deficiency in wastewater treatment plants where excess sulfur-containing compounds exist.

Physical properties	Specification
Assay as $Ca(NO_3)_2 * 4H_2O$	68.0 – 70.0%
Assay as Ca	10.9 – 11.3%
pH @ 15°C	6.5 – 8.0
Specific Gravity @ 15°C	1.450 – 1.465
Iron (Fe)	0.003%
Nitrate-Oxygen Per Gallon	3.5 – 3.55 lbs/gal
Appearance	Clear, colorless liquid
Freezing Point	-25°F
Manganese (Mn)	0.005%
Nitrogen, from NO_3	8.30%

Package Types

Bulk
3350# Totes
600# Dru


H2S (PPM)
450
400
350
300
250
200
150
100
50
0
Bioxide - 32 GPD - H2S Avg: 5 ppm Maximum: 40 ppm
CFWS chemical feeds turned on
Sulphatrox - 32 GPD - H2S Avg: 5 ppm - Maximum 31 ppm
24 Oct
26 Oct
28 Oct
30 Oct
01 Nov
03 Nov
05 Nov
07 Nov
09 Nov
11 N
Average: 5.31 PPM; Minimum: 0 PPM; Maximum: 40 PPM [10/22/2024, 10:41:39 AM --- 11/11/2024, 5:17:39 AM-04:00]

Safety Data Sheet

Sulphatrox

*** * * Section 1 - Chemical Product and Company Identification * * ***

Product Identifier:

Sulphatrox

Chemical Name

Inorganic Nitrate Solution

Recommended Use

Various Industrial Applications

Manufacturer Information

CAPE FEAR WATER SOLUTIONS INC.
399 OLD NC 87
Dublin, NC. 28332

Phone: 910-991-7700

CHEMTREC: (800) 424-9300

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

*** * * Section 2 – Hazard Identification * * ***

GHS Classification

Serious Eye Damage/Eye Irritation - Category 2A
Skin corrosion/irritation - Category 2
Acute toxicity - Oral - Category 4
Acute toxicity - Inhalation - Category 4

GHS Label Elements

Symbol(s)

Signal Word -

Warning

Hazard Statements

Harmful if swallowed.
Harmful if inhaled.
Causes skin irritation.
Causes serious eye irritation.

Sulphatrox

Precautionary Statements

Prevention

Wear protective gloves/protective clothing/eye protection/face protection. Avoid breathing dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation occurs: Get medical advice/attention.

IF ON SKIN (OR HAIR): Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.

IF INHALED: If inhaled, remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.

IF SWALLOWED: Rinse mouth. Do not induce vomiting. Immediately call a POISON CENTER or doctor/physician.

Storage

Store locked up.

Disposal

Dispose of contents/container in accordance with local/regional/national/international regulations.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
13477-34-4	Calcium Nitrate Tetrahydrate	68-70%
773218-5	Water	to 100%

Component Information/Information on Non-Hazardous Components

This product may be regulated, have exposure limits or other information identified as the following: Water Dissociable Compounds

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication). This product is considered hazardous under the criteria specified in the Canadian Workplace Hazardous Materials Information System (WHMIS).

* * * Section 4 - First Aid Measures * * *

Description of Necessary Measures

Eyes Contact

IF IN EYES: Immediately flush eyes with water for at least 15 minutes, while holding eyelids

open. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation occurs: Get medical advice/attention.

Skin Contact

IF ON SKIN (or hair): Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention.

Ingestion

IF SWALLOWED: If material is ingested, immediately contact a physician or poison control center. Give one to two glasses of water or milk. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to a victim who is unconscious or is having convulsions.

Inhalation

IF INHALED: If inhaled, immediately remove the affected person to fresh air. If the affected person is not breathing, apply artificial respiration. If irritation persists get medical attention. Notes to Physician Provide general supportive measures and treat symptomatically.

* * * Section 5 - Fire Fighting Measures * * *

General Fire Hazards

This product is an aqueous solution which will not burn. However, if evaporated to dryness this product is an oxidizer and can sustain combustion.

Hazardous Combustion Products

Decomposition may yield calcium compounds and oxides of nitrogen.

Extinguishing Media

Dry chemical, foam, carbon dioxide, water fog.

Fire Fighting Equipment/Instructions

Fire fighters should wear full-face, self-contained breathing apparatus and impervious protective clothing. Fire fighters should avoid inhaling any combustion products.

NFPA Ratings: Health: 1 **Fire:** 0 **Reactivity:**

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Containment Procedures

Stop the flow of material, if this is without risk. Wear appropriate protective equipment and clothing during clean up. Contain the discharged material and dike the spilled material where

possible. Prevent entry into drains, underground or confined spaces, water intakes and waterways. Avoid contact with combustible materials.

Clean-Up Procedures

Absorb spill with inert material such as: lime, polypads, or other suitable absorbent material. Shovel the absorbed material into appropriate container for disposal.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

Isolate exposure. Wear appropriate personal protective equipment. Follow all Local, State, Federal and Provincial regulations for disposal.

* * * Section 7 - Handling and Storage * * *

Handling Procedures

Open container carefully, as needed to relieve any build-up of pressure. Do not get this material in your eyes, on your skin, or on your clothing. Do not inhale vapors or mists of this product. Use this product with adequate ventilation. Wash thoroughly after handling.

Storage Procedures

Store in a cool, dry area. Do not freeze. Store away from direct sunlight and any sources of heat. Empty product containers may contain product residue. Do not reuse empty containers. Do not store this material in open or unlabeled containers.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Component Exposure Limits

ACGIH, OSHA, and NIOSH have not development exposure limits for this product's components.

Engineering Controls

Provide adequate local exhaust ventilation to maintain worker exposure below exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles (if splashing is possible).

Personal Protective Equipment: Skin

Use impervious gloves. Use of an impervious apron is recommended.

Personal Protective Equipment: Respiratory

Respiratory protection; not normally required for ambient air concentrations not exceeding the Occupational Exposure Limit. If ventilation is not sufficient to effectively prevent buildup of vapors or mists, appropriate approved NIOSH respiratory protection must be provided. Respirators should be selected by and used under the direction of a trained health and safety professional following the requirements found in OSHA's respirator standard (29 CFR 1901.134)

and ANSI's standard for respiratory protection (Z88.2-1992), applicable U.S. regulations, or the Canadian CSA Standard Z94.4-93 and applicable standards of Canadian Provinces. A written respiratory protection program, including provisions for medical certification, training, fit-testing, exposure assessments, maintenance, inspection, cleaning, and convenient, sanitary storage, must be implemented.

Personal Protective Equipment: General

Eyewash fountains and emergency showers are required. An emergency spill response will necessitate the use of more stringent personal protective equipment.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Colorless liquid	**Odor:**	None
Physical State:	Liquid	**Odor Threshold:**	Not Applicable
Vapor Pressure:	Not available	**pH:**	6.5 - 8.0
Vapor Density:	Not available	**Specific Gravity:**	1.45 @ 59ºF
Boiling Point / Boiling Range:	212 ºF (100 ºC)	**Evaporation Rate:**	(15ºC) Not
Melting Point / Freezing Point:	Not available / Not available	**Relative Density:**	available Not
Solubility (H2O):	Complete Auto-ignition	**Temperature:**	available Not
Flash Point:	Not Flammable	**Decomposition Temperature:**	available
Upper Flammable Limit (UFL):	Not Applicable	**Lower Flammable Limit (LFL):**	Not Applicable
Viscosity:	Not available	**Partition Coefficient (n-octanol / water):**	Not available
Flammability:	Not available		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

This is a stable material.

Chemical Stability: Conditions to Avoid

Avoid contact with extreme heat and incompatible materials.

Incompatibility

This product is incompatible with flammable and combustible materials, strong reducing agents and finely powdered metals.

Hazardous Decomposition

Decomposition may yield calcium compounds and oxides of nitrogen.

Hazardous Polymerization

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

This product may be harmful or fatal if swallowed. This product is irritating to the eyes, respiratory system and skin. The nitrate component of this product may cause methemoglobinemia upon ingestion characterized by cyanosis, headache, dizziness, fatigue, nausea, vomiting, drowsiness, stupor, coma and rarely death.

Sulphatrox

Component Analysis - LD50/LC50
Product is proprietary
Oral LD50 Rat: 3900 mg/kg

Information on Likely Routes of Exposure

Inhalation

This product is irritating to the respiratory system. Inhalation of vapors or mists of the product can cause sneezing, coughing and difficulty breathing.

Ingestion

This product may be harmful or fatal if swallowed. If ingested, this product will immediately cause burns to the mouth, throat, esophagus and possibly the digestive tract. Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product may cause methemoglobinemia upon ingestion characterized by cyanosis, headache, dizziness, fatigue, nausea, vomiting, drowsiness, stupor, coma and rarely death.

Skin Contact

This product is irritating to the skin. Depending on the duration of contact, symptoms will include reddening, discomfort, irritation, and possible tissue damage.

Eye Contact

Contact with the eyes can cause moderate irritation. Symptoms may include discomfort or pain and redness. Severe over exposure can result in swelling of the conjunctiva along with tissue damage which may lead to blindness.

Immediate Effects

Eye irritation and respiratory irritation.

Delayed Effects

Repeated skin contact with this material may produce dermatitis.

Medical Conditions Aggravated by Exposure

Pre-existing eye, skin and/or respiratory tract conditions.

Irritation/Corrosivity Data

Respiratory tract irritation, skin irritation, eye irritation.

Respiratory Sensitization

No data available.

Dermal Sensitization

No data available for the mixture

Germ Cell Mutagenicity

No data available for the mixture.

Carcinogenicity

Component Carcinogenicity

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Reproductive Toxicity

No data available for the mixture.

Sulphatrox

Specific Target Organ Toxicity - Single Exposure

No information available.

Specific Target Organ Toxicity - Repeated Exposure

No information available.

Aspiration Hazard

No information available

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

In high concentrations, this product may be harmful to both terrestrial and aquatic plant life.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

No ecotoxicity data are available for this product's components.

Environmental Fate

Based on the physical properties of this product, significant environmental persistence and bioaccumulation would not be expected.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

General Product Information

Wastes must be tested using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes. No EPA Waste Numbers have been assigned for this product's components.

Disposal Instructions

Dispose of waste material according to Local, State, Federal, and Provincial Environmental Regulations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not regulated as a hazardous material for transportation in current form.

Canada Transportation of Dangerous Goods Information

Shipping Name: Not regulated as a hazardous material for transportation in current form.

International Maritime Dangerous Goods

Shipping Name: Not regulated as a hazardous material for transportation in current form.

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Proprietary Product

SARA 313: form R reporting required for 1.0% de minimis concentration; Chemical Category N511 (related to Water Dissociable Compounds)

SARA 311/312: Acute Health Yes Chronic Health No Fire No Pressure No Reactive No

Federal Insecticide, Fungicide, and Rodenticide Act

No information is available.

State Regulations

General Product Information

Other state regulations may apply. Check individual state requirements.

Component Analysis - State

None of this product's components are listed on the state lists from CA, FL, MA, MN, NJ, or PA.

Component Analysis - WHMIS IDL

Components of this material have been checked against the Canadian WHMIS Ingredients Disclosure List. The List is composed of chemicals which must be identified on MSDSs if they are included in products which fall under WHMIS criteria specified in the Controlled Products Regulations and present above the threshold limits listed on the IDL. No components are listed in the WHMIS IDL.

WHMIS Classification

C, D2B

Additional Regulatory Information

A: General Product Information

Product is proprietary information

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	NDSL	EINECS	AU	MITI	PH KR	ELINCS	CN
Proprietary		Yes	Yes	No	No	Yes	Yes	Yes No	No	Yes
Water		Yes	Yes	No	Yes	Yes	Yes	No Yes	No	Yes

* * * Section 16 - Other Information * * *

Summary of Changes

New SDS: 07/10/2015 v1.0

Safety Data Sheet

Sulphatrox

Key / Legend

ACGIH = American Conference of Governmental Industrial Hygienists; **AU** = Australia; **BOD** - Biochemical Oxygen Demand; **C** - Celsius; **CA** - Canada; **CAS** = Chemical Abstracts Service; **CERCLA** = Comprehensive Environmental Response, Compensation, and Liability Act; **CFR** = Code of Federal Regulations; **CN** = China; **CPR** = Controlled Products Regulations; **DOT** = Department of Transportation; **DSL** = Domestic Substances List; **EINECS** = European Inventory of Existing Commercial Chemical Substances; **ELINCS** = European List of Notified Chemical Substances; **EmS** = Emergency Response Procedures for Ships Carrying Dangerous Goods; **EPA** = Environmental Protection Agency; **EU** = European Union; **F** - Fahrenheit; **HEPA** = High Efficiency Particulate Air; **HMIS** = Hazardous Material Information System; **HPV** – High Production Volume Chemical (EU); **IARC** = International Agency for Research on Cancer; **IATA** = International Air Transport Association; **ICL** – In Commerce List (Canada); **IDL** - Ingredient Disclosure List; **IDLH** - Immediately Dangerous to Life and Health; **JP** = Japan; **KR** = Korea; **LEL** - Lower Explosive Limit; **MITI** = Japan Ministry of International Trade and Industry; **mg/Kg** = milligrams per Kilogram; **mg/L** = milligrams per Liter; **mg/m3** = milligrams per Cubic Meter; **MSHA** = Mine Safety and Health Administration; **NA** = Not Applicable or Not Available; **NFPA** = National Fire Protection Association; **NIOSH** = National Institute for Occupational Safety and Health; **NJTSR** = New Jersey Trade Secret Registry; **NDSL** = Non-Domestic Substances Inventory; **NTP** = National Toxicology Program; **NZ** = New Zealand; **OSHA** = Occupational Safety and Health Administration; **PH** = Philippines; **RCRA** = Resource Conversation & Recovery Act; **RQ** = Reportable Quantity; **SARA** = Superfund Amendments and Reauthorization Act; **STEL** = Short Term Exposure Limit; **TDG** = Transport Dangerous Goods; **TSCA** = Toxic Substances Control Act; **TWA** - Time Weighted Average; **UEL** - Upper Explosive Limit; **US** - United States; **WHMIS** = Workplace Hazardous Materials Information System.

Other Information

Disclaimer: Supplier gives no warranty of merchantability or of fitness for a particular purpose. Any product purchased is sold on the assumption the purchaser will make his own tests to determine the quality and suitability of the product. Supplier expressly disclaims any and all liability for incidental and/or consequential property damage arising out of the use of this product. No information provided shall be deemed to be a recommendation to use any product in conflict with any existing patent rights. Read the Safety Data Sheet before handling product.

End of Sheet

Product Data Sheet

Ferrotrox

Ferrous Iron Solution

Description

Ferrotrox is a Ferrous Iron Solution that is proven to be efficient in controlling dissolved sulfide in wastewater collection systems to <0.5 mg/L levels. Ferrotrox binds the hydrogen sulfide in a reaction that forms ferrous sulfide, which prevents the formation of hydrogen sulfide gas.

Ferrotrox is also effective in phosphorus and solids removal in wastewater treatment facilities.

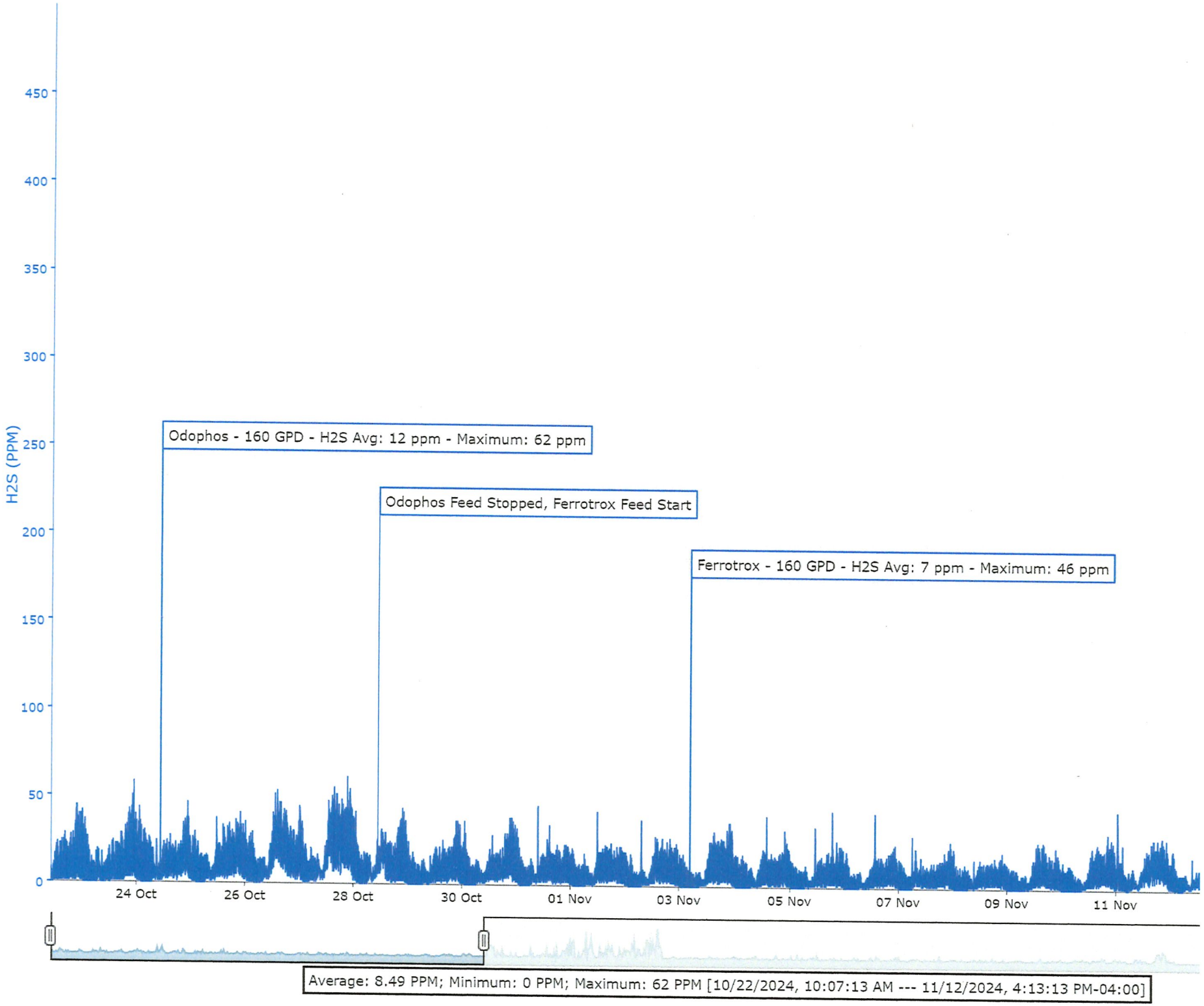
Typical Applications

- Lift Stations/Wetwells
- Gravity Mains
- Force Mains
- Wastewater Treatment Plants
- Solids Processing
- Ponds and Lagoons

Physical properties	Specification
Specific Gravity	1.15 – 1.18
Crystallization Point	<28°F
pH	2.0-6.0
Color	Translucent Green
Soluble Ferrous Iron	>5%
Insolubles	<0.5%
Free Acid	<0.75%

Package Types

Bulk
3350# Totes
600# Drum


H2S (PPM)
450
400
350
300
250
200
150
100
50
0
Odophos - 160 GPD - H2S Avg: 12 ppm - Maximum: 62 ppm
Odophos Feed Stopped, Ferrotrox Feed Start
Ferrotrox - 160 GPD - H2S Avg: 7 ppm - Maximum: 46 ppm
24 Oct
26 Oct
28 Oct
30 Oct
01 Nov
03 Nov
05 Nov
07 Nov
09 Nov
11 Nov
Average: 8.49 PPM; Minimum: 0 PPM; Maximum: 62 PPM [10/22/2024, 10:07:13 AM --- 11/12/2024, 4:13:13 PM-04:00]

Safety Data Sheet

Ferrotrox

1. IDENTIFICATION

Product name	Ferrotrox
Description	Proprietary aqueous solution
Product class	Specialty
Supplier address	399 Old Hwy 87 Dublin, NC 28332
Telephone numbers	
Company Phone Number	(910) 991-7700
Emergency Telephone	INFOTRAC 800-535-5053

2. HAZARDS IDENTIFICATION

Hazard classification	Skin Irritation, Category 2 Eye Irritation, Category 2A Acute Toxicity – Oral – Category 4 Acute Toxicity – Inhalation - 4
Signal word	Warning
Hazard statements	Causes skin irritation. Causes serious eye irritation

Pictograms of related hazards

Precautionary statements

Prevention

Wash skin thoroughly after handling.
Wear protective gloves, protective clothing, eye protection, and face protection.
Avoid release to the environment.

Response

IF ON SKIN: Wash with soap and water.
If skin irritation occurs: Get medical attention.
Take off contaminated clothing and wash it before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Immediately contact a POISON CENTER or health care provider.
If eye irritation persists: Get medical attention.

Disposal

Dispose of contents and container in accordance with local, state, and federal regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Weight %
Proprietary Iron Salt Solution	Proprietary	4.9-6.2 Ferrous Iron
Non-hazardous substances	Proprietary	>93.5

4. FIRST-AID MEASURES

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally to ensure complete rinsing. Remove contact lenses if present and easy to do, then resume rinsing. Get medical attention immediately.

Skin contact Immediately remove all contaminated clothing. Rinse with copious amounts of water; use an emergency shower if available. Wash contaminated clothing before reuse.

Ingestion If swallowed, DO NOT induce vomiting. Rinse mouth and get emergency medical attention. Do not give anything by mouth unless instructed to do so by a poison center or health care provider.

Inhalation If inhaled, move victim to fresh air. Seek emergency medical attention if breathing is difficult; perform artificial respiration if breathing stops.

Note to health care provider Esophageal corrosion may contraindicate the use of gastric lavage and/or activated charcoal.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media Use extinguishing media appropriate for the surrounding fire.

Unsuitable extinguishing media No information available

Protective equipment and precautions for firefighters Stay upwind of the fire. Full protective equipment including self-contained breathing apparatus should be used. Use water to cool closed containers. Contain water runoff if possible.

Specific hazards Reaction with metals may produce highly flammable hydrogen gas.

Hazardous combustion products Sulfur oxides, iron oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions Evacuate the area of all non-essential personnel. Do not touch spilled material without proper protective equipment. Ventilate the area and mitigate further release if it is safe to do so. Avoid contact with eyes.

Methods for clean-up

Small spills Contain spill and soak up with an inert absorbent material and place residues in a properly labeled container for disposal. Avoid discharge into sewer or surface water.

Large spills	Contain spill using trenches, diking, or absorption with an inert material (i.e. sand or earth). Reclaim spilled material into recovery or salvage drums or tank truck for proper disposal.

7. HANDLING AND STORAGE

Advice on safe handling	Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Wash hands thoroughly after handling.
Storage conditions	Store in a cool, dry, well-ventilated area away from incompatible materials. Keep containers closed when not in use.
Suitable materials of construction	Corrosion-resistant container; original container only is recommended.
Unsuitable materials of construction	Metals

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye/face protection	Chemical splash goggles, face shield
Skin protection	Chemical-resistant gloves and body-covering clothing
Respiratory protection	Observe published airborne exposure limits. NIOSH approved respirator should be used in accordance with OSHA respiratory protection requirements (29 CFR 1910.134).
Engineering controls	Adequate ventilation, eye-wash station, and emergency shower
General hygiene considerations	Do not eat, drink, or smoke while handling this product.

Chemical Name	OSHA PEL	ACGIH TLV
Ferrotrox Iron Solution	TWA: 1 mg/m³ (as iron salt)	TWA: 1 mg/m³ (as iron salt)
Non-hazardous substances	None established	None established

9. PHYSICAL AND CHEMICAL PROPERTIES

pH	2.0-6.0
Appearance	Clear green liquid
Odor	Slight acrid
Odor Threshold	No information available
Melting/freezing point	28°F (-2.2°C)
Initial boiling point/boiling range	No information available
Flash point	No information available
Evaporation rate	No information available
Flammability (solid, gas)	No information available
Upper/lower flammability or explosive limits	No information available
Vapor pressure	No information available

Vapor density	No information available
VOC content	No information available
Specific gravity	1.120-1.180
Solubility	Complete
Partition coefficient n-octanol/water	No information available
Auto-ignition temperature	No information available
Decomposition temperature	No information available
Viscosity	No information available

10. STABILITY AND REACTIVITY

Chemical stability Stable under normal conditions of storage and handling.

Hazardous polymerization Polymerization will not occur.

Conditions to avoid Extreme temperatures, incompatibilities

Incompatibilities Strong bases, oxidizers

Hazardous decomposition products No known non-thermal decomposition hazards.

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure Skin, eyes, ingestion

Acute toxicity

Parameter	Result
LD_{50}, Oral (rat)	1,389 mg/kg
LD_{50}, Oral (mouse)	1,520 mg/kg

Acute symptoms and effects

Eye Eye irritation with or without pain, burning, itching, redness, discharge, and serious eye damage.

Skin Skin irritation with or without pain, burning, itching, redness, and swelling. Symptoms may be exacerbated by open wounds, excoriations, rashes, or other skin breaches.

Ingestion Gastrointestinal distress with or without nausea, vomiting, and diarrhea. May cause irritation or corrosion of the oral and esophageal mucosa.

Inhalation Upper respiratory irritation with or without cough, watering of the eyes, and postnasal drip. Aspiration of liquid or vomit may cause severe respiratory distress, airway corrosion, and acute lung damage.

Reproductive effects No information available

Teratogenicity No information available

Mutagenicity No information available

Embryotoxicity No information available

Sensitization to product No information available

Synergistic products No information available

Carcinogenicity	No components have been identified as carcinogenic by OSHA, NTP, or IARC.
Chronic	No information available

12. ECOLOGICAL INFORMATION

Persistence	No information available
Bioaccumulative potential	No information available
Mobility	No information available

13. DISPOSAL CONSIDERATIONS

Disposal	Dispose of in accordance with federal, state, and local regulations.

14. TRANSPORT INFORMATION

US Department of Transportation (DOT)	Not regulated for quantities less than the reportable quantity.

15. REGULATORY INFORMATION

OSHA Hazard Communication Status	Skin Irritation, Category 2 Eye Irritation, Category 2A Aquatic Environment Toxicity: Acute, Category 3
EPA Registration Number	Not applicable
TSCA	The ingredients of this product are listed on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory.

Section 311 and 312 Health and Physical Hazards

Immediate	Delayed	Fire	Pressure	Reactivity
Yes	No	No	No	No

Section 313 Toxic Chemicals (40 CFR 372)

Chemical Name	CAS Number	Percent by Weight
None		

16. OTHER INFORMATION

HMIS Ratings	Health—2; Flammability—0; Reactivity—0
NFPA Ratings	Health—2; Flammability—0; Reactivity—0
HMIS/NFPA Rating Scale	Minimal—0; Slight—1; Moderate—2; Serious—3; Severe—4
SDS Issue Date	5/22/2023

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal, and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Product Data Sheet

Sulphatrox EX

Description

Wastewater Treatment:

Calcium Nitrate is commonly used in municipal wastewater facilities to remove unwanted H2S odors during treatment. Odor becomes a problem when sulfates reduce to sulfides under anaerobic conditions (lack of oxygen present). During the treatment of wastewater, bacteria are biochemically oxidizing organic matter in the wastewater and producing hydrogen. If free oxygen is not available for the hydrogen to react with and form water, then the bacteria will begin to breakdown other oxygen bearing compounds to sustain the reaction.

If other oxygen bearing compounds are not available in the wastewater, then sulfates will supply the oxygen needed and form H2S as a by-product. Calcium Nitrate serves as a preferential "receptor" for the hydrogen ion over sulfate. Calcium Nitrate can be used to prevent the formation of H2S odors or eliminate odors in applications where H2S is already present. By effectively eliminating dissolved H2S from the system, Calcium Nitrate can help reduce the potential for corrosion by preventing the formation of sulfuric acid. It can also be used to prevent oxygen deficiency in wastewater treatment plants where excess sulfur-containing compounds exist.

Sulphatrox EX was specifically formulated to perform in situations where low levels of dissolved sulfides are present at the nitrate dosing point. A proprietary component is dosed with Calcium Nitrate to interact instantly with small quantities of dissolved sulfides and prevents formation new sulfides downstream.

Physical properties	Specifications
Appearance	Clear/amber liquid
Solubility	Complete
Specific Gravity	1.31-1.45
Freezing Point	<-14°C
pH	8.0-10.0
Nitrate Oxygen Content	2.4-2.9 lb/gal
Odor	Slightly Chlorine

Package Types

Bulk
3350# Totes
600# Drums

Safety Data Sheet

Sulphatrox EX

* * * Section 1 - Chemical Product and Company Identification * * *

Product Identifier:

Sulphatrox EX

Chemical Name

Inorganic Nitrate Solution

Recommended Use

Wastewater Odor Control

Manufacturer Information

CAPE FEAR WATER SOLUTIONS INC.
399 OLD NC 87
Dublin, NC. 28332

Phone: 910-991-7700

CHEMTREC: (800) 424-9300

General Comments

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

* * * Section 2 – Hazard Identification * * *

Appearance & Odor: Colorless to amber liquid with a slight chlorine odor.

Emergency Overview: Spills will make the floor slippery. Do not allow the product to evaporate to dryness as the dry residue can ignite upon contact with combustible materials. Avoid long term exposure to ultraviolet light. Store in opaque containers.

Fire & Explosion Hazards: Not flammable as liquid solution. Strong oxidant if allowed to dry.

Primary Route(s) of Exposure: Skin and eye contact, and inhalation.

Inhalation - Acute Effects: Inhalation of vapors or mists may cause irritation to the respiratory tract. Breathing vapor or mists may be harmful.

Skin Contact - Acute Effects: Occasional brief contact with the liquid is not expected to result in significant irritation. Prolonged contact may cause irritation.

Eye Contact - Acute Effects: Eye contact will irritate and may burn the eyes.

Ingestion - Acute Effects: May be harmful if swallowed. May cause gastrointestinal irritation and nausea.

* * * Section 3 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
13477-34-4	Calcium Nitrate	32-73
7758-19-2	Sodium Chlorite	Proprietary
7732-18-5	Balance	Balance

* * * Section 4 - First Aid Measures * * *

Description of Necessary Measures

Inhalation First Aid: Remove affected person to fresh air. Give artificial respiration ONLY if breathing has stopped. Obtain medical attention.

Skin Contact First Aid: Immediately remove clothing from affected area and wash skin with flowing water and soap. Clothing should be washed before reuse. Obtain medical attention if irritation persists.

Eye Contact First Aid: Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contacts should be removed before or during flushing. Obtain medical attention if irritation develops.

Ingestion First Aid: If victim is alert, rinse mouth with water and give water to drink. Do not induce vomiting. If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in vomitus. Rinse mouth again and give more water to drink. Obtain medical attention immediately.

Medical Conditions Aggravated: Pre-existing disorders of the following organs or systems include: respiratory system (including asthma and other breathing disorders), and gastrointestinal system.

Note to Physician: Chlorine dioxide vapors are emitted when this product contacts acids or chlorine. If these vapors are inhaled, monitor the patient closely for delayed development of pulmonary edema which may occur up to 48-72 hr after inhalation.

* * * Section 5 - Fire Fighting Measures * * *

Flash Point/Method: Not applicable

Auto Ignition Temperature: Not applicable

Upper/Lower Explosion Limits: Not applicable

Extinguishing Media: Use extinguishing agent suitable for the surrounding fire.

Fire Fighting Procedures: Firefighters should wear full protective clothing and a NIOSH/OSHA approved positive pressure self-contained breathing apparatus. Approach fire from upwind to avoid hazardous vapors and toxic decomposition products. Use flooding quantities of water as fog or spray. This product becomes a fire or explosion hazard if allowed to dry, so use water spray to keep fire-exposed containers cool.

Fire & Explosion Hazards: If this product is allowed to dry it can ignite upon contact with

combustible materials.

Hazardous Products of Decomposition and/or Combustion: Gaseous oxides of sodium and nitrogen when heated above the melting point of the solid 306.8° C.

NFPA Ratings: Health: 1 **Fire:** 0 **Reactivity:** 1

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

* * * Section 6 - Accidental Release Measures * * *

Wear appropriate personal protective equipment (See Section 8). Stop leak if safe to do so without risk. Ventilate area. If safe to do so, absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Do not use organic materials, such as wood shavings, wood dust or paper, to absorb spills. Flush area with flooding amounts of water. DO NOT DUMP ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws, and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

* * * Section 7 - Handling and Storage * * *

Handling: Wash thoroughly after handling. Use with adequate ventilation. Do not get in eyes, on skin, or on clothing. Do not breathe mists or vapors. Wear all recommended personal protective equipment (See Section 8).

Storage: Protect from physical damage and freezing. Protect from ultraviolet radiation. Store in a cool well ventilated place away from incompatible materials such as combustible, organic, or other readily oxidizable materials. Avoid storage on wood or other combustible floors. Keep containers tightly closed. Do not store in very warm areas where the liquid may evaporate.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Respiratory Protection: If use conditions generate mists or vapors, wear a NIOSH-approved respirator with acid gas canisters.

Skin Protection: Wear rubber gloves and other protective clothing such as coveralls and rubber boots as appropriate to prevent skin contact. Wear a rubber apron if splashing is likely.

Eye Protection: Wear chemical goggles. In addition, wear a faceshield when connecting and disconnecting piping or if splashing is likely.

Ventilation Protection: General exhaust ventilation under normal use conditions. If vapors or mist are generated use local exhaust ventilation.

Other Protection: Recommend means of washing the eyes with a gentle flow of cool to tepid water be readily available in all areas where this material is handled or stored. Employees should wash their hands and face before eating, drinking, or using tobacco products.

Exposure Limits: Exposure limits have not been established for this product or its components.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Colorless liquid	**Odor:**	None
Physical State:	Liquid	**Odor Threshold:**	Not Applicable
Vapor Pressure:	Not available	**pH:**	8.0 - 10.0
Vapor Density:	Not available	**Specific Gravity:**	1.3-1.5 @ 68ºF (20ºC)
Boiling Point / Boiling Range:	212 ºF (100 ºC)	**Evaporation Rate:**	Not available
Melting Point / Freezing Point:	Not available / <25ºF (<-4 ºC)	**Relative Density:**	Not available
Solubility (H2O):	Complete	**Auto-ignition Temperature:**	Not available
Flash Point:	Not Flammable	**Decomposition Temperature:**	Not available
Upper Flammable Limit (UFL):	Not Applicable	**Lower Flammable Limit (LFL):**	Not Applicable
Viscosity:	Not available	**Partition Coefficient (n-octanol / water):**	Not available
Flammability:	Not available		

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability: This product is stable for 90 days or more under normal use conditions. Exposure to ultraviolet radiation may result in decomposition of sodium chlorite.

Incompatibilities: Avoid contact with wood and other flammable organics, flammable or combustible materials, cyanides, sodium hypophosphite, or boron phosphide.

Polymerization: Hazardous polymerization will not occur.

Decomposition: After water has evaporated, this material may thermally decompose producing oxides of nitrogen. Explosive and toxic chlorine dioxide gas will be generated on contact with acids or chlorine or ultraviolet radiation.

Conditions to Avoid: Do not expose to ultraviolet radiation. Do not allow to evaporate to dryness. Do not heat to 1000° F as an explosion may occur in the presence of reducing agents or inorganic materials.

* * * Section 11 - Toxicological Information * * *

Toxicological Data: Not established for this product. However, for its components:

Calcium nitrate: Oral (rat) LD50 = 302 mg / kg

Sodium chlorite: Oral (rat) LD50 = 165 mg / kg

Chronic Effects: The toxicity of nitrates is due to their in vivo conversion to nitrites which may lead to methemoglobinemia. Nitrate may react with secondary and tertiary amines to form nitrosamines, some of which are suspect cancer agents.

Mutagenicity: Sodium chlorite, a minor component of this material, has tested positive in some studies with laboratory animals. The significance of these results for human health is unclear because the oxidizing effects of the chlorite or the salty effects of the sodium may significantly affect the ability of the tests to accurately detect mutagens.

Carcinogenicity: There are no known carcinogenic effects of this product.

Neurotoxicity: No data available for this product or its components.

Other Effects: The substance may cause effects on the blood, resulting in formation of methemoglobin when ingested.

Target Organs: Target organs include the skin, eyes, digestive tract, and respiratory system.

* * * Section 12 - Ecological Information * * *

The ecological effects are not known. Safely store product to prevent release to the environment and water supplies.

* * * Section 13 - Disposal Considerations * * *

Material that cannot be used, or chemically reprocessed for use, and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations. NOTE: State and local regulations may be more stringent than federal regulations.

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not regulated as a hazardous material for transportation in current form.

International Maritime Dangerous Goods

Shipping Name: Not regulated as a hazardous material for transportation in current form.

* * * Section 15 - Regulatory Information * * *

OSHA HAZARD COMMUNICATION STANDARD: Health Hazard
CERCLA HAZARDOUS SUBSTANCE No
RQ: None
SARA SECTION 311/312:
Acute Health = Yes Chronic Health = No Fire = No
Pressure Release = No Reactivity = No

SARA SECTION 313: No
OSHA PROCESS SAFETY (29CFR1910.119): No
CALIFORNIA PROPOSITION 65: Not listed.

* * * Section 16 - Other Information * * *

Disclaimer: The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial, and local laws.

A PRODUCT OF CAPE FEAR water solutions

OPTIPRO

ENGINEERED CHEMICAL DOSING SOLUTIONS

Fast Facts

- 24 Programmable Events to perfectly match flow patterns
- System fault alarms notify the user anytime failures occur
- Highest level of security on the market via passcode enabled intrustion alarms
- Ability to act as a standalone unit or easily integrates into current SCADA systems
- Adaptable to any chemical dosing situation
- UL Listed control equipment provides the unparalleled reliability

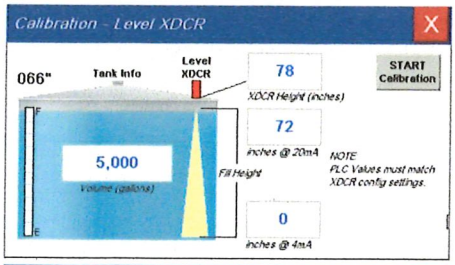
H2S – Odor Control Systems

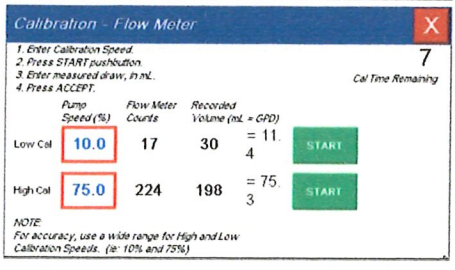
Cellular enabled dosing systems provide unmatched automation to the chemical dosing industry:

- OPTIPRO dosing control systems provide remote access to any feature that can be accessed while on-site, reducing the need for site visits.
- CFWS technical service personnel can monitor tank levels, and receive alarms for potential leaks and low levels, allowing for optimized chemical deliveries.
- Paired with cellular enabled H2S monitors, the OPTIPRO dosing control system allows for the highest level of asset protection from H2S corrosion.
- Flow is validated via a positive displacement flow meter, not relying on pump flow calibration.

CFWS Chemistry + OPTIPRO Dosing Systems = Winning Combination

The **Sulphatrox** family of products provides the most economical solution to H2S control. **Sulphatrox** nitrate-oxygen based odor control solution leads the industry for long duration force main H2S removal and prevention. The **reactiveFCX** oxidant based treatment solution targets H2S in short duration systems, allowing for a reduction in nitrate treatment and fighting fats, oils and grease at the dosing location.





CAPE FEAR water solutions
Email: sales@capefearwatersolutions.com
Phone: 910.930.2852

CAPE FEAR water solutions

Chemical Dosing Unit Specification – Cellular

- Control and monitoring to be accomplished using a programmable logic controller (PLC)
- Graphical user interface (HMI) to provide a visual representation of the process. HMI will allow remote access to see and control the developed displays via remote terminal connection.
- User will be able to make allowed changes to parameters using the HMI with security protected input.
- Monitoring will be allowed through remote access.
- The cellular modem will be utilized for data logging, alarm notification (SMS text messaging and/or email), monitoring and control/parameter changes.
- The control panel enclosure shall be constructed of Type 316 stainless steel and shall be rated NEMA 4X. It shall be equipped with a door with a continuous hinge. The hinged door shall have two latches and shall be capable of locking via a padlock.
- The control panel shall be equipped with a thermoelectric panel cooler.
- The Control Panel shall contain the following:
    - 1) Security-Protected Touch Screen Operator Interface with color display and integrated tank level indication.
    - (2) Peristaltic pumps with flow capability of 4 – 390 ml/min.
    - A single positive displacement flow meter
- Standards:
    - a. All fabrication and wiring shall conform to the standards of Underwriter's Laboratories, National Electrical Code, and any other applicable federal, state, or local codes.
- Electrical Requirements:
    - a. The control panel assembly requires a input of 110V, 20A GFCI protected electrical circuit.
    - b. The control panel may operate via a GFCI outlet or terminated connection.
- System Operation:
    - a. The peristaltic pumps shall be controlled by the HMI. The control system shall utilize 24 discrete dosing set points one setpoint for each hour of the day. The same 24 discrete dosing setpoint is then repeated and used for each day of the week.
        - 1) When in the AUTO position, the pump shall be controlled by the advanced dosing controller. The advanced dosing controller shall vary the feed rate in 1-hour increments as specified by the user. The pumps shall be turned on and off by the advanced dosing controller to match the specified dose curve.
        - 2) If the tank level is in alarm condition (empty, low or high), the cellular modem shall send out an alert to specified individuals via email and/or SMS messaging.
        - 3) The chemical dosing scheme shall be a stepping function from any given hour to another.

- 4) System shall have selectable High-Low-Empty digital output alarms and provide for remote customer lockout contacts for remote customer shutdown.
- 5) Feed pumps shall have the capability to be automatically shut down on empty tank alarm.
- 6) System shall calculate and be capable of providing alarms for leak detection.
- 7) On a monthly basis, the control panel will automatically run a calibration check on the pump, if the pump is out of calibration, an alarm shall be sent to the specified individuals.

- Pumps:
  - a. The pump shall have a 3-point roller design to assist in anti-siphon protection.
  - b. The pump shall have a 100:1 turndown controlled via operating mode.
  - c. The pump shall have reproducible flow rate outputs +/- 2%.
  - d. The pump shall have a maximum vertical suction lift of 25 ft. (7.6 m)
  - e. The pump head shall require no valves or tools for easy maintenance.
  - f. The pump shall be self-priming against maximum working pressure. A foot valve shall not be required.
  - g. The pump shall not lose prime or vapor lock.
  - h. The pump shall require a toolless tube change procedure. Pump tube change shall mandate no lubrication.
  - i. The pumps shall be self-priming capacity of suction lifts, when dry, up to twenty (20) feet.
  - e. Pump ends shall be threaded 1/4 inch polypropylene.
  - i. Pump motor shall be 110v, 60Hz single phase.
- Pipe and Appurtenances:
  - a. All suction and discharge piping shall be standard ¼" O.D. polyethylene encased in min. ¾" SCH40 PVC. All valves, fittings, and connectors shall be Schedule 40 PVC.
  - b. All fill line piping shall be 2 inch Schedule 80 PVC. All fill line valves, fittings, and connectors shall be Schedule 80 PVC.
  - c. Fill line shall have a 2 inch stainless steel male camlock with a 2 inch plastic female camlock cap.
  - d. All chemical feed seals shall be compatible with the chemicals to be used in the regular operation, maintenance, and cleaning of the feed system.
  - e. All fittings shall be solvent-welded or threaded.
  - f. Contractor must install chemical feed discharge lines so that the product is injecting directly into the waste streams and not onto structures or equipment.
  - g. A weighted strainer shall be installed on the suction line.
  - h. Tank shall be equipped with a 4" vent pipe.
  - i. Tank shall be equipped with a mechanical liquid level indicator.

S Series S40 Peristaltic Pump

SPECIFICATIONS

FLOW RATE OUPUT 0.60 TO 150.0 GPD

1.0 SCOPE

This specification covers the supply, construction materials and programming of a completely functional variable speed peristaltic chemical metering pump including all accessories as shown on the drawings and described herein. The chemical metering pump manufacturer shall be responsible for supplying pump manufacturer accessories featuring a peristaltic pump tube and pump head with 3-point roller design.

1.1 Quality Assurance

For the purpose of establishing quality assurance, experience, and system reliability, the products described herein are based on the metering pumps manufactured by the Stenner Pump Company. All pumps shall be factory-tested for power and function before packaging.

1.2 Warranty

The chemical metering pump manufacturer shall provide a two-year limited warranty on the metering pump from the date of purchase (proof of purchase required).

2.0 PUMP

2.1 Manufacturer: Stenner Pump Company

2.2 Description

A. General

The chemical metering pump shall be a programmable, DC motor-driven, peristaltic pump. The pump shall include brushless DC Motor with ball bearing support, OLED Display, silicon keypad with universal markings, totally enclosed housing with NEMA 4X rating, and patented QuickPro® pump head. The main shaft shall be splined for ease of maintenance. The pump shall offer a single signal cover with eight screws, O-ring seal, and two liquid tight cord grips for signal cables. Pump shall have integral clear cover on the control panel with tamper resistant screw. The power supply shall be single-phase, 120V 60Hz; 230V 60Hz; or 230V 50Hz.

The liquid shall only be in contact with the pump tube located within the QuickPro® pump head but may touch accessories including but not limited to, weighted suction line strainer, suction & discharge tubing, and injection ball/spring check valve.

B. Accessories Included

1. Each pump shall come standard with one latching mounting bracket suitable for vertical or horizontal mounting.
2. Each pump shall come standard with three connecting nuts 3/8".
3. Each pump shall come standard with one injection ball/spring check valve.
4. Each pump shall come standard with one weighted suction line strainer 3/8".
5. Each pump shall come standard with one 20' roll of suction/discharge tubing 3/8" white or UV black.
6. Each pump shall come standard with one additional pump tube.

7. Each pump shall come standard with one Quick Start Guide.

C. Agency Listings and Ratings

1. The pump provided shall require the following agency listings and ratings.
    a. cULus
    b. CE IP65
    c. NEMA 4X
2. Pumps supplied with Santoprene® tubes shall be tested by IAPMO to confirm to ANSI/NSF STD 61 & 372.
3. S40 Models with 5X Tube and Ball Check Valve with FKM seat & O-ring, tantalum spring and ceramic ball tested by ETL to conform to ANSI/NSF STD 50.

D. Materials of Construction

1. The pump shall have a polycarbonate tube housing and tube housing cover. The tube housing cover shall have an integral, oil impregnated bronze bushing for shaft support. The tube housing cover shall be secured to the tube housing via stainless steel latches that do not require a tool to fasten or unfasten.
2. The pump tube shall be FDA approved Santoprene®.
3. The injection ball check valve shall have a Ceramic ball FDA approved; tantalum spring; FKM seat & O-ring OR Ceramic ball FDA approved; stainless steel spring; EPDM seat; Santoprene® O-ring.
4. The pump head roller assembly shall have three rollers with the ability to expand and collapse. These rollers shall be constructed of polyethylene.
5. The roller bushings shall be oil impregnated bronze to aid in roller movement.
6. The suction/discharge tubing shall be FDA approved polypropylene.
7. Pump tube fittings & injection fittings shall be constructed of NSF listed PVC or polypropylene.
8. Pump tube connecting nuts shall be constructed of PVC or polypropylene (both NSF listed).
9. The pump shall have a suction line strainer and cap constructed of PVC or polypropylene (both NSF listed). The strainer shall also include a ceramic weight.
10. All fasteners shall be stainless steel.
11. Pump shall have pump head latches constructed of stainless steel.
12. The pump shall have Leak Detect components consisting of springs, pins and clips constructed of Hastelloy®. Leak Detect landing pads shall be gold plated. Leak Detect housing and drip pan shall be polypropylene.

E. Standard Features

1. The pump shall have a 3-point roller design to assist in anti-siphon protection.
2. The pump shall have a 100:1 turndown controlled via operating mode.
3. The pump shall have reproducible flow rate outputs +/- 2%.
4. The pump shall have a maximum vertical suction lift of 25 ft. (7.6 m)
5. The pump head shall require no valves or tools for easy maintenance.
6. The pump shall be self-priming against maximum working pressure. A foot valve shall not be required.
7. The pump shall not lose prime or vapor lock.
8. The pump shall require a toolless tube change procedure. Pump tube change shall mandate no lubrication.

F. Pump Flow Rate Outputs

25 psi (1.7 bar) max.

Pump Prefix	Tube	Turndown Ratio	Gallons per Day	Gallons per Hour	Ounces per Hour	Ounces per Minute	Liters per Day	Liters per Hour	Milliliters per Hour	Milliliters per Minute
S405X	5X	100:1	1.5-150.0	0.06-6.25	8.0-800.0	0.13-13.33	5.7-567.0	0.24-23.66	236.59-23,659.0	3.94-394.0
			Approximate output @ 50/60Hz							

100 psi (6.9 bar) max.

Pump Prefix	Tube	Turndown Ratio	Gallons per Day	Gallons per Hour	Ounces per Hour	Ounces per Minute	Liters per Day	Liters per Hour	Milliliters per Hour	Milliliters per Minute
S407X	7X	100:1	0.60-60.0	0.03-2.50	3.2-320.0	0.053-5.34	2.3-227.0	0.09-9.46	94.64-9464.0	1.58-158.0
			Approximate output @ 50/60Hz							

2.3 CONTROL

A. Pump shall have 45 RPM maximum

B. Pump shall have the capability to be adjusted manually by the up and down arrows on the keypad, from 0% to 100% of the pump's programmed flow rate output, in increments of 1.0%

C. The metering pump shall be microprocessor controlled. All pumping functions shall be set by keypad and all operations, and status shall be displayed on an illuminated OLED Screen. Keypad shall have 6 buttons (Up arrow, Prime, On/Off, Back, Enter, Down arrow). Three buttons (Down arrow, Up arrow, and Enter) shall be used to scroll and/or select between menu options.

D. Pump speed shall be determined via choice of control mode and programmed settings within said control mode.

1. Pump shall be adjusted by a programmed and/or calibrated 4-20 mA signal. Signal shall be scalable and invertible.
2. Pump shall be adjusted by a programmed and/or calibrated 0-10VDC signal identifying the pump output range. Signal shall be scalable and invertible.
3. Pump shall be activated by a pulse, adjusted by programmed pulse inputs and include the number of pulses to activate, pump run time, meter rate and pump speed.
4. Pump shall be activated by a Hall Effect water meter, adjusted by programmed Hall Effect inputs and include meter K factor, minimum process flow, speed at minimum flow, maximum process flow and speed at maximum process flow.
5. Pump shall be adjusted by programing the 7-day timer and setting the clock. The control mode shall have 24 independent timed events with each individually programmable timer's #01 - #24. Timer shall run from a minimum of 20 seconds to a maximum of 23 hours, 59 minutes, and 59 seconds from speeds 1% to 100%.
6. Pump shall be adjustable by the PPM Feed programmed inputs for Variable and Constant flow. Constant flow inputs shall include process flow, concentration, specific gravity, and ppm feed rate. Variable flow inputs shall include meter K factor, concentration, specific gravity, and ppm feed rate.

7. Pump shall be adjustable by the Cycle Timer programmed inputs including run time per cycle, total cycle time, and pump speed.
8. Pump shall have Modbus RTU over RS-485 capability.

2.4 PROGRAMMING AND CONFIGURATION

A. Programming shall allow pump to be calibrated to display pump output in percentage of full motor speed, RPM, GPD, GPH and OZ/MIN. Programming shall also allow units in Liters displaying LPD, LPH and mL/MIN. In GPD/LPD Calibration the pump maximum output must be entered and not changed.

B. The pump shall be equipped with keypad password protection with a programmable 4-character access code to prevent unauthorized changes to the operation. The manufacturer shall have a master override password for technical support purposes.

C. Pump shall be calibrated with the flow rate output determined by the pump tube.

D. The pump shall have a calibration mode to allow the pump to be calibrated to the system 4-20mA or 0-10VDC signal.

E. Pump shall include highly sensitive leak detector. The sensitivity shall be factory preset to distinguish between water and common water treatment chemicals to reduce the number of false tube leaks.

F. Pump shall have a 4-20mA output

G. Pump shall have Modbus RTU over RS-485 capability.

H. Pump shall have three configurable internal relays for output indication from the pump to a control system, another pump or PLC. Relays shall be rated for 24VDC @ 50mA. Each relay shall be allowed to be activated by more than one pump condition.

I. Pump shall have the following relays and/or performance indicators.

1. TUBE CHANGE shall be programmable to activate a relay and/or the display alarm when the set time is reached. The set time available shall be between 0 and 9999 hours.
2. TUBE LEAK shall be programmable to activate a relay and/or the display alarm. Both are activated by conductivity on Hastelloy pins. Tube leak sensitivity shall be calibrated by a potentiometer located under the signal cover.
3. STANDBY shall be programmable to activate a relay to cause another device to go into standby. The standby display alarm shall activate if a closed relay is wired into the standby connection terminals causing the pump to go into standby.
4. DRIVE FAULT shall be programmable to activate a relay if the pump shuts down due to drive fault error; the alarm will automatically appear on the display.
5. OFF shall be programmable to activate a relay when the pump is turned off from the control panel; the alarm will automatically appear on the display.
6. RUN shall be programmable to activate a relay when the pump is running.
7. MODE CHANGE shall be programmable to activate a relay if the mode of operation is changed from the selected mode of operation.

8. TRANSFER shall be programmable to activate a relay to transfer operation from the primary pump to a backup pump if a drive fault or loss of power occurs or if Leak Detect is programmed to stop the pump when a leak occurs.
9. REPEAT PULSE shall be programmable to activate a relay when the pump receives the dry contact input signal to repeat this signal to another pump or device.
10. HIGH SIGNAL shall be programmable to activate a relay and/or the display alarm if the input signal rises above the value programmed in the 4-20mA or 0-10VDC control mode.
11. LOW SIGNAL shall be programmable to activate a relay and/or the display alarm if the input signal falls below the value programmed in the 4-20mA or 0-10VDC control mode.
12. HIGH FLOW shall be programmable to activate a relay and/or the display alarm if the process flow rises above the value programmed in the Hall Effect or PPM Feed-Variable control mode.
13. LOW FLOW shall be programmable to activate a relay and/or the display alarm if the process flow falls below the value programmed in the Hall Effect control mode.
14. SIGNAL OVERRUN shall be programmable to activate a relay and/or the display alarm if the pump receives dry contact input signals while the pump is running instead of during available dose time.

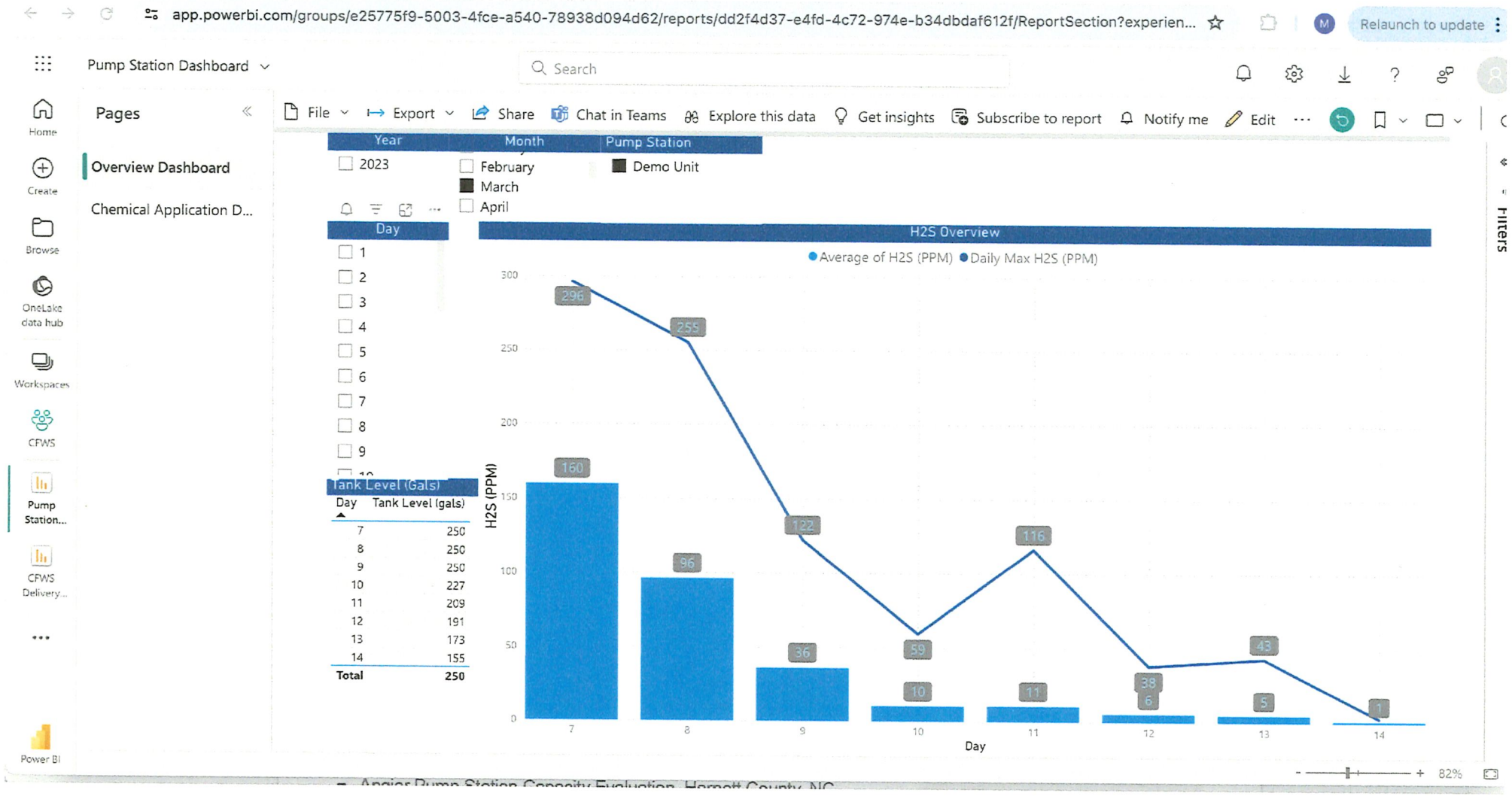
J. Pump shall have a RESET TOTALIZER option to allow the user to reset the total tallied amount of water treated using the Pulse, Hall Effect, or PPM Feed control modes.

K. Pump shall allow user to reset the pump to factory default settings.

L. Pump shall allow user to check the firmware version code in the pump.

M. Pump firmware can be updated by the factory.

END OF SPECIFICATION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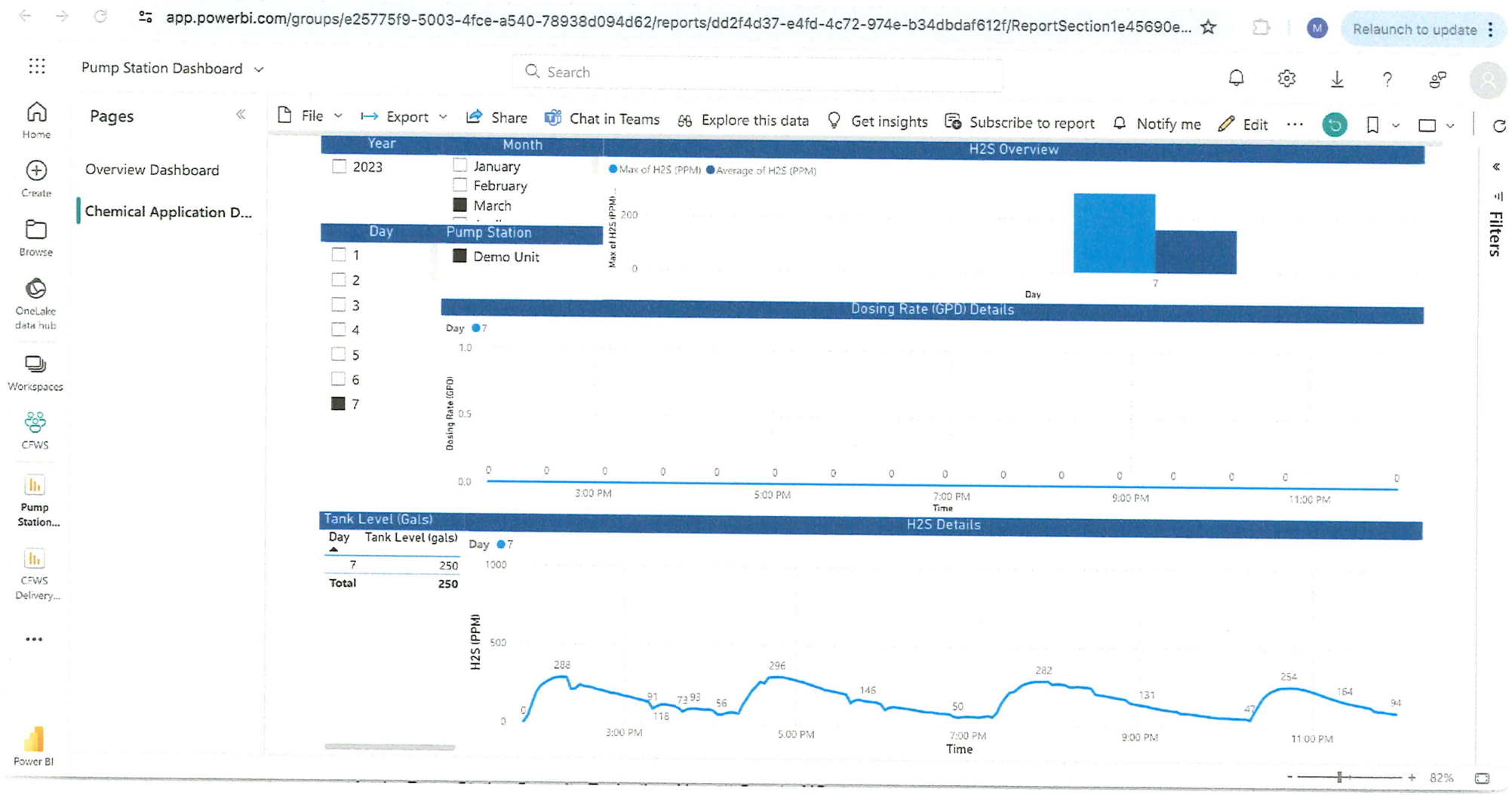
Chat in Teams
Explore this data
Get insights
Subscribe to report
Notify me
Edit
Year
2023
Month
February
March
April
Pump Station
Demo Unit
Day
1
2
3
4
5
6
7
8
9
H2S Overview
Average of H2S (PPM)
Daily Max H2S (PPM)
H2S (PPM)
Day
296
255
122
59
116
38
43
160
96
36
10
11
6
5
1
Tank Level (Gals)
Day
Tank Level (gals)
7 250
8 250
9 250
10 227
11 209
12 191
13 173
14 155
Total 250
Filters
Home
Create
Browse
OneLake data hub
Workspaces
CFWS
Pump Station...
CFWS Delivery...
Power BI
82%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Relaunch to update
Pump Station Dashboard
Search
Pages
Overview Dashboard
Chemical Application D...
File
Export
Share
Chat in Teams
Explore this data
Get insights
Subscribe to report
Notify me
Edit
Filters
Year
2023
Month
January
February
March
Day
1
2
3
4
5
6
7
Pump Station
Demo Unit
H2S Overview
Max of H2S (PPM)
Average of H2S (PPM)
Max of H2S (PPM)
200
0
Day
7
Dosing Rate (GPD) Details
Day 7
Dosing Rate (GPD)
1.0
0.5
0.0
3:00 PM
5:00 PM
7:00 PM
9:00 PM
11:00 PM
Time
Tank Level (Gals)
Day
Tank Level (gals)
7
250
Total
250
H2S Details
Day 7
H2S (PPM)
1000
500
0
288
91
118
73
93
56
296
146
50
282
131
47
254
164
94
3:00 PM
5:00 PM
7:00 PM
9:00 PM
11:00 PM
Time
Home
Create
Browse
OneLake data hub
Workspaces
CFWS
Pump Station...
CFWS Delivery...
Power BI
82%

CAPE FEAR water solutions

Chemical Spill Procedure

Whenever chemicals are stored or handled, there is a possibility of a chemical spill. These spills may be relatively minor, such as a leaking container, or could involve a major accident. They could also be associated with equipment failure where the contents of a fully loaded tank are suddenly released.

When a chemical spill occurs, there are fi ve steps to be taken:

(a) control the source of the spill;

(b) contain the spill;

(c) isolate the area concerned (if appropriate);

(d) contact the authorities (if appropriate); then

(e) clean up the spill.

Personal safety is paramount so use appropriate protective clothing and equipment when stopping / controlling any leakage.

Control the source of the spill

Advice on how to manage a spill is included in the Material Data Safety Sheet (MSDS).

Wherever practical, take immediate steps to stop the leakage and / or control the spill.

Put small leaking containers into larger containers or bins to prevent further release of the chemical.

If a spray hose bursts, turn off the appropriate valves to stop further chemical loss.

Contain the spillage

Do everything you can to contain the spilled material in as small an area as possible to keep it from spreading.

Liquid spills can often be contained by spreading absorbent materials such as fine sand, vermiculite, clay or pet litter over the whole spill. In other cases, a shovel or power equipment can be used to construct a dam. No matter how small the spill, it is important to stop it flowing into any body of water, including stormwater drains.

Isolate the contaminated area

If appropriate, rope off the contaminated area to keep people away from the spill. In severe cases it may be necessary to evacuate people downwind from the spill. Ideally, have someone stationed at the spill site until the chemical is cleaned up and the danger removed.

Contact the appropriate authorities

The fire brigade must be contacted in cases where it is likely a spill will:

- enter drains or watercourses;
- harm the environment; or
- pose a threat to public safety.

Other services include police, ambulance, the emergency telephone numbers on the pesticide labels, and public health authorities. If the spill may contaminate a waterway, contact DEC and appropriate water / river authorities so that downstream water users can avoid cases of poisoning or contamination.

Clean up the spill

1. General

Where appropriate, spread absorbent material over the contaminated area. Place this material in a drum or other suitable container lined with a heavy duty plastic bag.

2. Soil contamination

Where soil has been contaminated by a severe spill, remove the contaminated soil and dispose of it at a proper disposal site. Cover the area with at least 5 cms of lime, and then with fresh topsoil.

Where minor spills result in soil contamination, activated charcoal applied immediately to the contaminated site can often reduce soil contamination and subsequent plant damage.

3. Cleaning of equipment and vehicles

Clean all vehicles and equipment contaminated in the original accident or in the cleanup procedure. Make sure you wear adequate protective clothing to avoid personal contact with the chemical.

To clean your equipment only use household bleach (dilute to 50% of normal strength) or an alkaline detergent (e.g. dishwasher soap) solution. Do not mix bleach and alkaline detergents together.

DETECTION INSTRUMENTS Corporation

Hydrogen Sulfilde Gas Specialists

Acrulog monitors are designed for the wastewater industry. Acrulogs are available for monitoring, hydrogen sulfide gas levels and differential pressure, for prolonged periods of time to determine variations in levels and accurately develop strategies to control H2S production. This results in diminished odor complaints, reduced chemical expenditures and lower maintenance costs.

Acrulog PPM H2S Monitor

- Wide detection ranges: 0-50 PPM, 0-200 PPM, 0-1000 PPM and 0-2000 PPM.
- Long and short term sensors (depending on range type).
- Extra Long 90 day sensor available.
- Floats and self-rights in water.
- Records temperature & humidity.
- Touch control.
- Operating range -4-122F.
- Battery lasts up to two years.
- Collection system monitoring.
- Infrastructure corrosion control.

Acrulog Differential Pressure Monitor

- Models available: 0.001—2.00 inWC 0.001—10 inWC
- Records temperature.
- Records humidity.
- Extensive battery life.
- Bluetooth interface.
- Touch control.
- Robust IP68 case for harsh environments.
- Operating range -4-122F.
- Venting and inducting.

Acrulog Pumped H2S Monitor

- Ranges: 0-2000 PPB, 0-20 PPM, 0-50 PPM, 0-200 PPM and 0-1000 PPM.
- Up to 21days with alkaline batteries.
- Up to 60 days with lithium batteries.
- Operating range 14 -104F.
- Clip for easy access to batteries.
- Uses micro sampling technology (MST) at a flow of 30mils/minutes.
- Fence line odor monitoring
- Scrubber monitoring.
- H2S source detection.
- Odor studies.

All models come with Bluetooth for easy access to data and parameters.

All models are available with 4G LTE-M wireless modems, RS-485 or 4/20mA output options.

All models have extensive memory of 3 million data points.

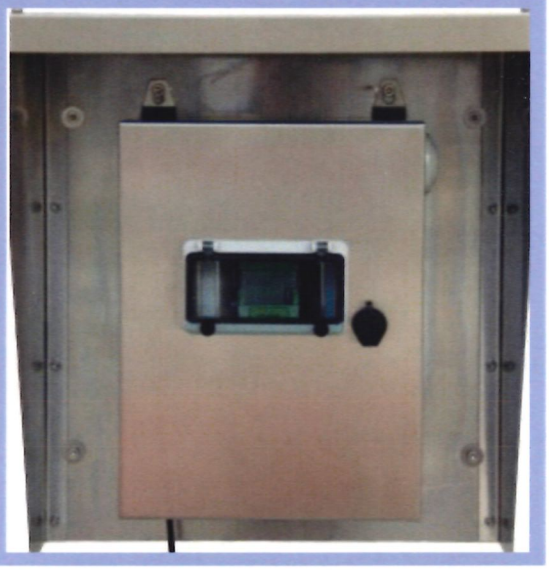
18441 N. 25th Ave., Suite 101,
Phoenix, AZ 85023
602-797-0630, Fax 602-797-0631
www.detectioninstruments.com

Acrulog Continuous Monitor (CEM)

- 1, 2, or 3 point system.
- Point Ranges:
  0-2000 PPB, 0-20 PPM, 0-50 PPM, 0-200 PPM and 0-1000 PPM
- Temperature controlled.
- Simple to maintain and service.
- Acrulogs easily be removed and replaced.
- Field calibrations.
- Robust cabinet and shade.
- 4/20mA or RS-485 output.
- Optional 4G LTE-M modem.
- Chemical / carbon scrubbers.
- Biofilters.

DiCom Perimeter Monitor

- Range: 0-2000 PPB.
- 4/20mA or RS-485 output.
- Optional 4G LTE-M modem.
- Transportable.
- Simple to calibrate.
- Stainless steel cabinet.
- Coated aluminum shade.
- Temperature controller.
- Insulated heated/cooled chamber.
- Ambient monitoring.



Ammonia Monitor

- Ranges: 0-50 & 0-100 PPM.
- 12 month + battery life.
- Durable sensor.
- Stores 3 million data points.
- Monitors temperature and humidity.
- Sludge handling.
- Biosolids facilities.
- Robust IP68 case for harsh environments.
- Odor monitoring and control.
- Operating range 32-122F

Detection Instruments:

- ✓ Are the only Acrulog authorized service center in the US.
- ✓ Calibrate and service Acrulogs in our workshop.
- ✓ Have an extensive fleet of Acrulog rentals - ask what monitors we rent out.
- ✓ Are here to help, got a question? Give us a call.

CAPE FEAR
water solutions

Reference List and Technical Data Provided by
Cape Fear Water Solutions Inc.

1. **Project Team:**

Team Member	Project Responsibility	Experience & Qualifications
Chad Garner	Lead Service Technician – Certified CDL Driver Located in Dublin, NC	4 years of experience in: • dosing system preventative and corrective maintenance. • H2S detection testing (atmospheric & dissolved sulfide). • Wastewater septicity testing.
Maurice Hester	Project Liaison – Back-up Service Technician Located in Tar Heel, NC	• 4 years of experience in cost effective H2S mitigation in wastewater streams. • 9 years of process control and optimization experience. • Mechanical Engineer
Joey Dockery	Business Manager – Back-up Service Technician Certified CDL Driver Located in Orrum, NC	• 25 years' experience in wastewater treatment. • NC Licensed Collections and Distribution Operator

Qualifications/Experience:

1. PWC – Fayetteville
   a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 13 chemical dosing locations, utilizing both calcium nitrate and ferrous-iron based treatment chemicals. Project work includes maintaining healthy chemical inventory levels at each site, dosing pump preventative and corrective maintenance, dosing pump calibration, routine atmospheric and in-solution H2S monitoring, on-call response to odor complaints, and monthly treatment system performance and maintenance reports.
   b. Client Contact Information:

      Tracy Dowd
      PWC
      PO Box 1089
      Fayetteville, NC 28302
      Phone: 910-223-4790

   c. Year of Contract: 2016 – Present
   d. Statement of Extent of Success: Renewed commitment 7 times since contract origination in 2016
   e. Contract Length: Annual

2. Harnett County Public Utility
    a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 15 chemical dosing locations. Project work includes chemical delivery on an as needed basis, dosing pump corrective maintenance and treatment system optimization in coordination with HCPU program manager.
    b. Client Contact Information:
        Vicky Paysuer
        Harnett County Public Utility
        200 McKinny Pkwy
        Lillington, NC 27546
        Phone: 910-893-2424
    c. Year of Contract: 2011 – Present
    d. Statement of Extent of Success: Renewed commitment 12 times since contract origination in 2011
    e. Contract Length: Annual

3. Warren County Utilities
    a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 4 chemical dosing locations. Project work includes maintaining healthy chemical inventory levels at each site, dosing pump preventative and corrective maintenance, atmospheric and in-solution H2S monitoring, on-call response to odor complaints, and treatment system optimization based on system changes and H2S test results.
    b. Client Contact Information:
        Marcie Byrd
        PO Box 577
        Warrenton, NC 27589
        Phone: 252-257-3647
    c. Year of Contract: 2012 – Present
    d. Statement of Extent of Success: Renewed commitment 11 times since contract origination in 2012
    e. Contract Length: Annual

4. South Granville Water and Sewer Authority
    a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 15 chemical dosing locations. Project work includes maintaining healthy chemical inventory levels at each site, dosing pump preventative and corrective maintenance, atmospheric and in-solution H2S monitoring, on-call response to odor complaints, and treatment system optimization based on system changes and H2S test results.
    b. Client Contact Information:
        Robert Jackson
        SGWASA
        415 Central Ave. Suite B
        Butner, NC 27509

Phone: 919-575-3112 ext 2

c. Year of Contract: 2010 – Present
d. Statement of Extent of Success: Renewed commitment 7 times since contract origination in 2016
e. Contract Length: Annual

5. Cumberland County Public Utility
   a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 3 chemical dosing locations. Project work includes maintaining healthy chemical inventory levels at each site, dosing pump preventative and corrective maintenance, dosing pump calibration, routine atmospheric and in-solution H2S monitoring, on-call response to odor complaints, and monthly treatment system performance and maintenance reports.
   b. Client Contact Information:
      Amy Hall
      Cumberland County Public Utility
      PO Box 1829
      Fayetteville, NC 28302
      Phone: 910-678-7637
      Fax: 910-678-7635
   c. Year of Contract: 2016 – Present
   d. Statement of Extent of Success: Renewed commitment 7 times since contract origination in 2016
   e. Contract Length: Annual

6. Town of Cary, NC
   a. Project Summary: Delivery of calcium nitrate chemical on an as-needed basis, dosing pump maintenance, supply dosing system repair parts, and recommend system changes for treatment optimization.
   b. Client Contact Information:
      Bryan Campbell
      Town of Cary
      400 James Jackson Ave.
      Cary, NC 27513
      Phone: 919-427-8021
   c. Year of Contract: April 2023 – Present
   d. Statement of Extend of Success: Renewal of contract
   e. Contract Length: Annual

7. Town of Fuquay-Varina, NC
   a. Project Summary: H2S mitigation of the regional wastewater collection system comprised of 9 chemical dosing locations. Project work includes maintaining healthy chemical inventory levels at each site, dosing pump preventative and corrective maintenance, dosing pump calibration, routine atmospheric and in-solution H2S monitoring, on-call response to odor complaints, treatment optimization based on H2S test results, and monthly treatment system performance and maintenance reports.
   b. Client Contact Information:
      Jonathan Joyner

Town of Fuquay-Varina
1415 Holland Rd
Fuquay-Varina, NC 27526
Phone: 919-499-7459

c. Year of Contract: No contract required – Service began June 2023
d. Statement of Extent of Success: increased services to 15 dosing locations beginning July 2024
e. Contract Value: N/A
f. Contract Length: N/A

8. Aqua North Carolina
    a. Project Summary: Municipal odor studies/H2S detection in wastewater collection systems, conduct H2S mitigation pilot studies, provide municipal collection systems with an optimized treatment plan utilizing calcium nitrate based on pilot study results, mitigate fats, oils, and grease problems in lift stations via chemical treatment.
    b. Client Contact Information:
        Joseph Pearce
        Aqua North Carolina
        202 Mackenan Dr
        Cary, NC
        Phone: 919-467-8712
    c. Year of Contract: No contract required – Service began February 2021
    d. Statement of Extend of Success: N/A
    e. Contract Length: N/A

Scope of Service/Methodology

The services being requested by this project include an un-interrupted supply of calcium nitrate solution at the available chemical dosing sites, 24/7/365 atmospheric H2S monitoring, waste stream solution testing, chemical treatment optimization, vapor-phase system monitoring and optimization to extend the life of the carbon while achieving standard levels of H2S adsorption. The primary objectives of the aforementioned actions are to minimize odor complaints from citizens and protect the wastewater infrastructure from corrosion.

Chemical Application and H2S Control

Initial actions taken by Cape Fear Water Solutions in any wastewater system are to conduct atmospheric H2S monitoring at specified points downstream of the dosing location. Atmospheric monitoring paired with in-solution H2S, ORP, and pH levels upstream, downstream, and on-location of the dosing site at different times of day is used to determine the septicity of the waste stream. Utilizing these results, a dosing plan is calculated based on the amount of incoming dissolved and atmospheric H2S. The dosing plan consists of variable flow rates to minimize excess chemical addition. Monitoring of local events and weather is also conducted to account for any major variations in wastewater flow.

Maintenance Plans

Cape Fear Water Solutions is prepared to dedicate a service technician to visit the dosing and monitoring sites as outlined by the contract. Typical site visits will occur twice

a week, on a Monday/Thursday and Tuesday/Friday split schedule and more frequently as deemed necessary. Wednesday is scheduled for non-routine testing at various locations. Pump settings and calibrations will be noted on the pump as well as stored in the Cape Fear Water Solutions maintenance database. Site visit checks include:

- Check the physical operating condition of the pump.
- Look for the presence of any abnormal noise, excessive vibration, low flow and pressure output or high temperatures.
- Check for leaks around fittings or as a result of deteriorating tubing e.g. when standard white translucent discharge tubing is exposed to direct sunlight. Take appropriate action to correct leak by tightening fittings or replacing components.
- Keep the pump free of dirt and debris as this provides insulation and can lead to excessive pump temperatures.
- Chemical inventory level.

Odor Complaints and Troubleshooting

Upon receipt of the complaint, a Cape Fear Water Solutions representative (Project Manager or Service Technician) will be dispatched to the site of the complaint, equipped with H2S testing equipment to survey the site and report the findings. After the site inspection is complete a site visit to the upstream chemical dosing location(s) will be completed to inspect the dosing system. Once all data is collected, a final report with a determining factor and any actions (if any) that were taken to remediate the complaint.

Avoiding Residual Product Reactions

The most effective way to reduce the potential of residuals from product reactions in hydrogen sulfide control is to maintain a proper dose of calcium nitrate, specifically avoiding over feeding the chemical. Cape Fear Water Solutions uses the ORP (oxidation-reduction potential) level, residual nitrate, and H2S levels to determine if there is an overfeeding of calcium nitrate. An ORP level target between -50mV and 50mV is optimal to allow for denitrification processes to occur in the water and slime layer. ORP ranges in this threshold does not allow sulfide or volatile acid formation.