EPWM - 005

GENERAL CORRESPONDENCE

2010 - 2015

INDEX OF CHANGES TO APPLICATION **8/9/10**

P. 2 – added Chemical information

P. 4 – Attachment A. – Replaced map of site placement of CAS equipment

P. 6 - Attachment B –
inserted Water Sample Categories page

P. 11 - highlighted clean produced waters section at top of page and removed NMED permit #

P. 12 – **Attachment C** – Revised Diagrams for Berm Construction and Loading/Unloading Connections

P. 17 - Attachment E (made changes on pp 18,19)
P. 18 – added Nabors Well Service information, changed volume of berm area
P. 19 – Highlighted – "all tanks will be labeled"

P. 20 – Attachment F – Added Nabors Well Service form C-133

P. 27 - Attachment J – new sheet
Added form C-138

P. 28 – Attachment K – Added two new H2S warning signs
- Added new Safety Equipment Layout Diagram
- Added revised Evacuation Layout Diagram / PPM Circles
- Revised Hydrogen Sulfide Exposure Control Standard (added 8 pages to the beginning and 1 page at the end)

P. 30 – Attachment M –
Revised Supply and Installation of Welded Seam LLDPE Liner

- **CAS** will continuously sample the water for total organic carbon (TOC)(, Calcium and Salinity levels to insure the water quality meets basic specifications. The water will then be passed through a Reverse Osmosis system for final polishing to insure it meets the 3103 standard.

Streams Disposition

- **Concentrated produced water** will be disposed of by **Nabors Trucking**, a licensed waste hauler in accordance with 19.15.34.11.

Waste hauler #: 214
Nabors Well Service
3006 E. Greene
Carlsbad, NM 88220

SWD Nix-Ann
Mesquite SWD, Inc 1031 EDDY STREET Carlsbad, NM 88220
Rockin' R Red Road
API #30-015-24305

- **Chemicals** used in water testing are confined to Deminerialized Water. They will be disposed of along with Waste Materials. Electronic Probe Cleaning will use small amounts of dilute Muratic Acid. These wastes will be neutralized by dilution to a pH of 7.0 and placed in the Hand Washing waste. Comprehensive testing by outside labs.

- **Waste material** from hand washing and toilet facilities will be hauled away by **J.T. Septic Tank Service. Artesia, NM**

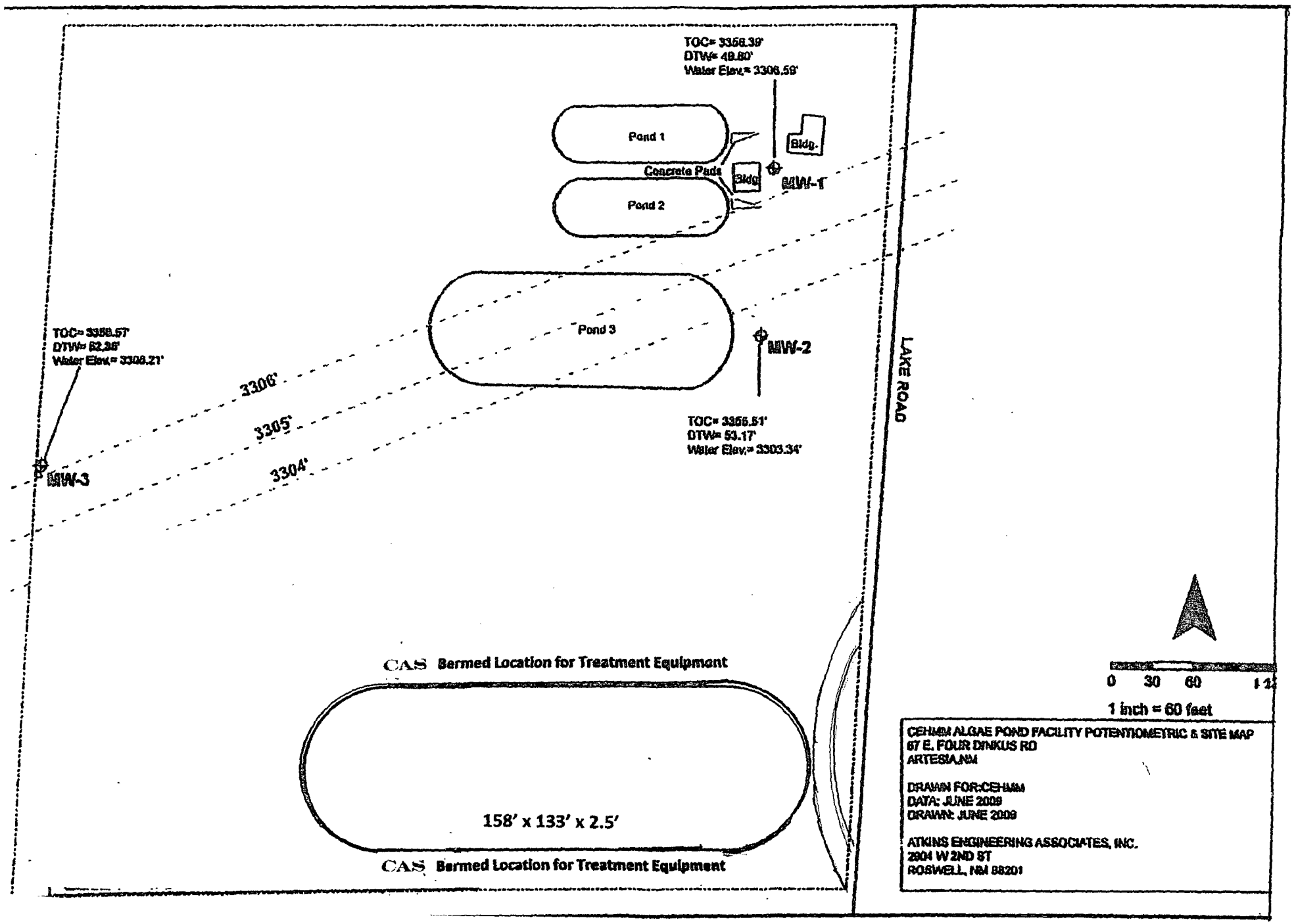
- **Liquid Waste concentrate** will disposed of at:
  GMI - Gandy Marley Incorporated
  OCD # NM 0010019
  Route 45 W. Crossroads, Roswell, NM 88203

- **Industrial Filters and R/O elements will be transported and disposed of at:**
  Lea Land LLC Landfill
  Hwy 180/62 30 miles N.E. of Carlsbad , NM @ Mile Marker 64
  Lea County, NM
  OCD permit # NM-1-035

Attachment Index

Map " B "

Site Placement of CAS Equipment in relation to Algae Ponds at Location
CAS 157 State Road Artesia, New Mexico 88210



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Attachment B

- **Water Sample - Showing Representative list of Characteristics to be Sampled X2 Annually**
- **Process description**
- **Process photographs**

Water Sample Categories	"Incoming Water"	Treat#1	Treat#2	Treat#3	Treat# 4	Treat# 5	Treat#6	Pre-Fin	Post Fin
SAR (Na Absorption Ratio)	24	35	30	45	45	41	56	46	27
TDS (mg/L)	6940	13400	13000	11200	12700	13200	12600	12600	1380
Turbidity (NTU)	12	94	42	55	40	36	31	ND	ND
Boron (mg/L)	2.45	2.92	2.98	2.81	2.85	2.85	2.9	2.82	2.12
Iron (mg/L)	0.113	0.734	0.687	0.571	0.086	ND	ND	ND	ND
Alkalinity (as CaCO3) (mg/L	980	25	ND	3	ND	3	ND	ND	ND
Cyanide (mg/L)	0.1	ND	ND	0.0134	0.173	0.038	0.091	0.01	0
Copper (mg/L)	0.00226	0.0082	0.017	0.0589	0.013	0.035	0.0092	0.0214	ND
Oil & Grease (HEM) (mg/L)	27.2	19.9	14	10.4	12.1	7.3	20.6	ND	ND
Calcium (mg/L)	469	826	843	859	832	825	804	800	40
Magnesium (mg/L)	106	181	182	188	181	177	174	174	8.38
Phosphorus (mg/L)	0.259	3.69	3.66	3.59	3.31	3.42	3.26	3.11	0.196
Potassium (mg/L)	67.2	164	165	163	163	156	160	165	22.9
Sodium (mg/L)	2020	3710	3780	3900	3720	3570	3620	3660	527
Strontium (mg/L)	14.5	24.4	25.2	25	24.3	22.9	23.3	22.9	0.965
Silicon, Recoverable (mg/L)	16.8	29	30.7	28.7	26.6	28	27.1	28.1	2.9
Aluminum (mg/L)	0.0228	0.74	0.86	0.789	0.686	0.602	0.54	0.716	0.0377
Arsenic (mg/L)	0.00336	0.0048	0.0039	0.0038	0.005	0.004	0.0031	0.0036	ND
Barium (mg/L)	0.0747	0.201	0.218	0.201	0.191	0.195	0.185	0.192	0.0091
Cadmium (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium (mg/L)	0.0029	0.003	0.0043	0.0059	0.1	0.005	0.003	0.0019	ND
Cobalt (mg/L)	0.00071	0.0016	0.0014	0.0015		.001	0.0014	0.0013	ND
Lead (mg/L)	0.00055	0.0023				.002	0.0014	0.0009	ND
Manganese (mg/L)	0.12					253	0.25	0.186	0.0094
Molybdenum (mg/L)						001	0.0013	0.0015	0.0018
Nickel (mg/L)						14	0.0125	0.0134	ND
Selenium (mg/L)						12	0.0122	0.012	ND
Silver (mg/L)							ND	ND	ND
Uranium (mg/L)	0.						ND	ND	ND
Zinc (mg/L)	0.						0.301	0.321	0.0207
Calcium (SAR Extracted) (m	5						776	795	38.2
Magnesium (SAR Extracted	1						169	172	8.03
Mercury (mg/L)	N						ND	ND	ND
Sodium (SAR Extracted)	232						6550	5490	695
Chloride (mg/L)	183						2950	2480	601
Nitrate-Nitrogen, Total (mg/	ND						1.12	1.04	ND
Sulfate (mg/L)	2010						4890	4180	262
Inorganic Carbon, TIC (mg/	53						ND	ND	0.81
Phenols (mg/L)	0.519						ND	ND	ND
PCB-1016 (mg/L)	ND				ND	ND	ND	ND	ND
PCB-1221 (mg/L)	ND			ND	ND	ND	ND	ND	ND
PCB-1232 (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1242 (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1248 (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1254 (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB-1260 (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene (mg/L)	3.18	0.209	0.152	0.115	0.076	0.037	0.0267	0.0057	0.0032
Carbon Tetrachloride (mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND

Insert after Pg 6

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Best Management Practices:

- Water loading and off-loading taps will have **ABOVE Ground** drip sumps provided
  - Drip sump diagram is provided in Attachment G
- Loading and off-loading drip sumps will be checked every 24 hours to monitor for valve leaks
- The treatment facility, including all storage tanks, is located within the limits of a lined, bermed area,
  - The volume of the bermed area is aproximately 1500% the volume of the largest vessel,
  - The berm is lined with a 60 mil, string reinforced LLPDE liner
  - Liner is anchored in an anchor trench to ensure that the liner remains in place for the lifetime of the installation
- All of the produced water storage and treatment equipment is located within the lined, bermed area
- All water delivered to the facility or transported from the facility will be documented with a water transfer ticket.
- All water delivered to the facility or transported from the facility will be transported by a state approved produced water hauler with a current, approved form C-133.
  All water transported from the facility for disposal by **Nabors Well Service Waste hauler #: 214 to:** **SWD Nix-Ann - owned by:**
  Mesquite SWD, Inc 1031 EDDY STREET Carlsbad, NM 88220
  Rockin' R Red Road API #30-015-24305
- Record keeping:
  - All water transfer tickets will document the well which produced the water or the disposal well which received the water.
  - Log sheets will be kept for daily operation and will be available on-site as well as periodically transmitted to CAS offices.
  - See **Attachment I** for a sample copy of the facility and process log sheet.
  - All water transfers will be subject to form C-138, specifying that all produced water is ONLY exempt or non-hazardous waste with exceptions stated in Subsection F of 19.15.36.13 NMAC.
    - A form C-138 signed by the generator or the generator's agent, will be provided and maintained on-site and updated on a monthly, weekly or per-load basis. These certificates will be available for the division's inspection upon request.

- **Cleaned produced waters will be monitored twice yearly by an EPA approved lab. The results of these analyses will be made available to the OCD and other interested parties. Challenge Produced waters will be sampled at the same time and compared for process efficacy.**

- Cleaned waters routed to the **CEHMM Water Storage Tank #1** are monitored locally by means of in place TDS and salinity monitoring systems installed permanently on the R/O. CEHMM will thoroughly analyze all waters to insure they meet 3103 specifications prior to accepting these waters for their purpose.
- In process remediated produced waters discharged from Process Vessel #6 are continuously monitored 10 times per hour by the **TOC Analyzer.** Salinity and TDS readings are sampled by the operators periodically as the system is in operation.

All vessel Water levels are continuously monitored by both electronic and mechanical means to insure that normal operating levels exist at all times during system operation. High fluid levels in any Process Vessel will cause the shutdown of the system preventing any input. Operators walk around the system hourly and are positioned so that any variations from normal operation can be seen immediately.

The **DWU 's water level** is also electrically monitored and a high level will shutdown the system and cause an alarm to sound along with a flashing light.

The CAS battery of three (3) 500 bbl tanks, which are located inside the berm, are continuously monitored both mechanically and visually for high levels.

Battery access extends beyond the berm and each access point is fitted with **ABOVE GROUND** drip pans to catch and collect connection loss. An off-road turnout is provided to isolate produced water trucks from the berm and CEHMM production areas. This turnout is protected by locked gates to minimize interference by uninvited people or animals during the unoccupied periods for the site.

BERM

A 125' x 150' (id) berm, fitted with a 60 mil LLPDE liner, detailed elsewhere in this submittal, has the capacity to hold 320% of the fluids contained in every system that is located inside the berm.

- **Solid non-toxic Industrial waste** ie: R/O Membranes, Final filter cartridges **will be transported by CAS truck to:**

  Lea Land LLC Landfill
  Hwy 180/62 30 miles N.E. of Carlsbad , NM @ Mile Marker 64
  Lea County, NM
  OCD permit # NM-1-035

Attachment J

State of New Mexico Energy Minerals and Natural Resources form C-138,

"REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE"

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-138
Revised March 12, 2007

*Surface Waste Management Facility Operator and Generator shall maintain and make this documentation available for Division inspection.

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. Generator Name and Address:

2. Originating Site:

3. Location of Material (Street Address, City, State or ULSTR):

4. Source and Description of Waste:

Estimated Volume _____ yd^3 / bbls Known Volume (to be entered by the operator at the end of the haul) _____ yd^3 / bbls

5. GENERATOR CERTIFICATION STATEMENT OF WASTE STATUS

I, _____, representative or authorized agent for _____ do hereby certify that according to the Resource Conservation and Recovery Act (RCRA) and the US Environmental Protection Agency's July 1988 regulatory determination, the above described waste is: (Check the appropriate classification)

☐ RCRA Exempt: Oil field wastes generated from oil and gas exploration and production operations and are not mixed with non-exempt waste. *Operator Use Only: Waste Acceptance Frequency ☐ Monthly ☐ Weekly ☐ Per Load*

☐ RCRA Non-Exempt: Oil field waste which is non-hazardous that does not exceed the minimum standards for waste hazardous by characteristics established in RCRA regulations, 40 CFR 261.21-261.24, or listed hazardous waste as defined in 40 CFR, part 261, subpart D, as amended. The following documentation is attached to demonstrate the above-described waste is non-hazardous. (Check the appropriate items)

☐ MSDS Information ☐ RCRA Hazardous Waste Analysis ☐ Process Knowledge ☐ Other (Provide description in Box 4)

GENERATOR 19.15.36.15 WASTE TESTING CERTIFICATION STATEMENT FOR LANDFARMS

I, _____, representative for _____ do hereby certify that representative samples of the oil field waste have been subjected to the paint filter test and tested for chloride content and that the samples have been found to conform to the specific requirements applicable to landfarms pursuant to Section 15 of 19.15.36 NMAC. The results of the representative samples are attached to demonstrate the above-described waste conform to the requirements of Section 15 of 19.15.36 NMAC.

5. Transporter:

OCD Permitted Surface Waste Management Facility

Name and Facility Permit #:

Address of Facility:

Method of Treatment and/or Disposal:

☐ Evaporation ☐ Injection ☐ Treating Plant ☐ Landfarm ☐ Landfill ☐ Other

Waste Acceptance Status:

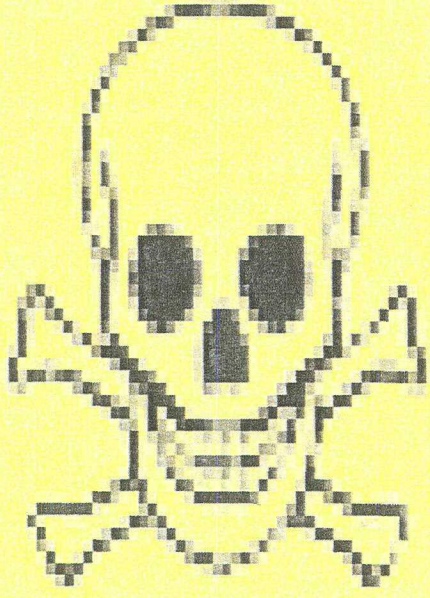
☐ **APPROVED** ☐ **DENIED** (Must Be Maintained As Permanent Record)

PRINT NAME: _____ TITLE: _____ DATE: _____

SIGNATURE: _____ TELEPHONE NO.: _____

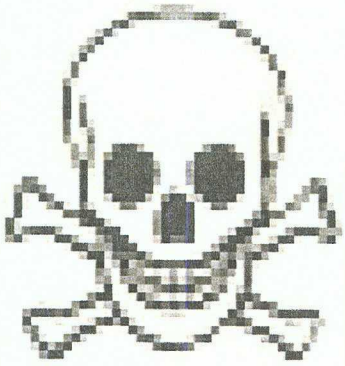
Surface Waste Management Facility Authorized Agent

CAUTION



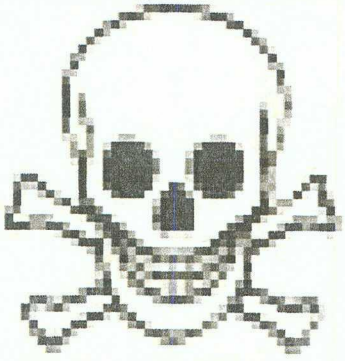
HYDROGEN
SULFIDE
POISONOUS GAS
MAY BE PRESENT

DANGER

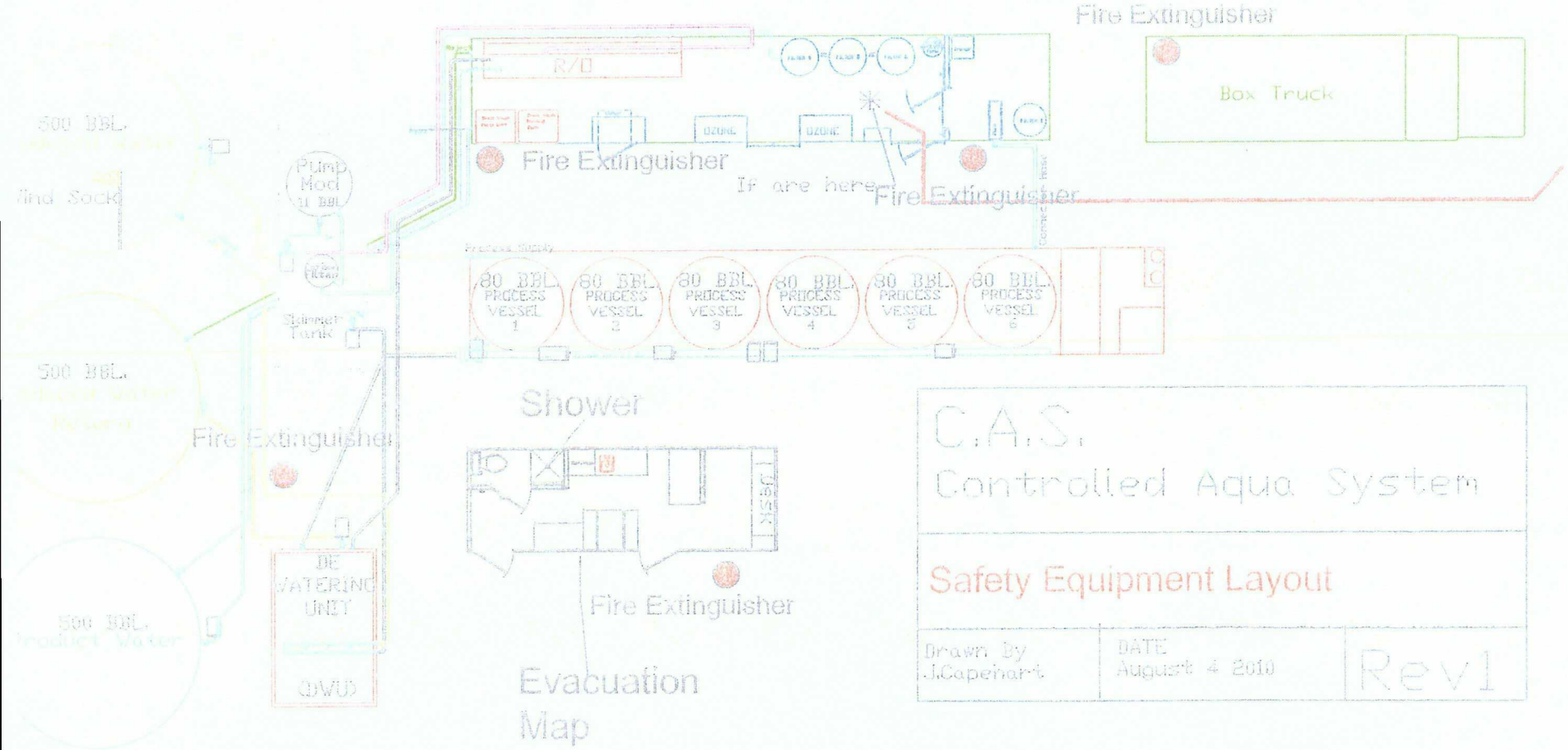


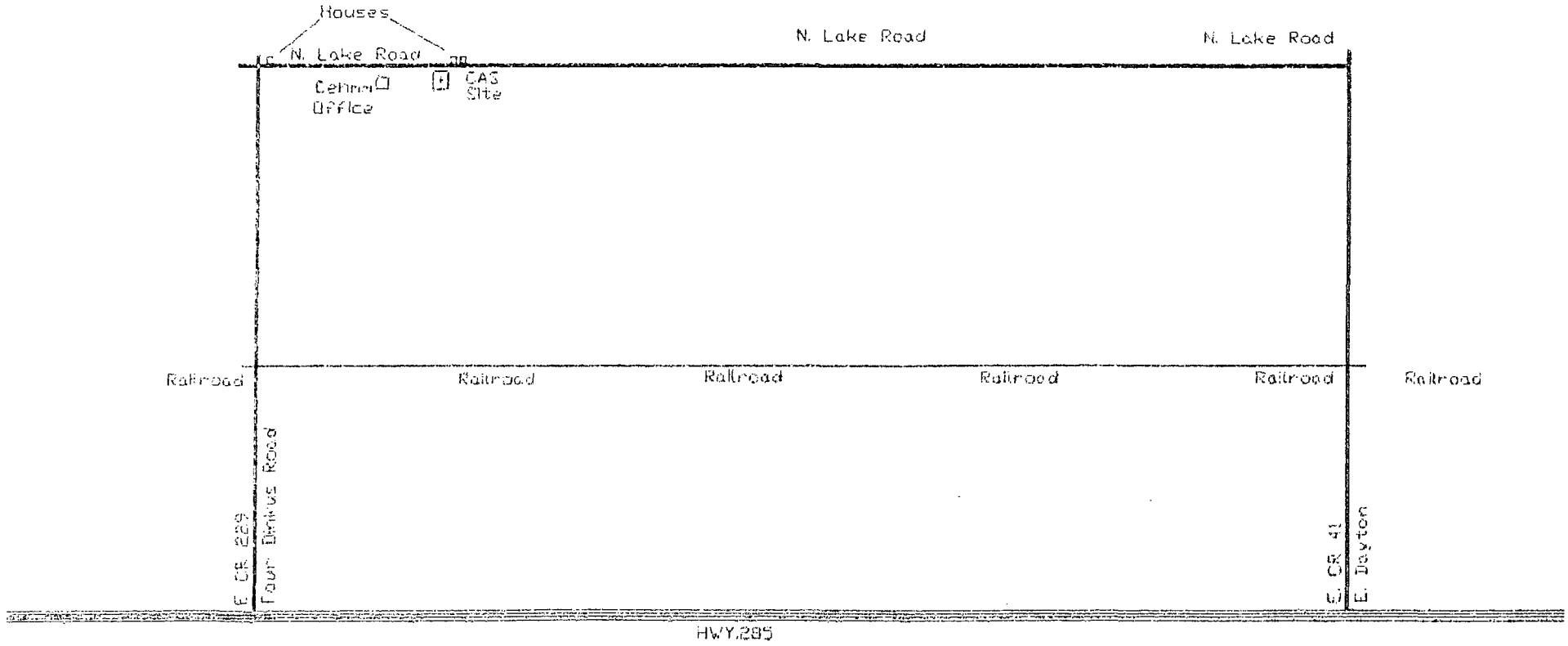
POISONOUS
GAS
HYDROGEN
SULFIDE

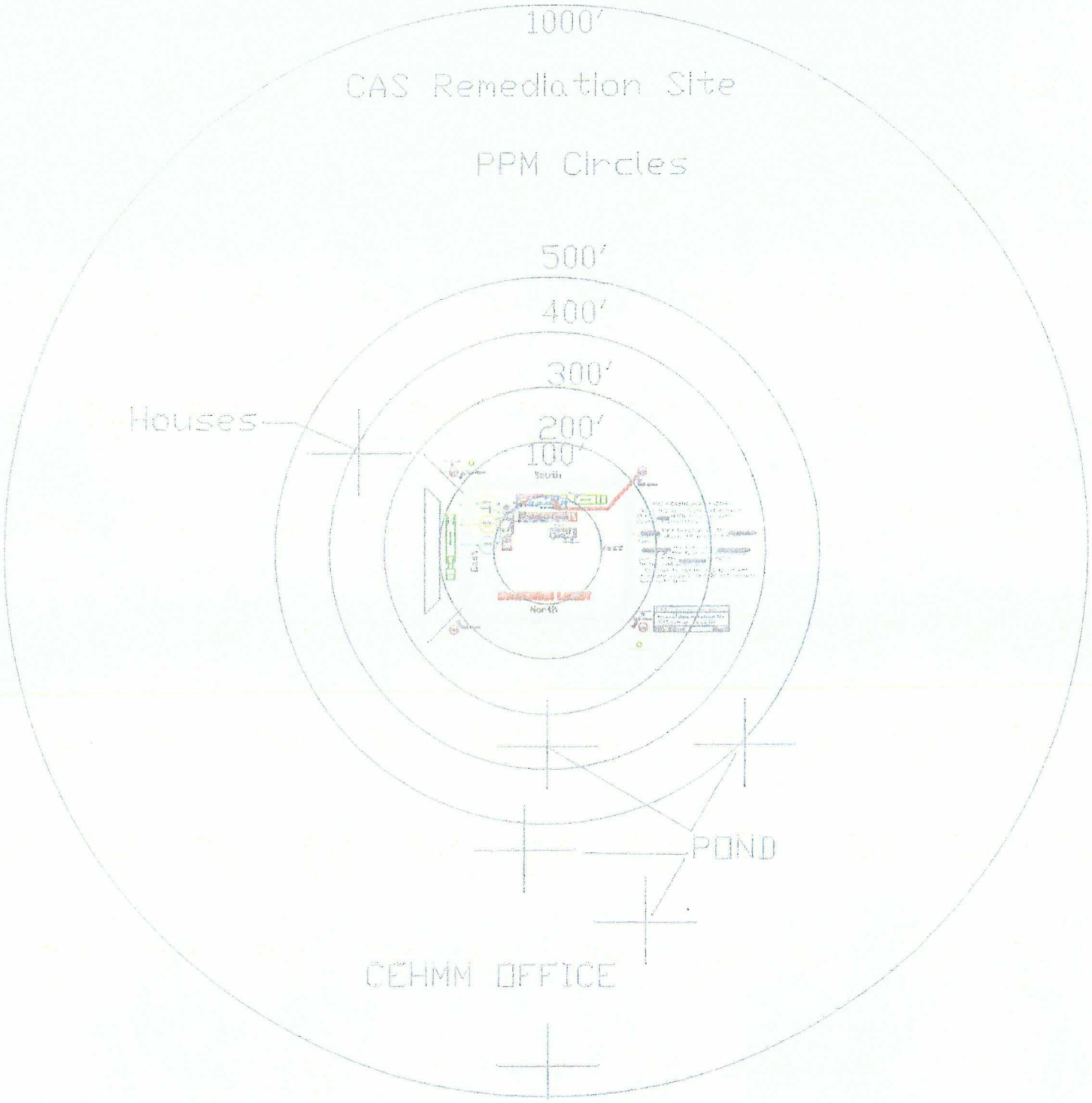
PELIGRO

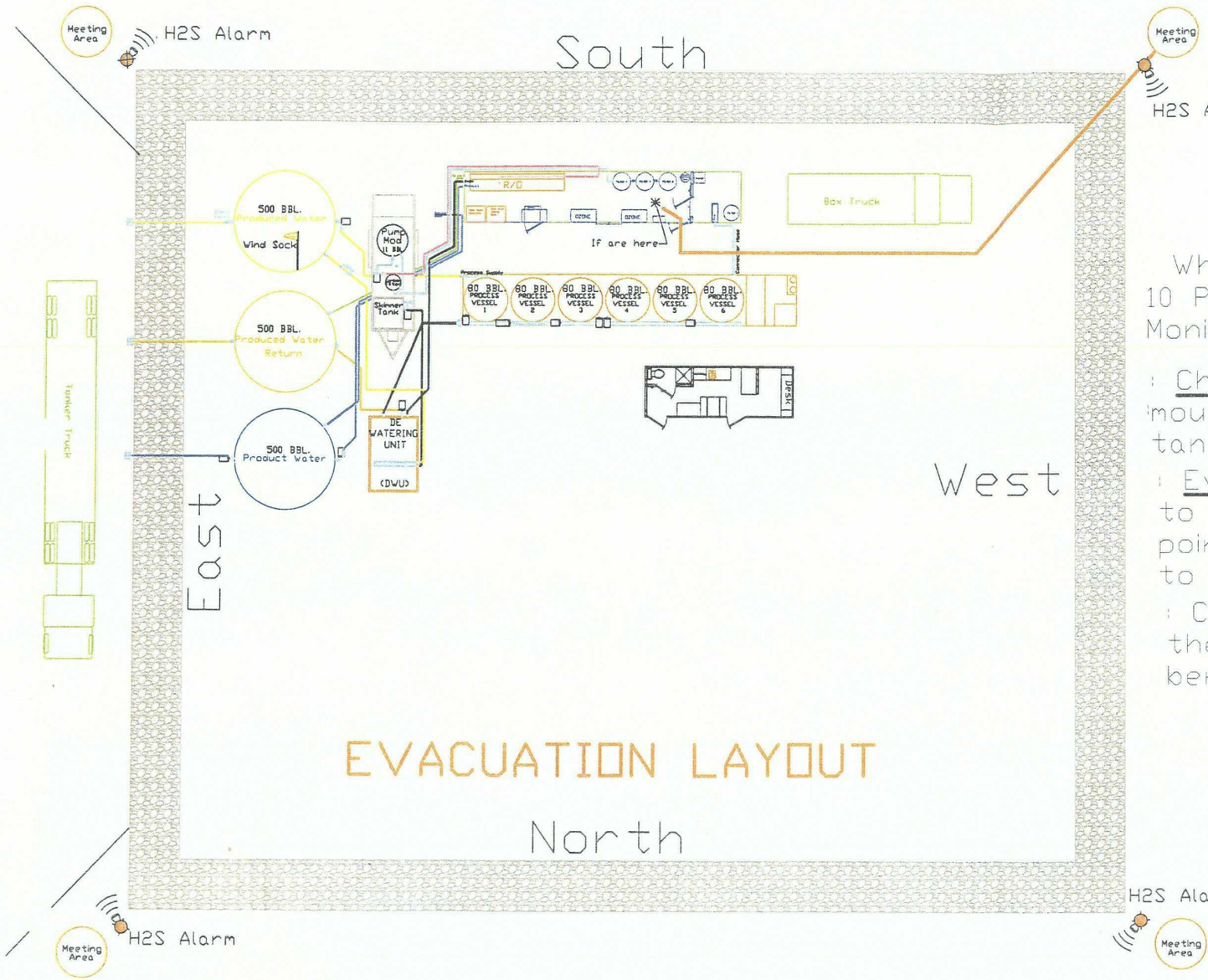


GAS
VENENOSO
ÁCIDO
SULFHÍDRICO


Fire Extinguisher
Box Truck
R/O
OZONE
OZONE
Fire Extinguisher
If are here
Fire Extinguisher
500 BBL.
Pump Mod 1 BBL
80 BBL PROCESS VESSEL 1
80 BBL PROCESS VESSEL 2
80 BBL PROCESS VESSEL 3
80 BBL PROCESS VESSEL 4
80 BBL PROCESS VESSEL 5
80 BBL PROCESS VESSEL 6
Skimmer Tank
500 BBL.
Fire Extinguisher
Shower
DESK
Fire Extinguisher
DE WATERING UNIT
500 BBL.
Evacuation Map
C.A.S.
Controlled Aqua System
Safety Equipment Layout
Drawn by J.Capenart
DATE August 4 2010
Rev1


Houses
N. Lake Road
N. Lake Road
N. Lake Road
Cemm
Office
CAS
Site
Railroad
Railroad
Railroad
Railroad
Railroad
Railroad
E. CR. 229
Four Points Road
E. CR. 41
E. Dayton
HWY.285


1000'
CAS Remediation Site
PPM Circles
500'
400'
300'
200'
100'
Houses
POND
CEHMM OFFICE



H2S !-CAUTION-GAS HAZARD!

When H2S is detected at a level> 10 PPM any (PAM) Personal Alarm Monitor - Immediately

: Check Wind Direction via the Windsock mounted above the produced water tank.

: Evacuate the berm area immediately to one of the four marked meeting points in the opposite direction to the wind direction.

: Continue to monitor H2S levels until they are below 10 PPM. Do not re-enter berm until then.

C.A.S. Controlled Aqua System Roswell, NM.			
Produced Water Remediation Site 157 Lake Road Artesia, NM			
Drawn By J.Capehart	DATE August 4 2010		Rev3

CAS CONTROLLED AQUA SYSTEMS 157 LAKE ROAD ARTESIA,NM 88210

Standard Category – Health and Exposure Control for Personnel

Revision Date: August 1, 2010

Review Date April 2011

APPROVAL

This HES Standard identifies methods and requirements for controlling employee exposures to hydrogen sulfide gas under routine and emergency conditions.

Approved: T.G. Coakley, President
Date: August 1, 2010

POLICY

Personnel exposures to hydrogen sulfide gas will be minimized through the use of industrial hygiene assessments, engineering and workplace controls, safe work procedures, and personal protective equipment.

Purpose:

This plan is intended to protect the health and safety of the public, contractors, and CAS personnel should an unanticipated release of a potentially hazardous volume of Hydrogen Sulfide (H_2S) occur.

Scope:

This plan covers the CEHMM Site located in Artesia New Mexico.
Detailed in this plan is a graph of the **Radius of Exposure** (ROE)
I

Definitions:

All Clear - Notification of effected personnel, by the response leader, that the incident has ended and the area is safe to re-enter.

A Potentially Hazardous Volume means a volume of hydrogen sulfide (H_2S) gas of such concentration that:

- The **100**-ppm ROE includes any public area.
- The 500-ppm ROE includes any public road.

- The 100-ppm ROE exceeds 3,000 feet.

Facility - Equipment involved in producing, processing, or transporting natural gas and/or crude oil, including the property to the edge of the pad or fence.

Hydrogen Sulfide Gas (H2S) - An extremely flammable, colorless, poisonous gas that may occur naturally as a component of production streams, such as crude oil, produced water and natural gas.

At low concentrations it has a rotten egg odor, but at higher concentrations deadens the sense of smell. Its specific gravity is heavier than air giving it a tendency to collect in low-lying areas on still days.

The permissible exposure limit is **10 ppm** and the short term exposure limit is **15 ppm**. It is considered to be immediately dangerous to life and health at 300 ppm and $_{above}$. H_2S is readily dispersed in air and is water soluble.

ICS (Incident Command System) - A team based concept for emergency response in which roles
and responsibilities are predetermined.

Incident Commander (IC) - Senior CAS employee in charge of an emergency response.

Incipient Stage Fire - A fire in the beginning or very early stages of development, which can be effectively extinguished by one or more persons with portable fire fighting equipment.

Muster site - A pre-defined staging or meeting area.

ROE – Radius of effect.

The Plan:

Training:

All personnel (company, contractors and sub-contractors) working for CAS are
required to complete hydrogen sulfide training before beginning work and annually thereafter.

Training on the contents of this plan shall be provided to all CAS and appropriate contract personnel:

- initially when the plan is first implemented,
- whenever the employees' responsibilities or designated actions under the plan change,
- whenever the contents of the plan are changed/revised,
- whenever a new employee begins employment, and

- periodically as needed for all employees.

CAS supervision is responsible for this training. Mock emergency drills involving facility evacuation and public protection measures shall be held periodically. Training and drills shall be critiqued, documented and kept on file for future reference.

H2S Monitors:

All personnel are required to wear a personal **H2S** monitor at all times. Monitors should have a vibrating alarm if used in high noise areas.

Provisions for Public Protection:

Eight-foot chain-link fencing topped with three strands of barbed wire surrounds the tank farm and processing equipment. All gates are locked.

Signs are posted at all facilities that warn of recognized hazards including;

POISON GAS
H2S
No Smoking
Automatic Start
Authorized Personnel Only
Personal Protective Equipment Requirements
Emergency Contact Numbers

Windsocks are located at the tank battery.

H2S Gas monitors are installed at 4 compass points adjacent to the bermed area and connected in common to a central alarm system. If these sensors read a level over 10 ppm the flashing light mounted atop the Green Process Trailer will Flash. If the reading is above 20 PPM the warning horn will sound.

Phase I • activated when:

1. **Sustained** H_2S concentration reaches **10 parts per million** (ppm) in any work area and the source is not readily identified and/or controllable.
2. **Continuous** H_2S levels are detected at **10 ppm** (or greater) at any public road, near an occupied residence or bus stop, and the source is not readily identified and/or immediately controlled.

Phase II - activated when:

1. **A potentially hazardous volume of H_2S is detected.**
2. **When sustained H_2S concentrations exceed 50 ppm at any boundary.**

Phase I:

Upon discovery on-site personnel should;

Make others on-site aware of the presence of H_2S and leave the area upwind or crosswind to a safe location. (Pre-determined if a pre-job tailgate meeting was conducted).

Prevent unauthorized persons from entering the area. Request assistance if needed.

A residence or other public area is in the vicinity, monitor for H_2S to ensure exposure is less than 10 ppm. Notify supervision if higher exposures are noted or if any other questions arise about steps necessary to protect these sensitive areas.

If considering re-entering the area to assess the H_2S source, ensure you have been properly trained to respond. Use an H_2S monitor with digital display (preferably a multi.gas monitor) and have a supplied air respirator (SAR) and back up person with SAR readily available.

Consider notification of supervisor if appropriate.

Proceed with caution. If H_2S concentration reaches 50 ppm at the facility boundary **Immediately notify supervision.**

If source can be safely controlled, monitor area to ensure H_2S levels are below 10 ppm. End response here and sound all clear to allow others to re-enter the area. Report length of the release and volume to supervisor.

If the source of H_2S cannot be identified and/or controlled, or if you cannot do so with out exposing yourself to danger, leave the area to a safe distance.

Notify supervision

Continue to monitor for H_2S and maintain site security until instructed by supervision to do otherwise.

Supervision;

Gather necessary information to determine the course of action and level of response.
Mobilize any additional man power or equipment necessary.
Ensure Phase II measures are implemented if appropriate.
Continue to monitor situation until incident is over.
Make notifications if required.
Complete reports if required.
Investigate as indicated.

Phase II

Upon discovery on-site personnel should;
Make others on-site aware of the presence of H_2S and leave the area upwind or crosswind to a safe location. (Pre-determined if a pre-job tailgate meeting was conducted).
Activate the facility ESD if available and it can be safely done.
Prevent unauthorized persons from entering the area.

Notify Supervisor.

Supervision;

- Initiate the **Incident Command System** as deemed appropriate.
- Mobilize the resources necessary to maintain site security and provide for the protection of personnel and the public.
- Issue warnings to all CAS personnel by radio and or phone to make them aware of the incident and its location.
- Have non-essential personnel leave the area. If deemed necessary, order a total personnel evacuation of the area.
- Notify non-company personnel known to work or reside in the area. If necessary to ensure their safety, dispatch CAS personnel with the appropriate monitor, supplied air respirators and means of communication to these locations.
- Have CAS personnel set up road blocks to prevent unauthorized entry into impacted areas until relieved by law enforcement or other authorized personnel.
- Make all appropriate notifications to CAS, Federal, State and local authorities.
- When the release has been contained and monitoring indicates the area is safe to re-enter, terminate operations and sound the all clear.
- Complete reports if required.
- Investigate as indicated.
- For, fires, natural disasters and terrorist or bomb threats report same to Fire Department and or Police Department.

All other personnel not involved in the immediate response;

- If a total evacuation is ordered, report to the **Incident command center** or nearest muster site to which you have safe access.
- Ensure all contract personnel working for you (or in your area) are accounted for and have them report to a safe muster site.
- Senior employee at each muster site should make a roster of all personnel reporting to that muster site and be prepared to make it available to the incident commander (IC).
- Maintain communication with the IC and be prepared to offer assistance as it is requested.

Artesia IC

Incident Commander		
Tim Coakley	575-513-0201	N/A
John Capehart	575-910-1353	N/A
Operations		
Tim Coakley	575-910-1353	N/A
Tom Michaud	575-420-5500	N/A
Planning Section		
John Capehart	575-910-1353	N/A
Robert Archuletta	575-317-4440	N/A
Logistics Section		f
John Capehart	575-910-1353	N/A
Safety/Environmental		
Tim Coakley	575-513-0201	N/A
John Capehart	575-910-1353	
Public Affairs		
Tom Michaud	575-420-5500	N/A

EMERGENCY NUMBERS

AGENCY	LOCATION	PHONE NUMBER
Police	Artesia	575-746-5000
Police	Carlsbad	575-885-2111
Fire	Artesia	575-746-5050
Fire	Carlsbad	575-885-2111
Ambulance	Artesia	575-746-5050
Ambulance	Carlsbad	575-885-2111

Hospitals	Artesia	575-748-3333
Hospitals	Carlsbad	575-887-4100
State Police	Artesia	575-748-9718
State Police	Carlsbad	575-885-3138

Emergency Equipment:

ITEM	QUANTITY
8' x 30' enclosed trailer	1
36" x 28" safety supply cabinet	1
30# fire extinguisher with bracket	3
windsocks, frames	1
Shower	1
Briefing area signs	2

Biohazard bags	Various
Absorbent pad	Various
Barrier tape	Various
Lockout box and material	1
NIOSH pocket guide to chemical hazards	1
Emergency Response Guidebook	1
Bullhorn	1
30 minute air respirator	2
Explosion proof flashlight	2
NOMEX clothing - various sizes	Various

NMED Surface Water Bureau
Harold S. Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87505-4182
(505) 827-0187

NMED Hazardous and Radioactive Materials Bureau
Harold S. Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87505-4182
Phone: (505) 827-1557

NMED Solid Waste Bureau
Harold S. Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87505-4182
Phone: (505) 827-2775

NMED Occupational Health and Safety Bureau
Harold S. Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87505-4182
Phone: (505) 827-4230

New Mexico State Police
Hazardous Materials Response (Santa Fe)
Phone (505) 827-9301
24 hour (505) 827-9126

New Mexico State Police District Offices

Roswell
24 hour (505) 622-7200

Farmington
24 hour (505) 325-7547

Gallup
24 hour (505) 863-9353

Hydrogen Sulfide Exposure Control Standard

2010

CAS - 3801 West Country Club Road Roswell, NM 8820 1 - Corporate Office

site plan for - 157 State Road Artesia, NM 88201 CEHMM Algae Bio-Diesel Facility

CONTENTS

I. Hazard-

H2S and SO2 are Poisonous Gases that can cause serious injury or Death.

Properties of H_2S.

- **Hydrogen sulfide is slightly heavier than air; a mixture of H_2S and air is explosive. Hydrogen sulfide and oxygen burn with blue flame to form Sulfur Dioxide (SO_2) and water.**
- **Probability of H_2S being present on site is high. Be aware and take all necessary precautions. Always assume the presence of H_2S when on any oil related or produced water site and take all necessary precautions.**

Exposure

- Exposure to lower concentrations can result in eye irritation, a sore throat and cough, nausea, shortness of breath, and fluid in the lungs. These effects are believed to be due to the fact that hydrogen sulfide combines with alkali present in moist surface tissues to form sodium sulfide, a caustic. These symptoms usually go away in a few weeks.
- Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness.

Detection

- 0.00047 ppm (parts per million) is the recognition threshold for **H_2S** , the concentration at which 50% of humans can detect the characteristic odor of hydrogen sulfide, normally described as resembling "a rotten egg".

Occupancy or working Limits

- **You** must be certain that you are working in an atmosphere containing less than 10 ppm. This level has an exposure limit of 8 hours per day. You may not work more than 8 hours per day in an atmosphere containing any amount of **H_2S.**

- The Maximum Permissible Exposure Limit (PEL) for a ceiling concentration is 20 ppm hydrogen sulfide, a level which may not ever be exceeded.
- 800 ppm is the lethal concentration for 50% of humans for 5 minutes exposure (LC50)
- Concentrations over 1000 ppm cause immediate collapse with loss of breathing, even after inhalation of a single breath.

CAS on site requirements include the installation of a permanent windsock, located prominently and visible to all personnel from anywhere in the CAS operation.

Applicable control measures

Engineering controls -- Plant systems containing hazardous chemicals must be completely assessed to assure that valves capable of releasing the toxic agent to the atmosphere are permitted to be opened only when absolutely necessary and are then vented to a safe location. The valves must also be capable of being locked out.

Sewer systems for draining tanks or drums which present potential exposure to hazardous chemicals should be constructed so that they are closed, vented to a safe location, or not open to the atmosphere. Alternatively, appropriate respiratory protection should be worn before these systems are used.

A valve configuration on an industrial process should be such that only the valves used for routine use as part of the normal process are readily capable of being opened. If the valves are required to be opened for occasional shutdown operations, they must be locked and tagged in the closed position to preclude erroneous opening during routine plant operations.

Valves that must remain available for immediate use in emergency operations should be clearly labeled as such so that they are not accidentally opened during routine operations.

Monitoring and detection equipment -- Operators working on units where there is potential exposure to hazardous chemicals may need to be supplied with personal monitoring equipment. Alternatively, stationary monitors could be installed. Personal or stationary monitors must be capable of sounding an audible alarm or warning.

Training -- All current and new employees must receive training in standard operating procedures covering all aspects of the job, with emphasis on safe work practices. Where appropriate, training should also include field observations (on-the-job training) by qualified supervisory personnel, including verification that workers have satisfied the training requirements.

Training must include proper procedures for working around areas of potential exposure

to hazardous chemicals and include the hazards of exposure. While labeling of pipes cannot be required, the hazard communication standard does require that the employer address the hazards of unlabeled piping systems in a written hazard communication program and that the information be provided through training to workers.

Respiratory protection -- Respirators must be provided by the employer when effective engineering controls are not feasible, or while they are being instituted, when such equipment is necessary to protect the health of the worker. The employer must provide respirators that are applicable for the purpose intended.
Written procedures must be developed for the safe use of respirators during the performance of operations presenting a potential exposure to hazardous chemicals.

Under circumstances where individuals may be exposed to an unknown concentration of hydrogen sulfide or some other hazardous chemical, back-up personnel with appropriate respirators and emergency equipment must be present.

1. SCOPE

This program applies to all personnel (employee, consultant, agency, contract, and subcontract - casual, full and part-time) working anywhere within the North America Production Operations.
Exemption: Facilities where it has been confirmed that H_2S is either not present (via multiple surveys, gas samples, etc), or where periodic atmospheric testing has confirmed that the maximum ambient concentrations can not reach or exceed 10 ppm, including inside confined spaces such as tank head spaces, pressure vessels, etc. , are not covered by this standard.

2. PURPOSE

To ensure that hydrogen sulfide hazards are identified and eliminated or controlled to the extent feasible. To ensure that personnel who work in environments where hydrogen sulfide may be present are adequately trained and protected through the use of safe work practices and PPE when the hazard cannot be eliminated. To assure that personnel exposures to hydrogen sulfide are monitored, as appropriate.

3. REFERENCES

3.1 American Petroleum Institute, RP49 Recommended Practices for Safe Drilling of Wells Containing Hydrogen Sulfide
3.2 American Petroleum Institute, RP55 Recommended Practices for Conducting Oil

and Gas Production Operations Involving Hydrogen Sulfide
3.3 American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices
3.4 ANSI Z88.2 – 1992 – American National Standard For Respiratory Protection
3.5 ANSI Z390.1 - 1995 – American National Standard Accepted Practiced for Hydrogen Sulfide Safety Training Programs

4. DEFINITIONS

4.1 Airline Respirator - An atmosphere-supplying respirator for which the atmosphere is supplied to the respirator through a hose from a source not carried by the wearer. An emergency egress bottle with a minimum 5 minute emergency air supply must be integral with the respirator. Airlines for respirators shall not exceed 100 feet in length unless approved by NIOSH in accordance with the manufacturer's certification for the respirator.

4.2 Atmosphere-supplying Respirator – A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere.
4.3 Casual Visitor - Any visitor (CAS employee or outside personnel) who is unfamiliar with the area or facility and is there for purposes other than performing work (e.g. tour groups, executive management, etc.). Facility supervisors should approve field visits by casual visitors. Casual visitors should receive a general site specific safety briefing. Personnel such as salespersons, delivery persons and similar persons are typically not covered as casual visitors.
4.4 Covered Employee - An employee who is covered under criteria defined in an HES Standard that requires the employee to have medical surveillance. Typical criteria may include exposures that exceed the occupational exposure limit, the Action Level, or some other criteria.
4.5 Emergency – An unintentional incident that results in the disruption of normal activities and may include an actual or potential uncontrolled release of an airborne contaminant, fire, explosion, injuries and/or property damage.
4.6 Emergency-use Respirator – A respirator placed in or near the work area for use in an emergency.
4.7 Employee Exposure – The level of exposure to an airborne contaminant that would occur if the employee were not using respiratory protection.
4.8 Engineering Controls –Controlmeasures utilized to prevent or reduce atmospheric contamination at the source by confinement, enclosure, local ventilation, dilution ventilation and substitution of less toxic materials (or other acceptable methods).
4.9 Escape-only Respirator – A respirator that is acceptable for use **only** for emergency

escape from a developing hazardous atmosphere.
4.10 Exclusive-use Respirator – A respirator assigned to and used by only one employee.
4.11 Fit Test – The use of an approved protocol to evaluate the effectiveness of the seal of a respirator to the face of an individual.
4.12 H_2S Area - An area, well, or other facility capable of having ambient **H_2S.** concentrations reaching or exceeding 10 ppm.
4.13 High H_2S Situation- A situation where the ambient concentration of hydrogen sulfide is known or anticipated to reach or exceed 100 ppm during the performance of work or during an emergency response operation.
4.14 Immediately Dangerous to Life and Health (IDLH) – An atmosphere that poses an immediate threat to life would cause irreversible adverse health effects or would impair an individual's ability to escape from a dangerous atmosphere (e.g. a concentration of oxygen of less than 19.5%). See H_2S IDLH.
4.15 LHCP – Licensed health care professional.
4.16 Local Program Administrator - A designated individual who is qualified to recognize, evaluate and control hazards in the workplace.
4.17 Occupational Exposure Limit – A Company identified exposure limit for a substance derived from the OSHA Permissible Exposure Limit, the ACGIH Threshold Limit Values, or other sources of exposure criteria developed for the purpose of protecting the health and safety of workers.
4.18 Personal Alarm Monitor (PAM) – A portable monitoring device worn at or near the breathing zone to measure concentrations of a hazardous substance. The PAM shall have a visual and an audible alarm that warns the wearer when a concentration of the hazardous substance reaches the Occupational Exposure Limit (OEL) or action level (e.g., **H_2S.** Carbon Monoxide, etc). PAMs used in high noise areas shall have a visual, audible and a vibrating alarm. See Section 8.9.4.
4.19 Positive-Pressure Respirator – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.
4.20 Qualitative Fit Test (QLFT) – A pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
4.21 Quantitative Fit Test (QNFT) – An assessment of the adequacy of the respirator fit by numerically measuring the amount of leakage into the respirator.
4.22 Rescue Personnel – Personnel that are designated and trained in the rescue of personnel who are unable to exit unaided from a hazardous environment.
4.23 Respirator Use Area – A designated work area where respiratory protection is required to protect employees from a hazardous atmosphere.
4.24 Self-Contained Breathing Apparatus (SCBA) – An atmosphere-supplying respirator for which the source of breathing air is designed to be carried by the wearer.

4.25 Standby Personnel – A person(s) outside of the respirator use area that has been trained and is responsible for monitoring the activity of personnel inside the respirator use area and the status of the air supply for airline respirators.
4.26 Supplied-air Respirator (SAR) – A self-contained breathing apparatus (SCBA) or airline respirator.
4.27 User Seal Check – An action conducted by the respirator user to determine if the respirator is properly seated to the face and to verify proper valve operation.

5. RESPONSIBILITIES

5.1 Employees shall be responsible for:
5.1.1
Being knowledgeable of the provisions of this program and participating in training when requested;
5.1.2
Observing safe work practices including the use of respirators when necessary;
5.1.3
Completing medical evaluation(s) processes required by this standard;
5.1.4
Completing training required by this standard;
5.1.5
Inspecting, cleaning, disinfecting and storing respirators in accordance with this standard and the Respiratory Protection Standard;
5.1.6
Serving as a standby person when required by safe work practices;
5.1.7
Informing their supervisor if respirator fit or use problems are encountered;
5.1.8
Removing defective respirators or equipment from service immediately upon discovery of any defect; and
5.1.9
Informing their supervisor of any hazards that they feel are not adequately addressed in this standard.
5.2 Local Program Administrators are responsible for:
5.2.1
Identifying work areas, processes and tasks that require the use of engineering controls and designating tasks and facilities where workers must observe specialized work practices for hydrogen sulfide;
5.2.2

Selecting appropriate respiratory equipment for use by personnel;
5.2.3
Ensuring that respirators are used properly;
5.2.4
Arranging for and/or conducting training for working in hydrogen sulfide environments; and
5.2.5
Maintaining required records.
5.3 CAS Supervisors shall be responsible for:
5.3.1
Ensuring that employees receive appropriate training, fit testing, and medical evaluations in accordance with this HES Standard, when required;
5.3.2
Ensuring that personnel properly utilize and calibrate personal and portable toxic gas detectors (personal alarm monitors);
5.3.3
Ensuring the availability and proper use of appropriate respiratory equipment;
5.3.4
Being aware of tasks requiring respiratory protection, ensuring that respirators are worn properly and that standby personnel/rescue personnel are provided/utilized as needed; and
5.3.5
Ensuring that engineering controls are maintained in working condition (where applicable).
5.4 HES Managers shall be responsible for:
5.4.1
Serving as, or designating a qualified person as, the Local Program Administrator and making the resources available that are necessary to fulfill the outlined responsibilities; and
5.4.2
Assisting with program implementation.
5.5 Management shall be responsible for:
5.5.1
Providing resources for this HES standard, as necessary;
5.5.2
Ensuring that engineering designs include provisions for appropriate materials selection and engineering controls for facilities; and
5.5.3

Ensuring effective implementation of this HES Standard.
5.6 Contractor Employees shall be responsible for:
5.6.1
Being knowledgeable of the hazards of hydrogen sulfide and participating in training when requested;
5.6.2
Observing safe work practices including the use of respirators when necessary;
5.6.3
Properly inspecting, cleaning, disinfecting and storing respirators;
5.6.4
Serving as a standby person when required by safe work practices;
5.6.5
Informing their supervisor if the respirator fit or use problems are encountered;
5.6.6
Removing defective respirators or equipment from service immediately upon discovery of any defect; and

5.6.7
Informing their supervisor of any hazards that they feel are not adequately addressed in this standard.

5.7 Contractor Management shall be responsible for:
5.7.1 Ensuring that their personnel are sufficiently trained to perform their job tasks safely following established safe work procedures; and Ensuring that their personnel who may be required to wear a respirator are required to pass an acceptable quantitative fit test in the type and size of respiratory equipment to be worn and trained in accordance with company procedures.

6. TRAINING
6.1 Prior to working in an environment that might expose personnel to hazardous concentrations of hydrogen sulfide, training shall be provided for each affected person and a card (or other certification), signed by the instructor, shall be furnished certifying that he/she has completed the training program. Training is not required when specifically exempted by other sections of this program.

NOTE: Training for **CAS** employees will be as directed by the Engineer in Charge.

6.2 Training shall be conducted annually in accordance with the requirements of the CAS Regulatory Information and Training Guideline and may be conducted by an instructor certified to train personnel in H2S hazards and management.

6.3 In accordance with the HAZCOM Standard, a material safety data sheet for hydrogen sulfide shall be available electronically or in paper form at field offices in areas where hydrogen sulfide may be encountered. Fit-testing and respiratory protection training shall be conducted in accordance with the Respiratory Protection Standard.

7.REQUIRED DOCUMENTATION
Record
Custodian
Retention

- Employee Records
- Employee Training Records
- Facility Atmospheric Monitoring Data
- Monitor Calibration Records (Fixed and Portable) Facility name

8. PROCEDURES

8.1 Hydrogen Sulfide Occupational Exposure Limit (OEL) – In all work areas where employee exposure to **H_2S** is reasonably foreseeable, appropriate measures shall be taken to evaluate and control exposures.

8.1.1

The following occupational exposure limits, as sampled in the breathing zone of the employee, shall apply to this program:

• An 8-hour Occupational Exposure Limit - Time-Weighted Average (OEL-TWA) of 10 ppm (12 hour OEL-TWA of 10 ppm).

• A 15-minute short-term Occupational Exposure Limit (OEL-STEL) and acceptable ceiling concentration of 15 ppm. This maximum concentration can occur only 4 times per day and there must be at least one hour between each STEL exposure.

• Immediately Dangerous to Life or Health (IDLH) concentration of 100 ppm.

8.2 Initial Facility Surveys

8.2.1

All facilities shall be surveyed initially to determine if **H_2S** is present, to identify what exposures may exist, and to quantify the exposure potential. Surveys can include area measurements with direct reading instruments, source measurements or other objective

data providing similar information (e.g., laboratory analysis of the production streams) and a review of incident and
injury records to determine problem sources of **H_2S.**

8.2.2

Measurements to evaluate the potential for the development of an IDLH atmosphere shall be conducted as a part of the initial survey.

8.3 Periodic Facility Surveys

8.3.1

Periodic facility surveys shall be made to determine the ongoing effectiveness of exposure controls and revalidate **H_2S.**levels associated with work areas and **H_2S** sources. Additional surveys shall be made as soon as practical when there has been a change in the process, work practice, or other reason that may result in increased levels of hydrogen sulfide in the facility.

8.3.2

Facilities that have operations with **H_2S** levels lower than 10 ppm shall be reevaluated at least once every 3 years to confirm the **H_2S** concentration of the product stream.

8.4 Personal Exposure Monitoring

8.4.1

Personal monitoring shall be performed to quantify the full-shift and short-term exposure potential for job assignments that may result in exposures to hydrogen sulfide. Representative full shift time-weighted average (TWA) samples, 15-minute STEL samples and peak concentration monitoring shall be conducted.

8.4.2

When initial personal monitoring results indicate employee exposure at or in excess of the OEL, additional monitoring shall be conducted to confirm the exposure. The monitoring shall cover similar job activities as those performed during the monitoring that resulted in the exceedance(s).

8.4.3

Employees whose hydrogen sulfide exposures exceed the OEL shall be monitored annually.

8.4.4

Non-routine exposures shall be monitored whenever practical.

8.4.5

When monitoring results indicate employee exposure is less than the OEL, no further monitoring is required, unless workplace conditions or job assignments change.

8.4.6

Additional monitoring shall be performed whenever there are changes in the method or type of production or process, control equipment, or work practices which may result in new or additional employee exposures to **H_2S.**

8.4.7
Employees shall be notified in writing as soon as practical after obtaining the monitoring results.
8.4.8
Monitoring data shall be documented and retained in accordance with Section 7 of this Standard.
8.5 Surveillance
8.5.1
All employees who work in **H_2S** areas and utilize respiratory protection equipment will be covered by the Respiratory Protection Standard and shall be evaluated in accordance with the requirements of that standard.
8.6 Engineering Controls
Engineering control measures shall be used, whenever feasible, to reduce and maintain employee exposures below the OELs. Examples of engineering controls include, but are not limited to:
- Remote gauging systems or sealed sight glasses on vessels and storage tanks;
- Fixed Stationary Alarm Monitors where there are hazardous concentrations of; **H_2S**
- Vapor recovery units, flares or remote vents;
- Lease automatic custody transfer units (LACT) for transferring product automatically;
- Fencing of facilities to secure against unauthorized access;
- Air blowers for ventilating equipment;
- Chemicals used in processes to suppress **H_2S** generation or enhance removal; and
- Local exhaust hoods for laboratory or similar installations.

8.7 Work Practices
8.7.1
API Recommended Practices
8.7.1.1
The American Petroleum Institute (API) has developed specific **H_2S** work practice documents for exploration and production operations. The use of these guidelines is recommended where applicable and when not in conflict with established company guidelines.
8.7.2
Examples of general work practices include, but are not limited to: • Use of wind direction indicators to determine safe areas for refuge; • Signage, labels, and other warnings as appropriate to communicate the presence of hydrogen sulfide; and • Controlling access to hazardous areas and allowing entry only to authorized, trained personnel. However, these general work practices may need to be supplemented with special work practices and respiratory protection.

8.7.3
Where appropriate or when required by regulation, the fencing of facilities and the use of caution signs and labels shall be used to alert employees and the general public to operations where there is a potential exposure to **H_2S.**
8.7.3.1
Wording for caution signs shall be:
8.7.3.2
Labeling schemes for containers and vessels containing s **H_2S** hall meet the requirements of the Hazard Communication (Hazcom) Plan. Where Hazcom labels are utilized the following target organ wording shall be used:

Danger - Extremely Flammable Gas - Hydrogen Sulfide
Gas Can Cause Eye and Respiratory Irritation and Asphyxiation

8.7.4
Some areas may have specific legal requirements for posting and fencing where hydrogen sulfide is present. Each operating component is responsible for meeting the specific requirements in their operating areas.

8.7.5
Where engineering controls are not feasible, the following special work practices shall be utilized depending on the type of process or job task and the potential for exposure to hydrogen sulfide.

8.7.5.1
For tasks involving entry into **IDLH, unknown H_2S atmospheric concentrations, or atmospheres that have the potential to become IDLH** entry shall be made with positive-pressure atmosphere-supplying respiratory protection. Methods shall be employed to determine the
hydrogen sulfide concentration prior to work being performed.

CAUTION

Hazardous Area
Hydrogen Sulfide
(Poisonous Gas)
Authorized Personnel Only

8.7.5.1.1
Work conducted in an IDLH atmosphere shall be authorized and documented with a safe work permit.
8.7.5.1.2
One or more standby persons with respiratory protection (with a separate air source) shall be present and in visual contact with the respirator wearer working in the hazardous area.
8.7.5.1.3
Appropriate provisions for rescue shall be made prior to commencing work in the hazardous area.
NOTE: Please see Respiratory Protection Standard for training and rescue provisions.
8.7.5.2
For tasks, not covered above, involving exposure to **H_2S** concentrations exceeding the OEL, such as areas around tanks and certain process vessels (e.g., sampling/gauging sour crude or intermediate product storage tanks, opening hatches on water knockout units, removing covers on sulfur recovery pits, loading sulfur tank trucks), shall require the use of positive-pressure atmosphere-supplying respiratory protection.
8.7.5.2.1
A standby person (with a separate air source) shall be present and in visual or voice contact with the respirator wearer working in the hazardous area.
8.7.5.2.2
When appropriate, provisions for rescue shall be made.
8.7.5.3
For tasks involving **confined space entry** (e.g., vessel entry) where **H_2S** may be present, work shall be authorized and documented with a safe work permit in accordance with the Confined Space Entry Standard.
8.8 Respiratory Protection
8.8.1
Respiratory protection shall be used if engineering controls are not feasible or are not sufficient to reduce exposures within the established limits.
8.8.2
All employees who, as a part of their regular duties, are required to wear respirators to minimize their exposure to **H_2S** shall be covered by the Respiratory Protection Standard.
8.8.3
Acceptable types of respirators include:
8.8.3.1
Positive-pressure self-contained breathing apparatus (Scott, MSA or equivalent) are acceptable for all hydrogen sulfide environments.

8.8.3.2
Positive-pressure supplied air (airline) respirators with a full-face piece and equipped with an escape bottle.
8.8.3.3
Emergency escape units (e.g., egress bottle with five minute air supply) shall be used only for emergency egress in areas where high concentrations of hydrogen sulfide may develop or in conjunction with an airline respirator.
8.8.3.4
Closed-circuit, self-contained breathing apparatus (ccscba) are permitted only for emergency escape from developing hazardous atmospheres.
8.8.3.5
Single use, mouth-piece type, escape-only cartridge respirators for use during emergency egress from an area where the concentration of hydrogen sulfide gas is expected to be below **10 ppm** during regular work activities, but where an accidental release of hydrogen sulfide might occur provided the release **does not exceed the maximum allowable concentration for the respirator (usually 100 – 150 ppm).**
8.8.3.6
No other types of respiratory protection shall be provided or used in atmospheres that contain or have the potential to contain hydrogen sulfide without appropriate approvals from NIOSH/MSHA .
8.9 Hydrogen Sulfide Detection Equipment
8.9.1
Fixed monitoring systems, personal monitors and portable gas detection equipment shall be utilized as required by this standard. The equipment shall be approved for use and shall be calibrated (and documented) and maintained in proper condition in accordance with the manufacturer's established calibration procedures. Portable instruments shall also be examined for proper operation by the user prior to each use.
8.9.2
Detection equipment shall be set to initially alarm at no higher than 10 ppm. If a detector, monitor or instrument is found to be defective, it shall be removed from service and tagged with a note for repair.
8.9.3
Fixed Monitoring Systems
8.9.3.1
Fixed monitoring systems should be considered for enclosed areas that have a potential for hydrogen sulfide gas concentrations to exceed 10 ppm. Fixed monitoring systems are recommended for process or other areas where a release would result in a concentration of

hydrogen sulfide above the IDLH level, which may result in a radius of exposure that may include dwellings, public and private occupancies, and places of assembly.

8.9.3.2

Temporary fixed monitoring systems shall be utilized during drilling and workover operations when a hydrogen sulfide hazard is or may be present.

8.9.3.3

Stand-alone temporary detection stations that transmit signals electronically or by hardwire may be utilized when fixed equipment is out of service or when deemed prudent for other temporary activities.

8.9.4

Personal Alarm Monitors

8.9.4.1

Personal alarm monitors (**PAMs**) or similar **H_2S** detection devices shall be used to supplement well-established work practices and respiratory protection.

8.9.4.2

PAMs shall be worn by **all** personnel assigned to work in areas where hydrogen sulfide is or may be present **and shall be worn such that the device or at least the sensing media is worn at or near the breathing zone (forward of the ears, within 12 inches of the nose and mouth)**
and outside the outermost layer of clothing.

8.9.4.3

PAMs shall not be used in lieu of other more reliable exposure control measures (e.g. tri-gas monitors) for confined space entry, emergency rescue, or for tasks involving **H_2S**-containing sources that have the potential for rapid increase of **H_2S** in excess of the IDLH.

8.9.4.4

The routine use of PAMs requires daily operational checks of the monitor, regular calibration checks of alarm settings (if required), and procedures to follow when alarm(s) sound(s).

8.9.4.5

Personal alarm monitors for use in high noise environments shall include provisions for a vibrating alarm, or shall be mounted on the hard hat or shirt collar to assure detection of alarm activation.

8.9.4.6

When PAMs are used for tasks involving **H_2S** levels potentially in excess of the exposure limits, the work procedure shall include:

- Instructions to exit the area when the alarm(s) sound(s); and Re-entry only with appropriate respiratory protection and backup personnel or by conducting air monitoring to confirm that exposure levels are acceptable.

8.10 Eye and Skin Protection
8.10.1 Personal protective equipment shall be worn where appropriate to prevent eye and skin contact with liquids containing hydrogen sulfide and eye irritation from exposure to airborne concentrations of **H_2S** (below the OEL).
8.10.1.1 Gloves - Gloves made of nitrile rubber or neoprene, or other suitable materials approved to be used for protection of the hands against absorption of hydrocarbons.
8.10.1.2 Goggles - Non-vented goggles should be worn if the concentration of hydrogen sulfide is not sufficient to warrant the use of a respirator but eye irritation exists. Goggles should also be used when handling hydrocarbons containing dissolved hydrogen sulfide if there is any possibility of splashing the material into the eyes.
8.10.1.3 Chemical Protective Clothing - Where atmospheres with high concentrations of hydrogen sulfide exist, chemical protective clothing may be necessary to prevent irritation to damp exposed skin. This would normally only be a concern during emergency operations since entry into this type of atmosphere would not be undertaken under normal circumstances.
8.11 First Aid
8.11.1 Where exposure to **H_2S** in excess of the IDLH is foreseeable, emergency response personnel shall be trained in first aid and cardiopulmonary resuscitation (CPR). When facilities are located remotely from emergency medical services, consideration should be given to the feasibility of maintaining oxygen on hand and providing it to personnel if overcome by
hydrogen sulfide.

8.12 Rescue Personnel
8.12.1 Rescue personnel, when required by this standard, shall be provided with appropriate respiratory protection and other equipment as deemed necessary for the task involved. This may include retrieval lines, wrist cuffs, or other retrieval and emergency equipment. Non-entry rescue methods shall be used whenever feasible.
8.13 Emergency Evacuation Plan
8.13.1 Each work location where exposure to hydrogen sulfide is possible shall have an emergency evacuation plan, an emergency response plan, or where required, an emergency contingency plan outlining the procedures to follow in the event of a sudden release of hydrogen sulfide.
8.13.2 CAS and contractor personnel shall be familiar with the provisions contained in the plan and it shall be reviewed with personnel prior to initial assignment to the job and whenever changes are made to the plan(s). The plan should address the identification of emergency evacuation routes and areas of safe refuge, methods or signals to alert personnel of an emergency condition, reporting procedures and any other emergency procedures specific

to the location.
8.14 Fire Protection
8.14.1 Adequate measures shall be taken to eliminate the risk of fire and explosion on any site where hydrogen sulfide may be present. If hot work is to be undertaken, a safe work permit shall be issued, in accordance with the hot work requirements and the CAS Safe Work Permit Standard, prior to performing the task.

9. Requirements By Area or Situation
9.1 **H_2S Area** - An area, well, or other facility capable of having ambient **H_2S** concentrations reaching or exceeding 10 ppm. For an **H_2S** area, the following requirements shall apply:
9.1.1
The use of a Personal Alarm Monitor for hydrogen sulfide gas is required for all workers at all times while on location. When working under supplied air, personal alarm monitors for **H_2S** are not required; however, area monitoring must be conducted to confirm that the IDLH is not exceeded.
9.1.1.1
Casual visitors to **H_2S** areas are not required to have a PAM and must be escorted by properly equipped personnel.
9.1.1.2
Casual visitors **are not allowed** in areas where there is a situation or work activity that may result in ambient **H_2S** concentrations of 10 ppm or greater.
9.1.2
Hydrogen sulfide training is required for all employees and contractor personnel working in **H_2S** areas.
9.1.2.1
Casual visitors are not required to have **H_2S** training; however, they should be familiar with emergency evacuation procedures.
9.1.3
Respiratory protection for emergency escape shall be readily available where egress is limited or restricted.
9.1.4
If the hydrogen sulfide concentration reaches or exceeds 10 ppm at any time while personnel are on the location, all personnel shall evacuate to a safe area. Personnel shall not re-enter the area without an approved positive-pressure self-contained breathing apparatus or supplied-air (airline) respirator with a full-face piece and emergency egress bottle (minimum 5 minute air
supply), unless the concentration is reduced to below 10 ppm.
9.1.4.1 One or more standby personnel are required while working under air.

9.1.5
No beards or similar facial hair (except approved moustaches, see the Respiratory Protection Standard) is permitted in these areas. Casual visitors need not be clean shaven.
9.1.6
One or more wind indicators shall be visible at the location and no ignition sources are allowed except by permit.
9.1.7
Personnel shall be familiar with emergency evacuation or contingency plans, including safe areas of refuge.
9.1.8
Fixed monitoring equipment shall be provided and maintained at continuously manned facilities. Fixed monitoring equipment should be considered for unmanned facilities. See Section 8.9.3.

9.1.9
Signage shall be provided at the entrance(s) to the area, as appropriate, to read as follows:
9.2 **High H_2S Situation** – A temporary situation where the **ambient concentration** of hydrogen sulfide is 100 ppm or greater.
9.2.1
If the ambient concentration of hydrogen sulfide is 100 ppm or greater, only specially approved tasks and emergency operations shall be permitted; all of the previously mentioned **H_2S** area requirements apply and regular work activities will not be permitted unless the concentration is reduced below **100 ppm** by ventilation or other engineering controls.
9.2.2
A Safe Work Permit shall be completed and reviewed prior to undertaking work in a high **H_2S** situation.
9.2.3
All personnel working in a high **H_2S** situation shall be supervised by a CAS representative who is competent by virtue of training and experience. Any safety deficiencies noted shall be immediately communicated to the CAS representative for immediate correction and/or temporary interruption of the work.
9.2.4
Continuous monitoring for explosive atmospheres (hydrogen sulfide or hydrocarbon) with an approved instrument that alarms at 10% of the lower explosive limit is required.
9.2.5
Approved respiratory protection shall be utilized.
9.2.6

Rescue provisions and equipment are required onsite, including communication systems with the person(s) performing the work.

Poisonous Gas H2S

CAUTION Hazardous Area

Hydrogen Sulfide
Do not enter!
Authorized Personnel Only

9.2.6.1
Personnel who will be expected to perform a rescue shall be adequately equipped, trained, and physically able to perform a rescue operation if needed.
9.2.6.2
Rescue personnel may also perform the standby duties.
9.2.6.3
Where applicable, the provisions of the Confined Space Entry Standard and the Emergency Response Plan shall be referenced for additional requirements.
9.2.7
Contractor personnel shall not be utilized in high **H_2S** situations unless specifically trained for the hazardous work.
9.2.8
Wind indicators shall be clearly visible at all times and no ignition sources are allowed.
9.2.9

Personnel shall be familiar with emergency evacuation/contingency plans, including areas of safe refuge.

A. ATTACHMENTS

A.3.3.2

New Mexico Oil Conservation Division Rule 19.15.11 is printed following Page 21 for your reference.

H2S PPM and average effects

Short Term Effects

0.13 ppm - Threshold of odor detection
0.77 ppm - Faint, but readily perceptible odor
4.6 ppm -Easily noticeable odor
10 ppm - Eye irritation, soreness, redness, burning
27 ppm - Strong, unpleasant, but not intolerable odor
50 ppm - Irritation & dryness of nose, throat, and airways, cough, shortness of breath, pneumonia
100 ppm - Immediate irritation of eyes and respiratory tract
150 ppm - Sense of smell may be paralyzed
200 ppm - Headaches, dizziness, nausea
500 ppm - Unconsciousness and death within a few minutes
1000 ppm - loss of consciousness, respiratory failure and immediate death

NOTE: Concentration levels from 10-50 ppm may be tolerable without immediate reaction. Loss of ability to detect odor, can result in death if exposure is unreasonably extended.

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I. LLPDE UNLOADING/STORAGE

A. LLPDE rolls will be unloaded under supervision of the liner installer – SouthWest Liner, using straps or other devices that will prevent damage to the liner material.
B. Rolls should be stored on subgrade that is clean, dry, and well compacted. LLPDE materials shall be stacked not more than two rolls high.
C. If any material damage is noted during unloading, the damaged areas are to be marked with a permanent marker, and a notation made as to the roll number, location of damage, and type of damage. Recording of minor damage to the outer wraps of liner material is not required.

II. MATERIAL DEPLOYMENT

A. Prior to placement of any liner materials, the subgrade is to be inspected and approved by the CAS Project Superintendent. Any areas found to be unacceptable are to be corrected prior to placement of liner material. Documentation of this inspection is to be provided if required by the project specifications.
B. Materials will not be deployed when moisture, high winds, or other adverse weather conditions are expected.
C. LLPDE materials are to be deployed using methods that will not crimp, bend, or otherwise damage the material. Unless otherwise approved, LLPDE materials are to be deployed using a "spreader bar" manufactured especially for this purpose.
D. If a Liner Installation Plan has been submitted, the geomembrane shall be installed in accordance with said Plan. The panel layout may be adjusted in the field if required by site conditions. Panels are to be identified with a Panel Number that allows ready identification of the location of the panel. The Panel Number is to be written on the liner material with a permanent marker.
E. Temporary sand bags are to be used to prevent material uplift and movement from winds during liner installation.
F. The liner panels shall be oriented at right angles to the toe of the berm (down slope) where possible. Except for roll end (butt) seams, horizontal seams are not allowed on slopes steeper than 2:1. Transition seams between vertical slope panels and horizontal panels will be located at least 5 feet from the toe of the slope. Liner panels are to be deployed in a manner that minimizes field seams.
G. No motorized equipment will be allowed to operate directly over the geomembrane material. Portable equipment (portable generators, compressors, etc.) will be mounted on rubber tires or placed on a sacrificial sheet of material.

H. LLPDE liner materials are to be deployed in a manner that minimizes wrinkling, but allows for sufficient material slack to properly conform to the subgrade. Ambient weather conditions and liner temperature are to be taken into account when

making this determination.

I. When LLPDE materials are deployed at temperatures greater than 80° F and in direct sunlight, the material will be allowed to stabilize overnight before the anchor trenches are backfilled. Stabilizing is accomplished using the following techniques:

1. Leave sufficient excess liner material on the outboard side of the anchor trench to allow for anticipated liner shrinkage.
2. Temporarily weight the liner in the anchor trench using sandbags.
3. Place sufficient sandbags at the toe of the slope to allow the liner to pull the excess material from the anchor trench as it shrinks. The number and placement of sandbags will vary according to the pond design and expected weather conditions.
4. Inspect the liner material while the material is still cool the following morning. If sufficient liner shrinkage has occurred, backfill the anchor trench that is to be backfilled.

III. MATERIAL SEAMING – DUAL HOT WEDGE WELDING

A. After allowing the liner temperature to stabilize, overlap adjacent panels a minimum of 4". Remove any excessive wrinkles prior to seaming.
B. Field seams are to be made using the dual-hot-wedge welding method whenever possible.
C. Prior to seaming any materials, trial seams shall be made. Trial seams are made on scrap pieces of geomembrane to verify that the seaming conditions and equipment are acceptable. At least (3) peel and (3) shear tests are to be conducted on each trial seam, using a field tensiometer furnished by the liner installer. The peel and shear values for trial seams are to meet or exceed the project specifications.

D. Upon completion of a successful test, the date, time, seamer name, wedge welding machine number, machine temperature setting, machine speed setting, and test results are to be recorded in the Trial Seam Log. No seaming is to be done until a successful test seam has been completed and recorded.
E. If a trial seam fails the test, the entire process will be repeated. If the same welding machine and seamer fail the testing a second time, the welding machine and the seamer will not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are completed
F. Trial seams are to be conducted at immediately prior to the start of any welding period, if the welding equipment has been shut down for a period of more than (10) minutes, or if a substantial change in weather conditions occurs. A trial seam

is to be done for each piece of welding equipment to be used during that welding period.

G. The area to be seamed is to be clean and dry. If required, a protective layer is to be placed under the seam to prevent dust or moisture from entering the seam area, and/or the liner material in the seam area is to be wiped with a clean rag.

H. At the start of each seam, the machine operator is to mark the date, time, machine number, machine temperature, machine speed, and operator initials on the lining material with a permanent marker. This information is to be recorded in the project log.

I. The machine operator is responsible for ensuring that the area to be seamed is clean and dry. If any questionable seam areas are noted, the operator is to mark these areas for later inspection and testing.

J. The machine operator is to read the machine temperature at intervals of approximately 100 feet, and mark the temperature on the lining material. This procedure will ensure that seams are made at the proper temperature. If an excessively high or low temperature reading is noted, the operator is to stop seaming and mark the affected area for testing. The cause of the problem is to be located and corrected, and a new trial seam made and tested before seaming resumes.

IV. DUAL HOT WEDGE WELDING – AIR PRESSURE TESTING

A. Wedge welded seams consist of a double seam with an air channel between the seams. Upon completion of a wedge seam, the open ends of the air channel are sealed off and a needle inserted into the air channel. The air channel is pressurized, allowed to stabilize, and the initial pressure reading is taken.

Continued on page 4

B. The minimum starting test pressure is 30 PSIG. The maximum allowable pressure drop during the five minute test is 4 PSIG.

C. After five minutes, the final pressure reading is taken. The date, test start and ending times, and starting and ending pressures are to be written on the material with a permanent marker. This information is also to be recorded in the project log.

D. At the conclusion of the test, a small hole is cut in the air channel at the end of the seam opposite the inflation needle. The air pressure should drop to 0 PSIG with ten seconds of the cut being made. This procedure ensures that the air channel is not blocked. If the air pressure does not drop to 0 PSIG, the cause of the problem is to be located and the seam re-tested.

E If a wedge welded seam area does not pass the air pressure test, the cause of the failure is to be located and repaired, and the seam is to be re-tested. If the cause of the failure cannot be located, the failed seam area must be sealed with an extrusion weld and fully vacuum tested.

V. MATERIAL SEAMING - EXTRUSION WELDING

A. Extrusion welding is to be used for detail work, repairs, and in other areas where wedge welding cannot be used.
B. Prior to the start of any extrusion welding, trial seams are to be conducted per Item III.C through G.
C. Areas to be extrusion welded are to be clean and dry. Surface oxidation is to be removed by grinding. Grinding is to be done not more than one hour prior to the time the extrusion weld is made, using the procedures listed below:
    1. The grinding shall not extend more than ¼ inch beyond the limit of the extrudate after seam completion.
    2. Grinding shall be performed preferentially in a perpendicular path across the seam.
    3. The depth of grinding shall be less than 10 percent of the sheet thickness.
    4. All shavings produced from grinding shall be removed from the seaming area prior to welding.

D. Where patches are required, the patches are to be round or oval in shape, and are to overlap the damaged area by a minimum or 4" on all sides. Patches are to be heat sealed to the main liner prior to extrusion welding to prevent the edge of the patch from lifting when the extrudate is applied. The extrusion welder shall be purged prior to beginning a seam until all potentially heat-degraded extrudate has been removed from the barrel.
E. Extrusion welds are to be tested by use of a vacuum box. A soap solution is applied to the area to be tested, and a vacuum applied to the area. The tested area is then observed for soap bubbles. Any defective areas must be marked, repaired, and retested until passing results are achieved.

VI. SEAM TESTING

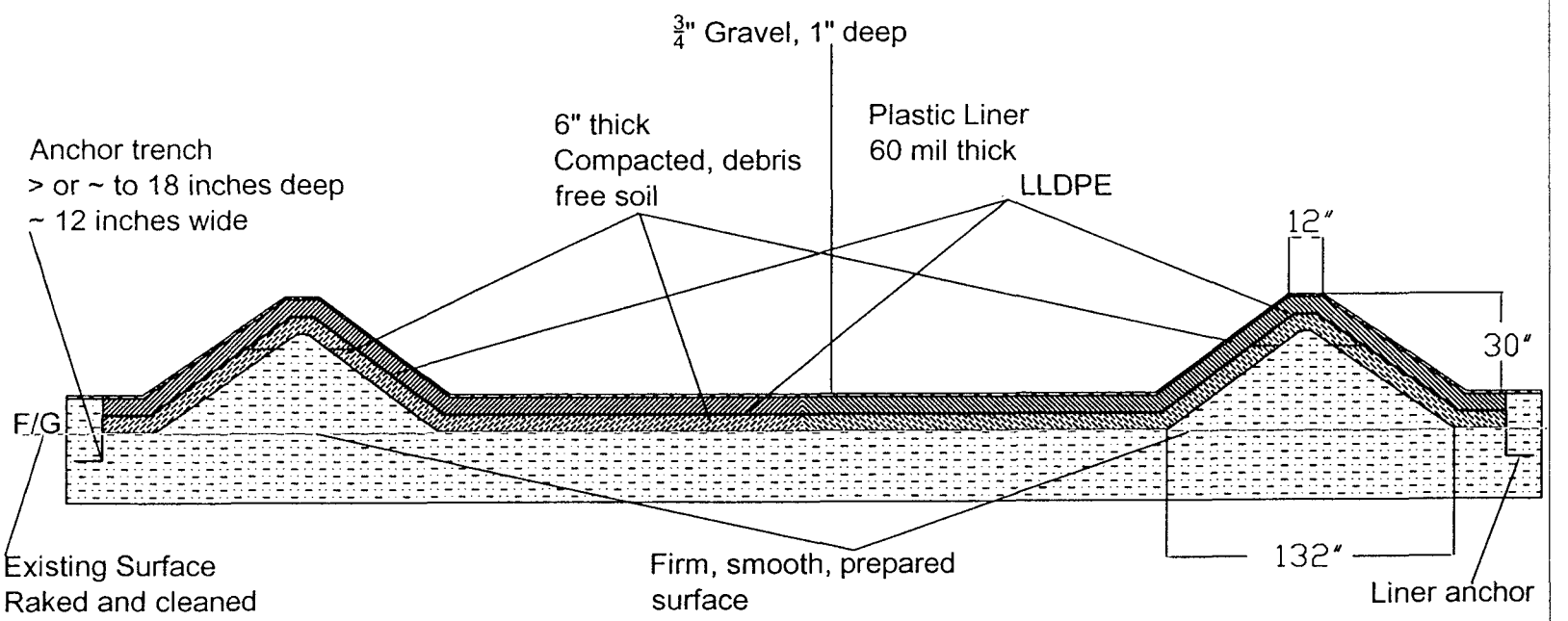
The following values are considered acceptable for seam adhesion tests. All values are expressed in ponds per inch of material width. All testing is done at the speed of two (2) inches per minute. All failures are to exhibit Film Tearing Bond (FTB).

Material Thickness (PPI)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
40 mil	81	65	52
60 mil	121	98	78
80 mil	162	130	104
100 mil	203	162	130

Attachment C

Diagrams of berm construction design and plan layout

Berm Construction Diagram
(drawing not to scale)

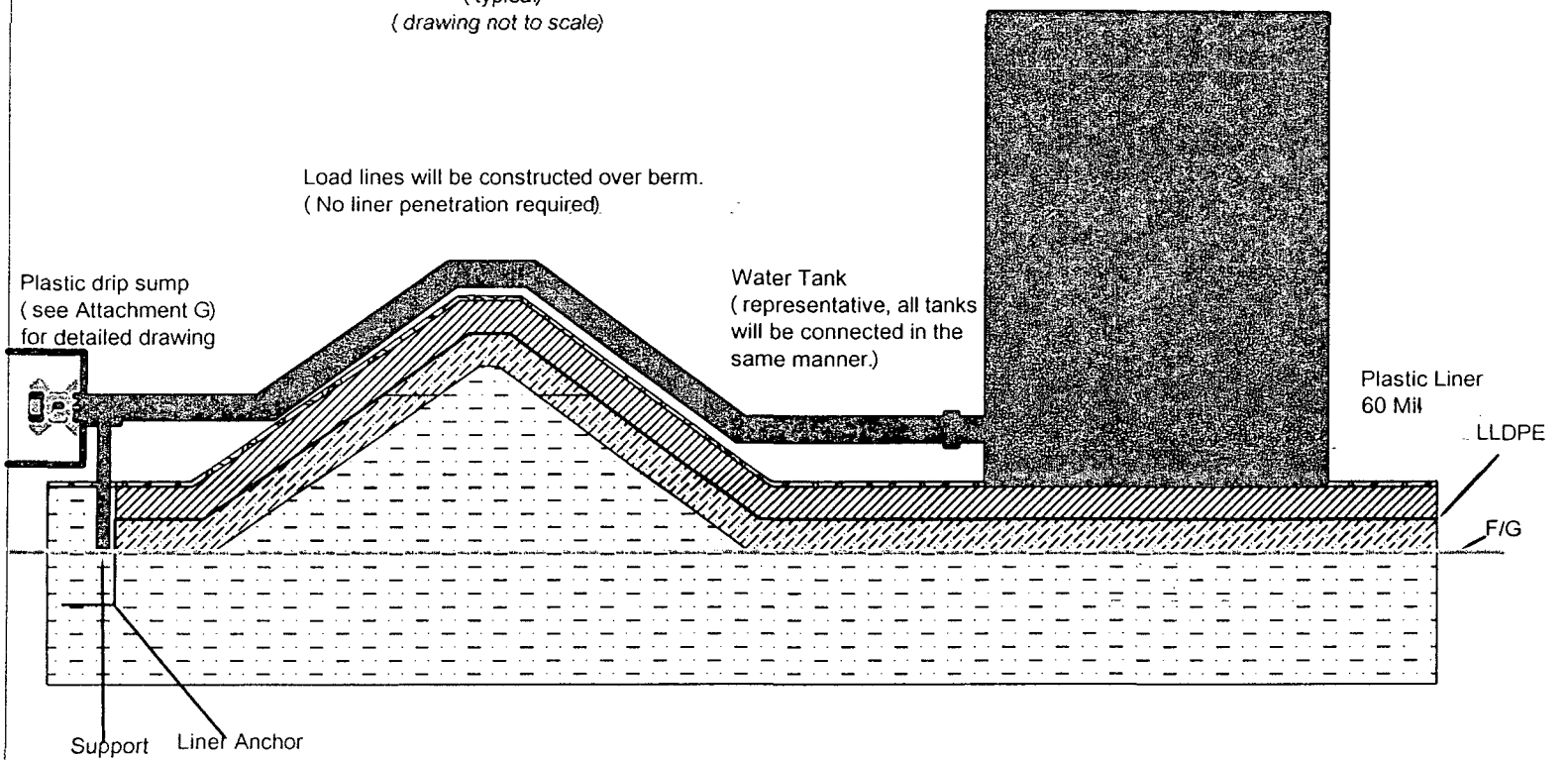


Revised Berm Drawing
Insert after Attachment C

C.A.S. Controlled Aqua Systems			
Berm Construction			
Drawn By: J. Capehart	DATE August 4 2010	Scale N/A	REV 1

Loading/unloading Connections

(typical)
(drawing not to scale)



C.A.S. Controlled Aqua Systems			
Loading/Unloading Connections			
Drawn By: J. Capehart	DATE August 4 2010	Scale N/A	REV 1

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Best Management Practices:

- Water loading and off-loading taps will have **ABOVE Ground** drip sumps provided
  - Drip sump diagram is provided in Attachment G
- Loading and off-loading drip sumps will be checked every 24 hours to monitor for valve leaks
- The treatment facility, including all storage tanks, is located within the limits of a lined, bermed area,
  - The volume of the bermed area is aproximately 320% of the total available volume of water contained in all vessels and piping.
  - The berm is lined with a welded 60 mil, LLPDE liner
  - The LLPDE Liner is anchored in an anchor trench to ensure that the liner remains in place for the lifetime of the installation.
- All of the produced water storage and treatment equipment is located within the lined, bermed area
- All water delivered to the facility or transported from the facility will be documented with a water transfer ticket.
- All water delivered to the facility or transported from the facility will be transported by a state approved produced water hauler with a current, approved form C-133.
- All water transported from the facility for disposal by **Nabors Well Service Waste hauler #: 214 to: SWD Nix-Ann - owned by: Mesquite SWD, Inc 1031 EDDY STREET Carlsbad, NM 88220 Well is on Rockin' R Red Road API #30-015-24305**
- Record keeping:
  - All water transfer tickets will document the well which produced the water or the disposal well which received the water.
  - Log sheets will be kept for daily operation and will be available on-site as well as periodically transmitted to CAS offices.
  - See **Attachment I** for a sample copy of the facility and process log sheet.
  - All water transfers will be subject to form C-138, specifying that all produced water is ONLY exempt or non-hazardous waste with exceptions stated in Subsection F of 19.15.36.13 NMAC.
    - A form C-138 signed by the generator or the generator's agent, will be provided and maintained on-site and updated on a monthly, weekly or per-load basis. These certificates will be available for the division's inspection upon request.

- All tanks will be labeled in accordance with **19.15.18.16 NMAC.**
- In the case of an unauthorized release, CAS will comply with 19.15.29 NMAC (Attachment N) and 19.15.30 NMAC (Attachment O).

Submit a single copy to Santa Fe Office

State of New Mexico
Energy Minerals and Natural Resources

Form C-133
Revised May 27, 2003

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

AUTHORIZATION TO MOVE PRODUCED WATER

Transporter Name NABORS WELL SERVICES LTD.

Address	Office Location (If different)
515 W. GREENS RD. STE. 1170	P.O. BOX 5208
HOUSTON, TX 77067	HOBBS, NM 88241

Phone Numbers(s) 281-874-0035 (CORPORATE) 505-392-2577 (HOBBS)

State Corporation Commission Permit No. 2395

Please attach a copy of the New Mexico Public Regulation Commission (PRC) Warrant for Transportation Services. If a corporation name or LLC has not been established with the PRC or a partnership has not been established with the New Mexico Secretary of State's Office. In accordance with Section 51 of 19.6.2 NMAC, "the division may deny approval of a form C-133 if

(1) the applicant is a corporation or limited liability company, and is not registered with the public regulation commission to do business in New Mexico;

(2) the applicant is a limited partnership, and is not registered with the New Mexico secretary of state to do business in New Mexico;

(3) the applicant does not possess a carrier permit under the single state registration system the public regulation commission administers, if it is required to have such a permit under applicable statutes or rules; or

(4) the applicant or an officer, director or partner in the applicant, or a person with an interest in the applicant exceeding 25 percent, is or has within the past five years an officer, director, partner or person with an interest exceeding 25 percent in another entity that possesses or has possessed an approved form C-133 that has been cancelled or suspended, has a history of violating division rules or other state or federal environmental laws, is subject to a commission or division order, issued after notice and hearing, finding such party to be in violation of an order requiring corrective action, or has a penalty assessment for violation of division or commission rules or orders that is unpaid more than 70 days after issuance of the order assessing the penalty."

NOTE: It is the responsibility of each holder of an approved Form C-133 to familiarize its personnel with the content of Sections 51 and 52 of 19.15.2 NMAC and to assure operations in compliance therewith. Failure to move and dispose of produced water in accordance with Sections 51 and 52 of 19.15.2 NMAC are cause for cancellation of Form C-133 and the authority to move produced water.

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Signature W.D. EHLERT Date 09/14/07

Printed Name W.D. EHLERT Title VICE PRESIDENT

E-mail Address

(This space for State Use)

Approved by EBC Title

Date 10/2/07

3801 W Country Club Rd.
Roswell, NM 88201
575-623-3201
575-623-3201
CASwater.com

Controlled Aqua Systems

Fax

To: Brad Jones **From:** Tim Gaskin

Fax: 505 476-3462 **Pages:**

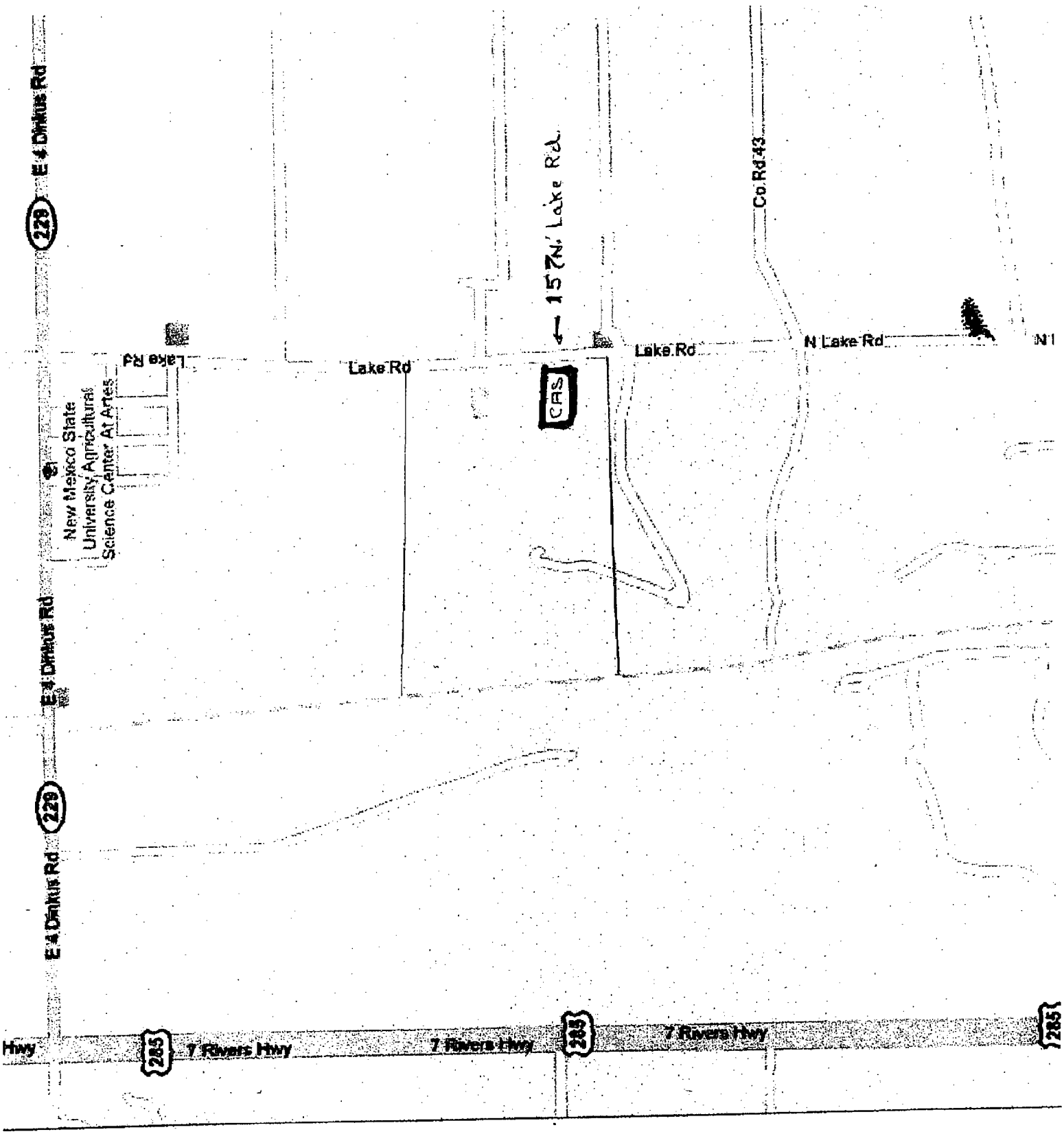
Phone: **Date:**

Re: **cc:**

☐ Urgent ☑ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

- **Comments:**

Tacky but - - -



Produced Water Treatment Facility CAS 157 North Lake Road, Artesia, NM - 88210

CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

June 3, 2010

To: Brad Jones, OCD
Subject: Application for Produced Water Treatment Facility
From: Tim Coakley, Jody Harris

Mr. Jones:

Please find enclosed the revised proposal from CAS for the Application for Produced Water Treatment Facility originally sent to you on April 7, 2010

This revision includes additions, expansions and clarifications in response to your letter dated May 24, 2010.

If you have any questions, please contact me. We look forward to hearing from you on this.

Sincerely,

Jody Harris
jharris@harrisdev.com
Office: 575-623-3201
Direct: 575-208-4567
Fax: 206-339-0014

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CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

Application for Produced Water Treatment Facility

Revised:
June 3, 2010

Application for Produced Water Treatment Facility

Application: NEW

Type: Produced Water Treatment Facility

Operator: Industry Standard Technology Corporation, dba Controlled Aqua Systems (CAS)

Address: 3801 W. Country Club, Roswell, NM 88201

Contact Person: Jody Harris Phone: 575-623-3201

Location: 157 Lake Road, Artesia, NM 88210
(**SE 1/4** of **N 2/4** Section **16** Township **18S** Range **26E**)

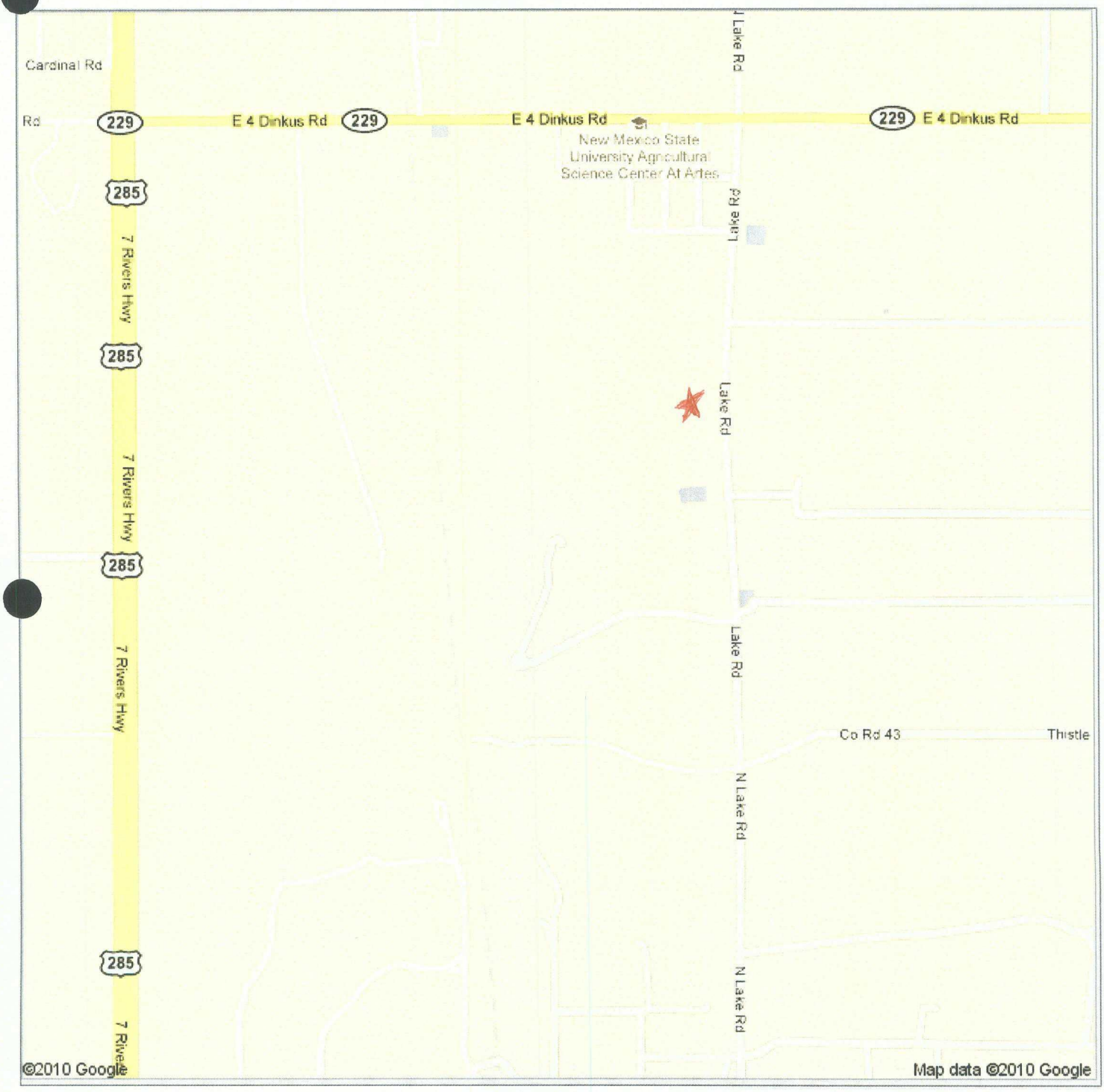
Industry Standard Technology Corporation DBA CAS proposes a Water Treatment Facility for extracting treated produced water from oil field produced water.

- Produced water from area wells will be the source stream for the process.
- The treated produced water will be provided to the Center of Excellence for Hazardous Materials Management (CEHMM) for use in algae/bio-fuel project.
- The treated produced water will meet or exceed the requirements of CEHMM requirements for algae/bio-fuel project. The requirements for the CEHMM water are as follows:
    - At or below 1100 TDS
    - At or below 24 mg/L Chlorine
    - At or below 1 mg/L NO3-N
    - At or below 190 Alkalinity (CaCO3)
    - At or below 750 Sulfate (SO4)
    - At or below 240 Bicarbonate (HCO3)
    - At or below 1760 Electrical Conductivity (EC)
    - pH at or near 7.5
- The "concentrated produced water" will be disposed of according to standard OCD approved procedures for produced water (19.15.34.11 NMAC).

    - The waste stream will be the produced water with all components concentrated by the process.
    - Chemicals used in water testing, filter cleaning and instrument maintenance, operation, cleaning and calibration will be dumped into this waste stream.
    - Concentrated produced water will be hauled away by American Production Services (APS). APS's Waste Hauler's Permit Number is 3924. It will be transported for disposal to one of these two disposal wells:
        - Geronimo SWD LLC – API# 263684
        - Judah Oil LLC – API# 245872
- The "skimmer" stream will be a BS&W stream that will be disposed of at the Triassic Park Waste Disposal Facility (Environmental Protection Agency (EPA) I.D. No. NM0001002484 located at Route 45 West Crossroads, Roswell, NM 88203 (575) 347-0434.
- All produced water and concentrated produced water will be transported to and from the facility by OCD-approved C-133 transporters.
- Solid wastes including filters, membranes, filter media, etc, that may be generated in the course of operation will be disposed of at the Lea Land Inc. Industrial Solid Waste Landfill near Carlsbad, NM.

Google maps

Notes 157 Lake Road, Artesia, NM 88210
Location of CAS Produced Water Treatment Facility



Index of Attachments:

Attachment A: Names and addresses of the applicant and principle officers and owners of 25 percent or more of the applicant. Specify the office held by each officer and identify the individual(s) primarily responsible for overseeing management of the facility.

Attachment B: Process description

Attachment C: Berm construction diagrams and berm layout

Attachment D: Closure and post closure plan, including a responsible third party contractor's cost estimate, sufficient to close the water treatment facility in a manner that will protect fresh water, public health, safety and the environment.

Attachment E: a best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Attachment F: Water Transfer form for receipt and release of produced water

Attachment G: Water transfer sump trap diagram (vendor drawing)

Attachment H: Ozone Emission Potential from the CAS Produced Water Remediation System

Attachment I: Process and Facility Sample Inspection Log Sheet

Attachment J: State of New Mexico Energy Minerals and Natural Resources form C-138, "REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE"

Attachment K: CAS Hydrogen Sulfide Exposure Control Standard

Attachment L: Commitment from Devon to provide produced water

Attachment M: Liner specification sheet

Attachment N: OCD Release Notification Guidelines

Attachment O: OCD Remediation Guidelines

Attachment A

Names and Addresses of Applicant and Principle Officers and Owners

Names and Addresses of Applicant and Principle Officers and Owners

Industry Standard Technology Corp.
dba Controlled Aqua Systems (CAS)

Address: 3801 W. Country Club Road
Roswell, NM 88201

Phone: 575-623-3201

Sole Owner/Officer - Timothy Coakley, President
2905 W 25th St
Roswell, NM 88201
Cell: 575-513-0201

Additional persons responsible for operations at site facility:

- Robert Archuleta - 1515 N. Missouri Ave., Roswell, NM 88201
- John Capehart - 601 Moore, Roswell, NM 88201
- Jody Harris - 407 N. York Ave., Hagerman, NM 88232

Attachment B

Process description

Process Flow Diagram for CAS Remediation Equipment

4-5-10

The descriptions below are referenced to the attached photographs of the produced water remediation system's equipment. Those photographs have been component named to correspond with the descriptions below.

The CAS system's primary function is to remediate oil and gas field produced waters by a process termed as progressive, selective, oxidation, isolation and functional removal of all contaminants present both in solution and in suspension of oil and gas produced waters to discharge levels in compliance with 3103 specifications.

The exact process knowhow is omitted from this disclosure and the focus of the document is on the input and outputs process and waste streams to and from all components.

An overview of the process design:

1. Produced waters are introduced to the CAS Remediation System via the **Pump Module** from **Produced Water Tank #1**. The primary function of the **Pump Module** it is to keep Process Vessel #1 at its operating level. In the case of "hot" (> 100 deg F) produced water, a closed loop cooling system (optional) which is located at the top of the trailer, may be connected in series, to facilitate the transfer of this heat to the atmosphere. The **Pump Module** functions as a metering device for the system. The Pump Module forwards every gallon of incoming produced water it receives to **Process Vessel #1**. Its waste products from the collection tank are routed to the **DWU** described in #13 below.

2. **Process vessel #1**- Is supplied by 5# compressed air, produced onboard the remediation system trailer. This compressed air is introduced to all of the liquid contained in **Process Vessel #1** by a proprietary mixing system. Suspended particles are agglomerated and routed to the **Dewatering System Unit (described in # 13 below)**, for separation. The collection of these suspended particles, as well as BS+W (Basin Sediment and Waste), are routed to the **Dewatering System Unit.** The remaining balance of the liquid continually flows in its entirety to **Process Vessel #2**. Level control is achieved by two separate means. *A high level in any Process Vessel will shut down the System Process Flow.

3. **Process Vessel #2** – is supplied ozone gas generated onboard **Process Trailer #2** . This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #2.** Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the liquid continually flows in its entirety to **Process Vessel #3.**

Further Explanation of ozone gas consumption and application 6/1/10

Page 1, Item 3

Ozone Emission Potential from the CAS Produced Water Remediation System

May 30, 2010

Disclosure

Ozone is recognized as a pollutant both by the EPA and NMED. Therefore it is critical to guard against any emission. The air quality focus is on 185 nm wavelength ozone, and it is the subject of this regulation as its presence typically indicates a condition of smog or VOC's which, when deteriorated, produce low level (185 nm) ozone as a byproduct.

In the CAS process, all ozone gas generated is 254 nm and is completely injected directly into the fluid being treated.

Method

The ozone is mixed into the interstitial spaces of the water molecules by means of a rotating injector system. The transfer has been determined to be 99% effective. The contaminants in the produced water totally consume the ozone in the oxidation process. The ozone generation system is controlled by an ORP process control system. (Oxidation Reduction Potential - the industry standard system of control for waste water remediation systems using ozone, since patented in 1993).

- The gas head spaces of the tanks are connected together by piping and the combination of Offgas is introduced to the first tank as a supply gas, by the means of a conventional injector and recirculation pump thereby reusing the oxygen and other gases that are not consumed in the individual process tanks.

- The ozone generators are controlled by variable output process from the oxidation reduction process variable. This process prevents any ozone residual being present at the input of the final stage of treatment polishing as it is necessary not to have any molecular ozone present in the water being supplied to the Reverse Osmosis membrane system.

- The byproduct of ozone use is O2, oxygen.

- Stray Ozone gas emissions from the CAS system are not a part or consequence of the system operation.

USPatent # 5,236,673 Aug 16, 1993

4. **Process Vessel #3** – is supplied ozone gas generated onboard **Process Trailer #2** . This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #3**. Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #4**.

5. **Process Vessel #4**– is supplied ozone gas generated onboard **Process Trailer #2**. This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #4**. Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #4**.

6. **Process Vessel #5**– is supplied ozone gas generated onboard **Process Trailer #2**. This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #5**. Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #6.**

7. **Process Vessel #6**– is supplied ozone gas generated onboard **Process Trailer #2**. This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #6**. Agglomerated and separated contaminant particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Trailer#2.**

8. **Process Trailer#2-** Contains the **Ozone Generating System**, (4) **Particle Filtration Systems**, a Total Organic Monitoring System (**TOC Analyzer**), a reverse osmosis system (**The R/O**), a reverse osmosis cleaning station and laboratory monitoring equipment for pH, TDS, Salinity and water flow. The trailer is powered by 480 3 phase electricity from **Process Trailer #1**.

9. **Ozone Generating** System – A self contained ozone generation system is contained within **Process Trailer#2.** It is routed to (5) Process Vessels as described above.

10. **TOC Analyzer -** A laboratory grade TOC analyzer is provided to monitor and sample the total organic carbon levels in the effluent of **Process Vessel #6.** This level is ideally maintained at 5 ppm or less with an alarm function provided at 10 ppm that will cause the system on **Process Trailer #1** to go into recirculation mode, until the levels are reduced to the setpoint of the monitoring system.

11. **R/O** - A reverse osmosis system is provided to polish the treated water to standards required by the application being fed by the CAS Remediation System. The system has one liquid input supplied from the Activated Carbon Filter, and it has two discharge points. One is termed product water and it is routed from the R/O to the **CEHMM Water Storage Tank #1.** Reject water from the **R/O** is routed to the **Produced Water Return Tank** where it is transported to a licensed produced water disposal company. Backwash fluids from the R/O, when required, are routed to the Produced Water Return Tank. They are supplied from **CEHMM Water Storage Tank #1.**

12. Filtration Systems located in **Process Trailer #2** (4): Four back-washable permanent media filtration systems are contained within Process Trailer #2. All fluid discharged from Process Vessel #6 is passed in series through these four filters. One Activated Carbon Filter, also back-washable and permanent, is placed as a final polish before the input of the R/O. All backwash fluids passed from these filters are supplied from the **CEHMM Water Storage Tank #1,** and are routed to the **Dewatering System Unit (DWU)** for recovery and retreatment.

13. **Dewatering System Unit (DWU)-** The system is capable of containing all particles routed to the DWU by mechanical separation. Fluids routed to the DWU are recycled to Process Vessel #1. Separated solids are retained in the **DWU** and passed to a licensed oilfield waste handler to be routed to his approved landfill via a licensed waste handler vehicle. Produced water will be hauled by American Production Services (APS). APS's Waste Hauler's Permit Number is 3924. It will be transported for disposal to one of these two disposal wells:

- Geronimo SWD LLC – API# 263684
- Judah Oil LLC – API# 245872

The "skimmer" stream will be a BS&W stream that will be disposed of at the Triassic Park Waste Disposal Facility (Environmental Protection Agency (EPA) I.D. No. NM0001002484 located at Route 45 West Crossroads, Roswell, NM 88203 (575) 347-0434.

14. **Produced Water Tank #1** - A 500 bbl fiberglass vessel .

15. **CEHMM Water Storage Tank #1 - a 500 bbl fiberglass tank.**

16. **Produced Water Return – 500 bbl fiberglass tank.**

Monitoring

Cleaned waters routed to the **CEHMM Water Storage Tank #1** are monitored locally by means of in place TDS and salinity monitoring systems installed permanently on the R/O.

Remediated produced waters from Process Vessel #6 are continuously monitored 10 times per hour when system is operating by the **TOC Analyzer.** Salinity and TDS readings are sampled by the operators periodically as the system is in operation.

All vessel Water levels are continuously monitored by both electronic and mechanical means to insure that normal operating levels exist at all times during system operation. High fluid levels in any Process Vessel will cause the shutdown of the system preventing any input. Operators walk around the system hourly and are positioned so that any variations from normal operation can be seen immediately.

The **DWU 's water level** is also monitored and a high level will shutdown the system and cause an alarm to sound along with a flashing light.

The CAS battery of four (4) 500 bbl tanks, which are located inside the berm, are continuously monitored both mechanically and visually for high levels.

Battery access extends beyond the berm and each access point is fitted with drip sumps to catch and collect connection loss (See Attachment G). An off-road turnout is provided to isolate produced water trucks from the berm and CEHMM production areas. This turnout will be

protected by locked gates to minimize interference by uninvited people or animals during the unoccupied periods for the site.

H_2S monitoring is described in the CAS Hydrogen Sulfide Exposure control Standard, see Attachment K.

BERM

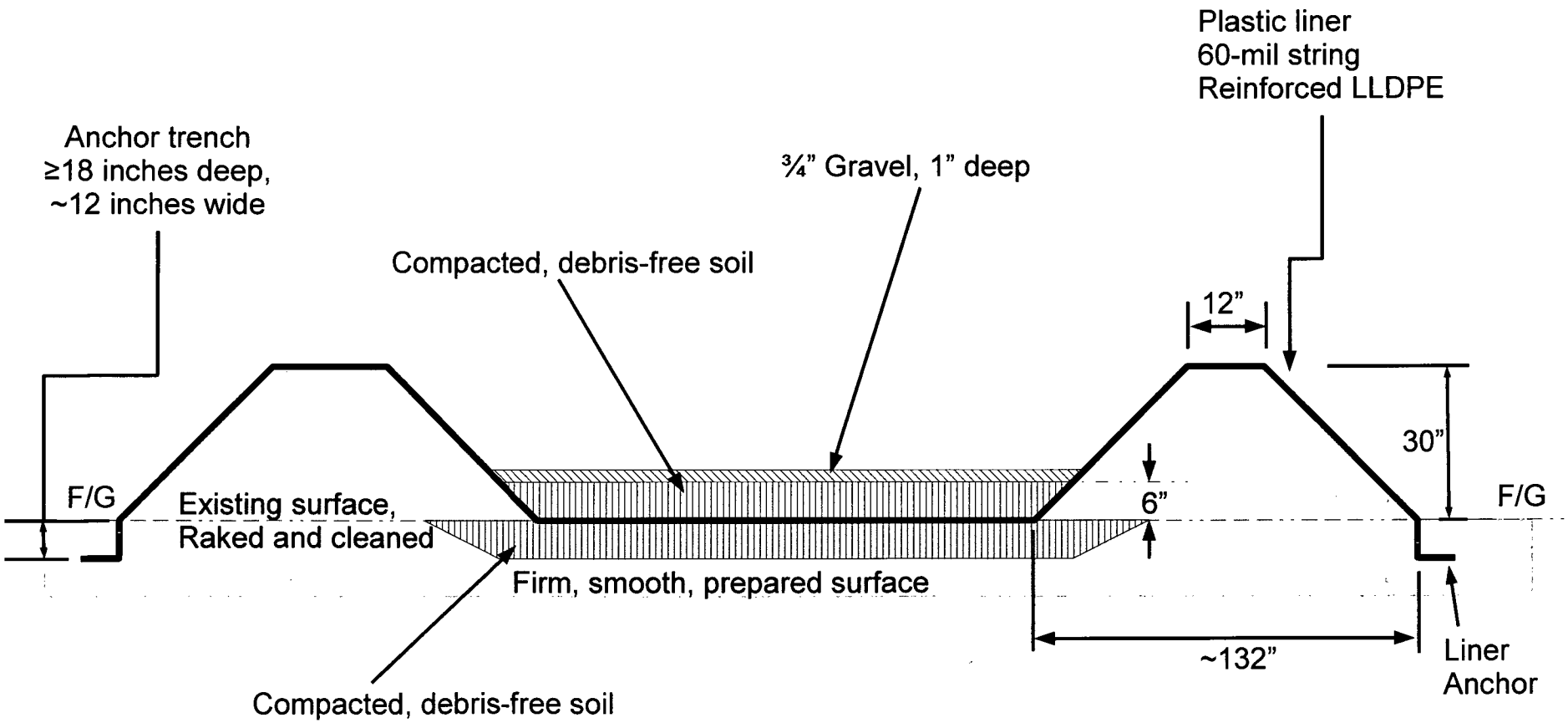
133' x 158' (id) berm, fitted with a 60 mil liner, detailed elsewhere in this submittal, has the capacity to hold more than 350% of the fluids contained in every system that is located inside the berm. For detailed plan and construction drawings, see Attachment C.

Attachment C

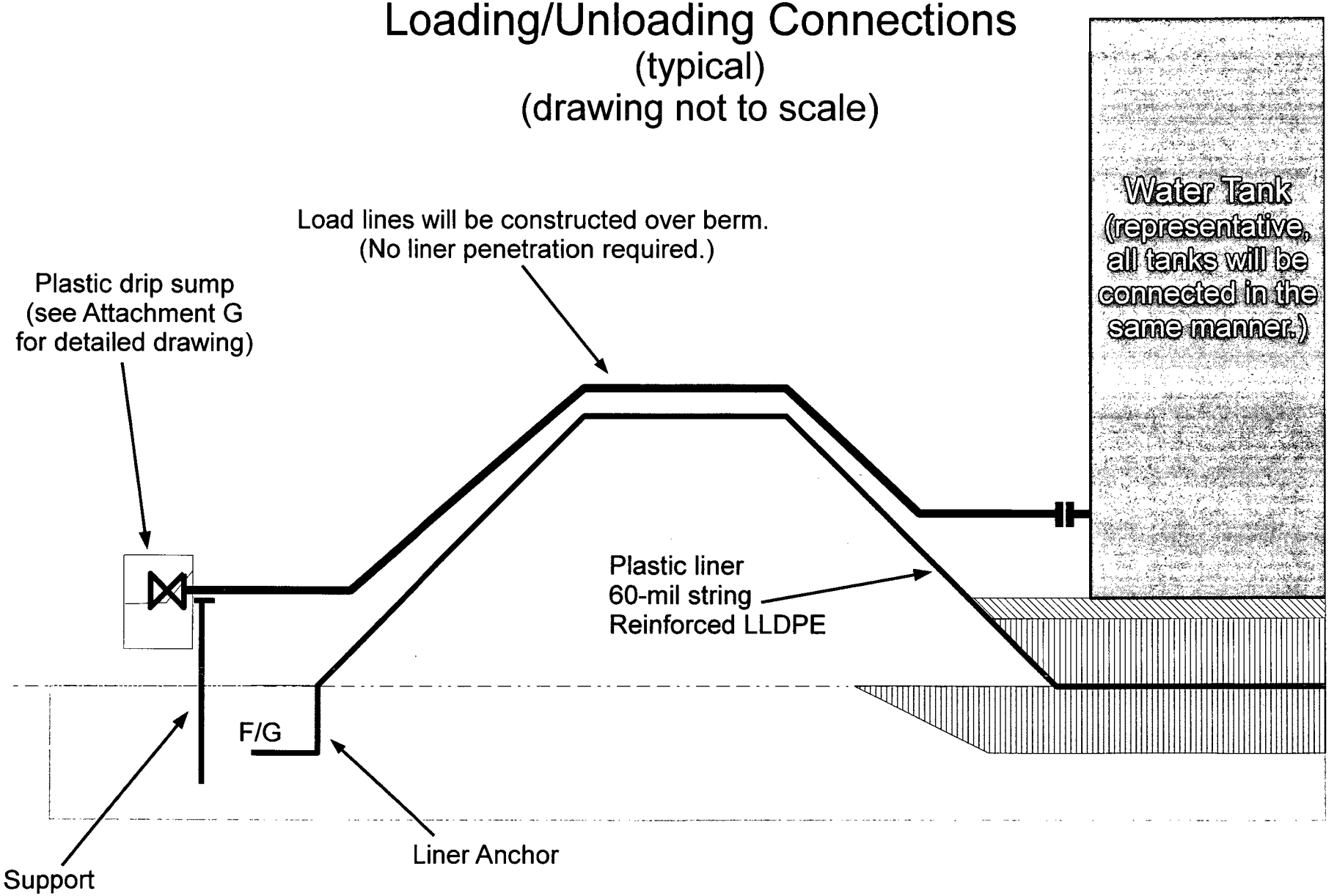
Cross-section diagrams of berm construction design

and plan layout

Berm Construction Diagram
(drawing not to scale)



Loading/Unloading Connections
(typical)
(drawing not to scale)



Frame 38

Frame 37

Tanker Truck

Frame 33

Produced Water

Frame 34

Produced Water Return

Frame 35

Reserve (Future)

Frame 36

CEHMM Water

PUMP MODULE

Frame 31

DE WATERING UNIT

(DWU)

Frame 32

Desk Counter

Lab

Frame 29

Box Truck

Frame 30

Filtered Water Holding Tank

Frame 28

PROCESS VESSEL 1

PROCESS VESSEL 2

PROCESS VESSEL 3

PROCESS VESSEL 4

PROCESS VESSEL 5

PROCESS VESSEL 6

Frame 26

Frame 27 (Future)

Desk Counter

Tpp.

Frame 25

133'

158'

Attachment D

Site closure plan

Site Closure Plan

The site will be closed in accordance with 19.15.17.13 NMAC, revised for a lined, bermed, non-pit installation.

Closure: (19.15.17.13 C)

1. All liquids and BS&W shall be removed from the lined area prior to implementing a closure method and shall dispose of the liquids and BS&W in a division-approved facility.
2. The liner system shall be removed and disposed of in a division-approved facility.
3. The operator shall test the soils beneath the lined area to determine whether a release has occurred. The operator shall collect, at a minimum, a five point, composite sample; collect individual grab samples from any area that is wet, discolored or showing other evidence of a release; and analyze for BTEX, TPH and chlorides to demonstrate that the benzene concentration, as determined by EPA SW-846 methods 8021B or 8260B or other EPA method that the division approves, does not exceed 0.2 mg/kg; total BTEX concentration, as determined by EPA SW-846 methods 8021B or 8260B or other EPA method that the division approves, does not exceed 50 mg/kg; the TPH concentration, as determined by EPA method 418.1 or other EPA method that the division approves, does not exceed 100 mg/kg; and the chloride concentration, as determined by EPA method 300.1 or other EPA method that the division approves, does not exceed 250 mg/kg, or the background concentration, whichever is greater. The operator shall notify the division of its results on form C-141. The division may require additional delineation upon review of the results.
4. If the operator or the division determines that a release has occurred, then the operator shall comply with 19.15.29 NMAC and 19.15.30 NMAC, as appropriate.
5. If the sampling program demonstrates that a release has not occurred or that any release does not exceed the concentrations specified in Paragraph (3) of Subsection C of 19.15.17.13 NMAC, then the operator shall remove the berm material to the location it was originally acquired from, or other location at the discretion of the land owner.

Reclamation of location. (19.15.17.13 G)

1. Once the operator has closed the facility, the operator shall reclaim the location and all areas associated with the facility including associated access roads to a safe and stable condition that blends with the surrounding undisturbed area. The operator shall substantially restore the impacted surface area to the condition that existed prior operations by placement of the soil cover as provided in Subsection H of 19.15.17.13 NMAC, recontour the location and associated areas to a contour that approximates the original contour and blends with the surrounding topography and re-vegetate according to Subsection I of 19.15.17.13 NMAC.
2. The operator may propose an alternative to the re-vegetation requirement if the operator demonstrates that the proposed alternative effectively prevents erosion, and protects fresh water, human health and the environment. The proposed alternative shall be agreed upon by the surface owner. The operator shall submit the proposed alternative, with written documentation that the surface owner agrees to the alternative, to the division for approval.

Soil cover designs. (19.15.17.13 H)

1. The soil cover for closures where the operator has removed the facility contents or remediated the contaminated soil to the division's satisfaction shall consist of the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater.
2. The operator shall construct the soil cover to the site's existing grade and prevent ponding of water and erosion of the cover material.

Re-vegetation. (19.15.17.13 I)

The location of the site is in an area that has been cleared of native vegetation by the owner. This area is inside a research facility.

Closure notice. (19.15.17.13 J)

1. The operator shall notify the surface owner by certified mail, return receipt requested, that the operator plans to close facility. Evidence of mailing of the notice to the address of the surface owner shown in

the county tax records is sufficient to demonstrate compliance with this requirement.

2. The operator shall notify the appropriate division district office verbally or by other means at least 72 hours, but not more than one week, prior to any closure operation. The notice shall include the operator's name and the location to be closed by unit letter, section, township and range.
3. The operator shall notify the environmental bureau in the division's Santa Fe office at least 60 days prior to cessation of operations and provide a proposed schedule for closure. If there is no closure plan on file with the environmental bureau in the division's Santa Fe office applicable to the permanent pit, the operator shall provide a closure plan with this notice. Upon receipt of the notice and proposed schedule, the environmental bureau in the division's Santa Fe office shall review the current closure plan for adequacy and inspect the site.

Closure report. (19.15.17.13 K)

Within 60 days of closure completion, the operator shall submit a closure report on form C-144, with necessary attachments to document all closure activities including sampling results; information required by 19.15.17 NMAC; a plot plan; and details where applicable. In the closure report, the operator shall certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in the approved closure plan.

Attachment E

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Best Management Practices:

- Water loading and off-loading taps will have drip sumps provided
    - Drip sump diagram is provided in Attachment G
- Loading and off-loading drip sumps will be checked every 24 hours to monitor for valve leaks
- The treatment facility, including all storage tanks, is located within the limits of a lined, bermed area,
    - The volume of the bermed area is aproximately 1500% the volume of the largest vessel,
    - The berm is lined with a 60 mil, string reinforced LLPDE liner
    - Liner is anchored in an anchor trench to ensure that the liner remains in place for the lifetime of the installation
- All of the produced water storage and treatment equipment is located within the lined, bermed area
- All water delivered to the facility or transported from the facility will be documented with a water transfer ticket.
- All water delivered to the facility or transported from the facility will be transported by a state approved produced water hauler with a current, approved form C-133.
- All water transported from the facility for disposal will be transported to one of the following state approved produced water disposal sites:
    - Geronimo SWD LLC – API# 263684
    - Judah Oil LLC – API# 245872
- Record keeping:
    - All water transfer tickets will document the well which produced the water or the disposal well which received the water.
    - Log sheets will be kept for daily operation and will be available on-site as well as periodically transmitted to CAS offices.
    - See **Attachment I** for a sample copy of the facility and process log sheet.
    - All water transfers will be subject to form C-138, specifying that all produced water is ONLY exempt or non-hazardous waste with exceptions stated in Subsection F of 19.15.36.13 NMAC.
        - A form C-138 signed by the generator or the generator's agent, will be provided and maintained on-site and updated on a monthly, weekly or per-load basis. These

certificates will be available for the division's inspection upon request.

- All tanks will be labeled in accordance with 19.15.18.16 NMAC.
- In the case of an unauthorized release, CAS will comply with 19.15.29 NMAC (Attachment N) and 19.15.30 NMAC (Attachment O).

Attachment F

Water transfer form for receipt and release of produced water

Water transfer form for receipt and release of produced water

Date: _____

Water received from producer:	Water released to disposal:
Well API#: _____	Well API#: _____

Volume of water transfered (bbl): _____

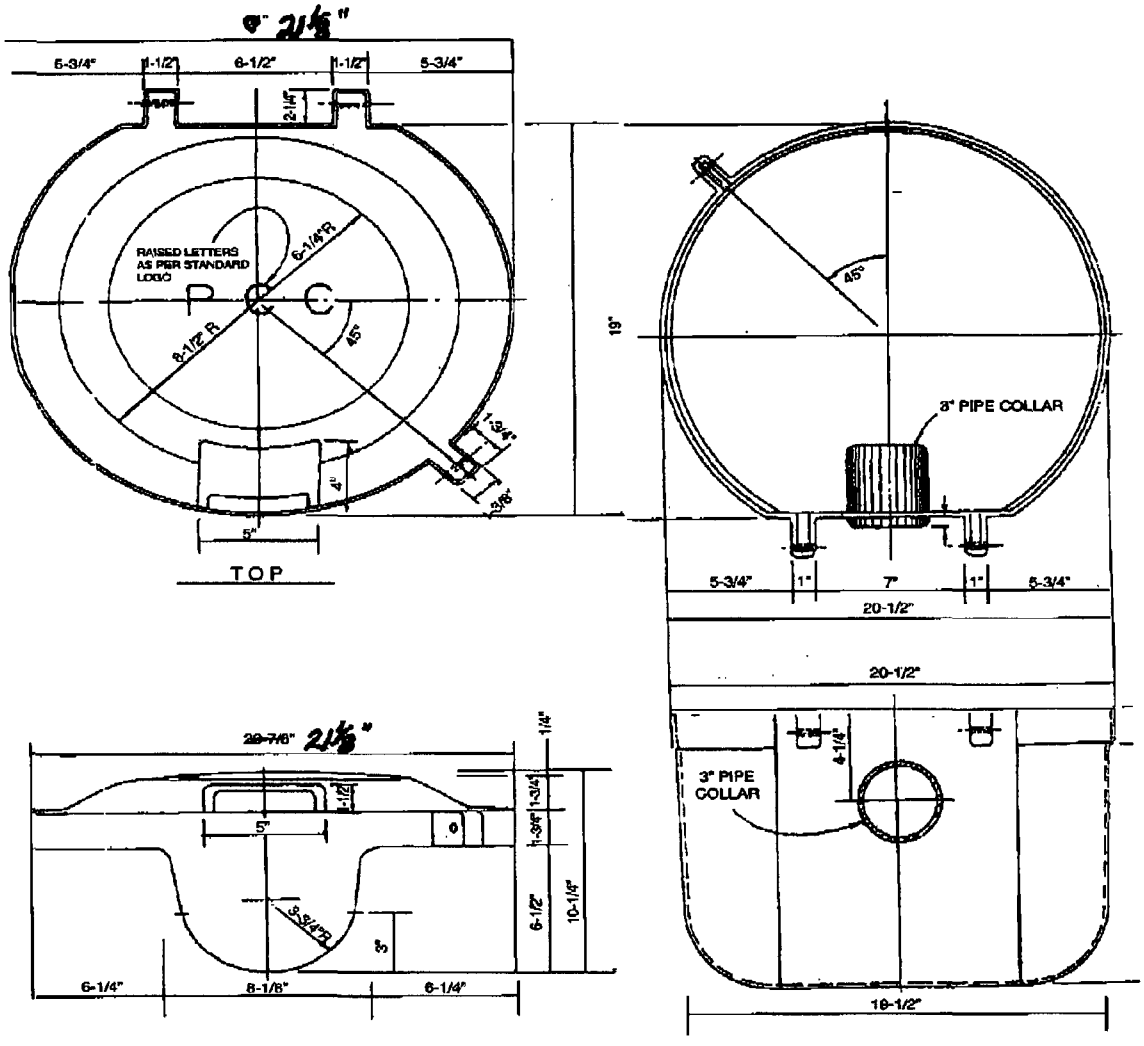
Water hauler: _____
(Copy of form C-133 must be produced on request)

Attachment G

Loading/Unloading drip sump diagram

Loading/Unloading Drip Sump Diagram

PCC 301



REAR

Attachment H

Ozone Emission Potential from the CAS Produced Water Remediation System

Ozone Emission Potential from the CAS Produced Water Remediation System

May 30, 2010

Disclosure

Ozone is recognized as a pollutant both by the EPA and NMED. Therefore it is critical to guard against any emission. The air quality focus is on 185 nm wavelength ozone, and it is is the subject of this regulation as its presence typically indicates a condition of smog or VOC's which when deteriorated, produce low level (185 nm) ozone as a byproduct.

In the CAS process, all ozone gas generated is 254 nm and is completely injected directly into the fluid being treated. The contaminants in the produced water totally consume the ozone in the oxidation process. The ozone generation system is controlled by an ORP process control system. (Oxidation Reduction Potential - the industry standard system of control for waste water remediation systems using ozone, since patented in 1993)

The generators are variable output by necessity to avoid any ozone residual being present at the input of the final stage of treatment polishing- Reverse Osmosis.

The byproduct of ozone is O2, oxygen. Stray Ozone gas emissions from the CAS system are not a part or consequence of its operation.

USPatent # 5,236,673 Aug 16, 1993

Attachment I

Process and Facility Inspection Log Sheet

Daily Log Sheet

Date ___/___/___	Reading	Reading
Site Conditions		
Check Site for Water leaks		
Skimmer #1 Flow Rate est.		
Skimmer #2 Flow Rate est.		
Skimmer #3 Flow Rate est.		
Foam level and Presence		
Skimmer #4 Flow Rate est.		
Foam level and Presence		
Skimmer #5 Flow Rate est.		
Foam level and Presence		
Skimmer #6 Flow Rate est.		
Foam level and Presence		
Wind Direction		
Air Temperature		
Weather		
H2S ppm		
Ozone Gen. On		
Ozone Supply Pressure		
Ozone flow #2		
Ozone flow #3		
Ozone flow #4		
Ozone flow #5		
Ozone flow #6		
Ozone Power lights Off?		
Mixer system		
Mixer Amps Tank #1		
Mixer Amps Tank #2		
Mixer Amps Tank #3		
Mixer Amps Tank #4		
Mixer Amps Tank #5		
Mixer Amps Tank #6		
Mixer flush		
Air Compressor		
Drain A/C pressure sensor		
Drain A/C Moisture traps		
Chiller		
Discharge Temperature		
O2 Concentrator		
Power On		
Supply Pressure		
O2 Discharge Pressure		
Drain O2 Moisture trap		
Drain O2 concentrator traps		

Comments

R/O Process		
Inlet PSI		
ORP		
R/O #1 Reject Flow		
R/O #1 Discharge Flow		
R/O #1 ORP		
R/O Exit Temp		
Pre-Filter Delta P		
Discharge Pump Press.		
TOC Instrument		
TOC		
Furnace Temp		
Air Pressure		
Inlet Air Flow		
Outlet Air Flow		
Acid Level		
Distilled Level		
Sample Frequency		
Highest TOC prev. 24 hours		
Lowest TOC preV. 24 hours		
Clean Sample Flask		
Sample Filtration		
On Line/ Off Line		
Supply Water Source		
Filter Color		
Date filters were changed		
R/O on line /off line		
Fittings tight?		
Solids Removal Sys		
Filter Inlet Pressure		
Filter Discharge Pressure		
Settling Tank Level		
Cyclone Tank Level		
Filter pump hz.		
Backwash Sample Taken		
Fittings tight?		
Cyclone Discharge Pressure		
Test Float Switches		
Dumpster Solids level		
Dump Red Dewater System		
BSW System		
Process Vessel #1		
Process Vessel #2		
Process Vessel#3		
Process Vessel #4		
Process Vessel #5		
Process Vessel #6		

Attachment J

State of New Mexico Energy Minerals and Natural Resources form C-138,

"REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE"

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-138
Revised June 10, 2003

Submit Original
Plus 1 Copy
to Appropriate
District Office

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. RCRA Exempt: ☐ Non-Exempt: ☐ ☐Verbal Approval Received: Yes ☐ No ☐	4. Generator
	5. Originating Site
2. Management Facility Destination	6. Transporter
3. Address of Facility Operator	8. State
7. Location of Material (Street Address or ULSTR)	

9. Circle One:

A. All requests for approval to accept oilfield exempt wastes will be accompanied by a certification of waste from the Generator; one certificate per job.

B. All requests for approval to accept non-exempt wastes must be accompanied by necessary chemical analysis to PROVE the material is not-hazardous and the Generator's certification of origin. No waste classified hazardous by listing or testing will be approved

All transporters must certify the wastes delivered are only those consigned for transport.

BRIEF DESCRIPTION OF MATERIAL:

Estimated Volume _____cy Known Volume (to be entered by the operator at the end of the haul) _____cy

SIGNATURE _____ TITLE: _____ DATE: _____
Waste Management Facility Authorized Agent

TYPE OR PRINT NAME: _____ TELEPHONE NO. _____

E-MAIL ADDRESS _____

(This space for State Use)

APPROVED BY: _____ TITLE: _____ DATE: _____

APPROVED BY: _____ TITLE: _____ DATE: _____

Attachment K

CAS Hydrogen Sulfide Exposure Control Standard

CAS - CONTROLLED AQUA SYSTEMS

Standard Category – Health and Exposure Control for Personnel

Revision Date: May 1, 2010

Review Date April 2011

APPROVAL

This HES Standard identifies methods and requirements for controlling employee exposures to hydrogen sulfide gas under routine and emergency conditions.

Approved: T.G. Coakley, President
Date: May 1, 2010

POLICY

Personnel exposures to hydrogen sulfide gas will be minimized through the use of industrial hygiene assessments, engineering and workplace controls, safe work procedures, and personal protective equipment.

CONTENTS

1. SCOPE

This program applies to all personnel (employee, consultant, agency, contract, and subcontract - casual, full and part-time) working anywhere within the North America Production Operations.

Exemption: Facilities where it has been confirmed that H_2S is either not present (via surveys, gas samples, etc), or where periodic atmospheric testing has confirmed that the maximum ambient concentrations can not reach or exceed 10 ppm, including inside confined spaces such as tank head spaces, pressure vessels, etc. , are not covered by this standard.

2. PURPOSE

To ensure that hydrogen sulfide hazards are identified and eliminated or controlled to the extent feasible. To ensure that personnel who work in environments where hydrogen sulfide may be present are adequately trained and protected through the use of safe work practices and PPE when the hazard cannot be eliminated. To assure that personnel exposures to hydrogen sulfide are monitored, as appropriate.

3. REFERENCES

3.1 American Petroleum Institute, RP49 Recommended Practices for Safe Drilling of Wells Containing Hydrogen Sulfide

3.2 American Petroleum Institute, RP55 Recommended Practices for Conducting Oil and Gas Production Operations Involving Hydrogen Sulfide

3.3 American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices

3.4 ANSI Z88.2 – 1992 – American National Standard For Respiratory Protection

3.5 ANSI Z390.1 - 1995 – American National Standard Accepted Practiced for Hydrogen Sulfide Safety Training Programs

4. DEFINITIONS

4.1 Airline Respirator - An atmosphere-supplying respirator for which the atmosphere is supplied to the respirator through a hose from a source not carried by the wearer. An emergency egress bottle with a minimum 5 minute emergency air supply must be integral with the respirator. Airlines for respirators shall not exceed 100 feet in length unless approved by NIOSH in accordance with the manufacturer's certification for the respirator.

4.2 Atmosphere-supplying Respirator – A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere.

4.3 Casual Visitor - Any visitor (CAS employee or outside personnel) who is unfamiliar with the area or facility and is there for purposes other than performing work (e.g. tour groups, executive management, etc.). Facility supervisors should

approve field visits by casual visitors. Casual visitors should receive a general site specific safety briefing. Personnel such as salespersons, delivery persons and similar persons are typically not covered as casual visitors.

4.4 Covered Employee - An employee who is covered under criteria defined in an HES Standard that requires the employee to have medical surveillance. Typical criteria may include exposures that exceed the occupational exposure limit, the Action Level, or some other criteria.

4.5 Emergency – An unintentional incident that results in the disruption of normal activities and may include an actual or potential uncontrolled release of an airborne contaminant, fire, explosion, injuries and/or property damage.

4.6 Emergency-use Respirator – A respirator placed in or near the work area for use in an emergency.

4.7 Employee Exposure – The level of exposure to an airborne contaminant that would occur if the employee were not using respiratory protection.

4.8 Engineering Controls – Control measures utilized to prevent or reduce atmospheric contamination at the source by confinement, enclosure, local ventilation, dilution ventilation and substitution of less toxic materials (or other acceptable methods).

4.9 Escape-only Respirator – A respirator that is acceptable for use only for emergency escape from a developing hazardous atmosphere.

4.10 Exclusive-use Respirator – A respirator assigned to and used by only one employee.

4.11 Fit Test – The use of an approved protocol to evaluate the effectiveness of the seal of a respirator to the face of an individual.

4.12 H_2S Area - An area, well, or other facility capable of having ambient H_2S concentrations reaching or exceeding 10 ppm.

4.13 High H_2S Situation- A situation where the ambient concentration of hydrogen sulfide is known or anticipated to reach or exceed 100 ppm during the performance of work or during an emergency response operation.

4.14 Immediately Dangerous to Life and Health (IDLH) – An atmosphere that poses an immediate threat to life would cause irreversible adverse health effects or would impair an individual's ability to escape from a dangerous atmosphere (e.g. a concentration of oxygen of less than 19.5%). See H_2S IDLH.

4.15 LHCP – Licensed health care professional.

4.16 Local Program Administrator - A designated individual who is qualified to recognize, evaluate and control hazards in the workplace.

4.17 Occupational Exposure Limit – A Company identified exposure limit for a substance derived from the OSHA Permissible Exposure Limit, the ACGIH Threshold Limit Values, or other sources of exposure criteria developed for the purpose of protecting the health and safety of workers.

4.18 Personal Alarm Monitor (PAM) – A portable monitoring device worn at or near the breathing zone to measure concentrations of a hazardous substance. The PAM shall have a visual and an audible alarm that warns the wearer when a concentration

of the hazardous substance reaches the Occupational Exposure Limit (OEL) or action level (e.g. H_2S, Carbon Monoxide, etc). PAMs used in high noise areas shall have a visual, audible and a vibrating alarm. See Section 8.9.4.
4.19 Positive-Pressure Respirator – A respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.
4.20 Qualitative Fit Test (QLFT) – A pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
4.21 Quantitative Fit Test (QNFT) – An assessment of the adequacy of the respirator fit by numerically measuring the amount of leakage into the respirator.
4.22 Rescue Personnel – Personnel that are designated and trained in the rescue of personnel who are unable to exit unaided from a hazardous environment.
4.23 Respirator Use Area – A designated work area where respiratory protection is required to protect employees from a hazardous atmosphere.
4.24 Self-Contained Breathing Apparatus (SCBA) – An atmosphere-supplying respirator for which the source of breathing air is designed to be carried by the wearer.
4.25 Standby Personnel – A person(s) outside of the respirator use area that has been trained and is responsible for monitoring the activity of personnel inside the respirator use area and the status of the air supply for airline respirators.
4.26 Supplied-air Respirator (SAR) – A self-contained breathing apparatus (SCBA) or airline respirator.
4.27 User Seal Check – An action conducted by the respirator user to determine if the respirator is properly seated to the face and to verify proper valve operation.

5. RESPONSIBILITIES
5.1 Employees shall be responsible for:
5.1.1
Being knowledgeable of the provisions of this program and participating in training when requested;
5.1.2
Observing safe work practices including the use of respirators when necessary;
5.1.3
Completing medical evaluation(s) processes required by this standard;
5.1.4
Completing training required by this standard;
5.1.5
Inspecting, cleaning, disinfecting and storing respirators in accordance with this standard and the Respiratory Protection Standard;
5.1.6
Serving as a standby person when required by safe work practices;
5.1.7
Informing their supervisor if respirator fit or use problems are encountered;

5.1.8
Removing defective respirators or equipment from service immediately upon discovery of any defect; and
5.1.9
Informing their supervisor of any hazards that they feel are not adequately addressed in this standard.
5.2 Local Program Administrators are responsible for:
5.2.1
Identifying work areas, processes and tasks that require the use of engineering controls and designating tasks and facilities where workers must observe specialized work practices for hydrogen sulfide;
5.2.2
Selecting appropriate respiratory equipment for use by personnel;
5.2.3
Ensuring that respirators are used properly;
5.2.4
Arranging for and/or conducting training for working in hydrogen sulfide environments; and
5.2.5
Maintaining required records.
5.3 CAS Supervisors shall be responsible for:
5.3.1
Ensuring that employees receive appropriate training, fit testing, and medical evaluations in accordance with this HES Standard, when required;
5.3.2
Ensuring that personnel properly utilize and calibrate personal and portable toxic gas detectors (personal alarm monitors);
5.3.3
Ensuring the availability and proper use of appropriate respiratory equipment;
5.3.4
Being aware of tasks requiring respiratory protection, ensuring that respirators are worn properly and that standby personnel/rescue personnel are provided/utilized as needed; and
5.3.5
Ensuring that engineering controls are maintained in working condition (where applicable).
5.4 HES Managers shall be responsible for:
5.4.1
Serving as, or designating a qualified person as, the Local Program Administrator and making the resources available that are necessary to fulfill the outlined responsibilities; and
5.4.2
Assisting with program implementation.
5.5 Management shall be responsible for:
5.5.1

Providing resources for this HES standard, as necessary;
5.5.2
Ensuring that engineering designs include provisions for appropriate materials selection and engineering controls for facilities; and
5.5.3
Ensuring effective implementation of this HES Standard.
5.6 Contractor Employees shall be responsible for:
5.6.1
Being knowledgeable of the hazards of hydrogen sulfide and participating in training when requested;
5.6.2
Observing safe work practices including the use of respirators when necessary;
5.6.3
Properly inspecting, cleaning, disinfecting and storing respirators;
5.6.4
Serving as a standby person when required by safe work practices;
5.6.5
Informing their supervisor if the respirator fit or use problems are encountered;
5.6.6
Removing defective respirators or equipment from service immediately upon discovery of any defect; and

5.6.7
Informing their supervisor of any hazards that they feel are not adequately addressed in this standard.

5.7 Contractor Management shall be responsible for:
5.7.1 Ensuring that their personnel are sufficiently trained to perform their job tasks safely following established safe work procedures; and Ensuring that their personnel who may be required to wear a respirator are required to pass an acceptable quantitative fit test in the type and size of respiratory equipment to be worn and trained in accordance with company procedures.

6. TRAINING
6.1 Prior to working in an environment that might expose personnel to hazardous concentrations of hydrogen sulfide, training shall be provided for each affected person and a card (or other certification), signed by the instructor, shall be furnished certifying that he/she has completed the training program. Training is not required when specifically exempted by other sections of this program.

NOTE: Training for CAS employees will be as directed by the Engineer in Charge.

6.2 Training shall be conducted annually in accordance with the requirements of the CAS Regulatory Information and Training Guideline and may be conducted by an instructor certified to train personnel in H2S hazards and management.

6.3 In accordance with the HAZCOM Standard, a material safety data sheet for hydrogen sulfide shall be available electronically or in paper form at field offices in areas where hydrogen sulfide may be encountered. Fit-testing and respiratory protection training shall be conducted in accordance with the Respiratory Protection Standard.

7.REQUIRED DOCUMENTATION

Record
Custodian
Retention

- Employee Records
- Employee Training Records
- Facility Atmospheric Monitoring Data
- Monitor Calibration Records (Fixed and Portable) Facility name

8. PROCEDURES

8.1 Hydrogen Sulfide Occupational Exposure Limit (OEL) – In all work areas where employee exposure to H_2S is reasonably foreseeable, appropriate measures shall be taken to evaluate and control exposures.

8.1.1

The following occupational exposure limits, as sampled in the breathing zone of the employee, shall apply to this program:

• An 8-hour Occupational Exposure Limit - Time-Weighted Average (OEL-TWA) of 10 ppm (12 hour OEL-TWA of 10 ppm).

• A 15-minute short-term Occupational Exposure Limit (OEL-STEL) and acceptable ceiling concentration of 15 ppm. This maximum concentration can occur only 4 times per day and there must be at least one hour between each STEL exposure.

• Immediately Dangerous to Life or Health (IDLH) concentration of 100 ppm.

8.2 Initial Facility Surveys

8.2.1

All facilities shall be surveyed initially to determine if H_2S is present, to identify what exposures may exist, and to quantify the exposure potential. Surveys can include area measurements with direct reading instruments, source measurements or other objective data providing similar information (e.g., laboratory analysis of the production streams) and a review of incident and injury records to determine problem sources of H_2S.

8.2.2
Measurements to evaluate the potential for the development of an IDLH atmosphere shall be conducted as a part of the initial survey.
8.3 Periodic Facility Surveys
8.3.1
Periodic facility surveys shall be made to determine the ongoing effectiveness of exposure controls and revalidate H_2S levels associated with work areas and H_2S sources. Additional surveys shall be made as soon as practical when there has been a change in the process, work practice, or other reason that may result in increased levels of hydrogen sulfide in the facility.
8.3.2
Facilities that have operations with H_2S levels lower than 10 ppm shall be reevaluated at least once every 3 years to confirm the H_2S concentration of the product stream.
8.4 Personal Exposure Monitoring
8.4.1
Personal monitoring shall be performed to quantify the full-shift and short-term exposure potential for job assignments that may result in exposures to hydrogen sulfide. Representative full shift time-weighted average (TWA) samples, 15-minute STEL samples and peak concentration monitoring shall be conducted.
8.4.2
When initial personal monitoring results indicate employee exposure at or in excess of the OEL, additional monitoring shall be conducted to confirm the exposure. The monitoring shall cover similar job activities as those performed during the monitoring that resulted in the exceedance(s).
8.4.3
Employees whose hydrogen sulfide exposures exceed the OEL shall be monitored annually.
8.4.4
Non-routine exposures shall be monitored whenever practical.
8.4.5
When monitoring results indicate employee exposure is less than the OEL, no further monitoring is required, unless workplace conditions or job assignments change.
8.4.6
Additional monitoring shall be performed whenever there are changes in the method or type of production or process, control equipment, or work practices which may result in new or additional employee exposures to H_2S.
8.4.7
Employees shall be notified in writing as soon as practical after obtaining the monitoring results.
8.4.8
Monitoring data shall be documented and retained in accordance with Section 7 of this Standard.
8.5 Surveillance

8.5.1
All employees who work in H_2S areas and utilize respiratory protection equipment will be covered by the Respiratory Protection Standard and shall be evaluated in accordance with the requirements of that standard.
8.6 Engineering Controls
Engineering control measures shall be used, whenever feasible, to reduce and maintain employee exposures below the OELs. Examples of engineering controls include, but are not limited to:
- Remote gauging systems or sealed sight glasses on vessels and storage tanks;
- Fixed Stationary Alarm Monitors where there are hazardous concentrations of H_2S;
- Vapor recovery units, flares or remote vents;
- Lease automatic custody transfer units (LACT) for transferring product automatically;
- Fencing of facilities to secure against unauthorized access;
- Air blowers for ventilating equipment;
- Chemicals used in processes to suppress H_2S generation or enhance removal; and
- Local exhaust hoods for laboratory or similar installations.

8.7 Work Practices
8.7.1
API Recommended Practices
8.7.1.1
The American Petroleum Institute (API) has developed specific H_2S work practice documents for exploration and production operations. The use of these guidelines is recommended where applicable and when not in conflict with established company guidelines.
8.7.2
Examples of general work practices include, but are not limited to: • Use of wind direction indicators to determine safe areas for refuge; • Signage, labels, and other warnings as appropriate to communicate the presence of hydrogen sulfide; and • Controlling access to hazardous areas and allowing entry only to authorized, trained personnel. However, these general work practices may need to be supplemented with special work practices and respiratory protection.
8.7.3
Where appropriate or when required by regulation, the fencing of facilities and the use of caution signs and labels shall be used to alert employees and the general public to operations where there is a potential exposure to H_2S.
8.7.3.1
Wording for caution signs shall be:
8.7.3.2
Labeling schemes for containers and vessels containing H_2S shall meet the requirements of the Hazard Communication (Hazcom) Plan. Where Hazcom labels are utilized the following target organ wording shall be used:

Danger - Extremely Flammable Gas - Hydrogen Sulfide
Gas Can Cause Eye and Respiratory Irritation and Asphyxiation

8.7.4
Some areas may have specific legal requirements for posting and fencing where hydrogen sulfide is present. Each operating component is responsible for meeting the specific requirements in their operating areas.

8.7.5
Where engineering controls are not feasible, the following special work practices shall be utilized depending on the type of process or job task and the potential for exposure to hydrogen sulfide.

8.7.5.1
For tasks involving entry into IDLH, unknown H_2S atmospheric concentrations, or atmospheres that have the potential to become IDLH entry shall be made with positive-pressure atmosphere-supplying respiratory protection. Methods shall be employed to determine the hydrogen sulfide concentration prior to work being performed.

CAUTION

Hazardous Area
Hydrogen Sulfide
(Poisonous Gas)
Authorized Personnel Only

8.7.5.1.1
Work conducted in an IDLH atmosphere shall be authorized and documented with a safe work permit.
8.7.5.1.2
One or more standby persons with respiratory protection (with a separate air source) shall be present and in visual contact with the respirator wearer working in the hazardous area.
8.7.5.1.3
Appropriate provisions for rescue shall be made prior to commencing work in the hazardous area.
NOTE: Please see Respiratory Protection Standard for training and rescue provisions.
8.7.5.2

For tasks, not covered above, involving exposure to H_2S concentrations exceeding the OEL, such as areas around tanks and certain process vessels (e.g., sampling/gauging sour crude or intermediate product storage tanks, opening hatches on water knockout units, removing covers on sulfur recovery pits, loading sulfur tank trucks), shall require the use of positive-pressure atmosphere-supplying respiratory protection.

8.7.5.2.1

A standby person (with a separate air source) shall be present and in visual or voice contact with the respirator wearer working in the hazardous area.

8.7.5.2.2

When appropriate, provisions for rescue shall be made.

8.7.5.3

For tasks involving **confined space entry** (e.g., vessel entry) where H_2S may be present, work shall be authorized and documented with a safe work permit in accordance with the Confined Space Entry Standard.

8.8 Respiratory Protection

8.8.1

Respiratory protection shall be used if engineering controls are not feasible or are not sufficient to reduce exposures within the established limits.

8.8.2

All employees who, as a part of their regular duties, are required to wear respirators to minimize their exposure to H_2S shall be covered by the Respiratory Protection Standard.

8.8.3

Acceptable types of respirators include:

8.8.3.1

Positive-pressure self-contained breathing apparatus (Scott, MSA or equivalent) are acceptable for all hydrogen sulfide environments.

8.8.3.2

Positive-pressure supplied air (airline) respirators with a full-face piece and equipped with an escape bottle.

8.8.3.3

Emergency escape units (e.g., egress bottle with five minute air supply) shall be used only for emergency egress in areas where high concentrations of hydrogen sulfide may develop or in conjunction with an airline respirator.

8.8.3.4

Closed-circuit, self-contained breathing apparatus (ccscba) are permitted only for emergency escape from developing hazardous atmospheres.

8.8.3.5

Single use, mouth-piece type, escape-only cartridge respirators for use during emergency egress from an area where the concentration of hydrogen sulfide gas is expected to be below 10 ppm during regular work activities, but where an accidental release of hydrogen sulfide

might occur provided the release does not exceed the maximum allowable concentration for the respirator (usually 100 – 150 ppm).

8.8.3.6

No other types of respiratory protection shall be provided or used in atmospheres that contain or have the potential to contain hydrogen sulfide without appropriate approvals from NIOSH/MSHA .

8.9 Hydrogen Sulfide Detection Equipment

8.9.1

Fixed monitoring systems, personal monitors and portable gas detection equipment shall be utilized as required by this standard. The equipment shall be approved for use and shall be calibrated (and documented) and maintained in proper condition in accordance with the manufacturer's established calibration procedures. Portable instruments shall also be examined for proper operation by the user prior to each use.

8.9.2

Detection equipment shall be set to initially alarm at no higher than 10 ppm. If a detector, monitor or instrument is found to be defective, it shall be removed from service and tagged with a note for repair.

8.9.3

Fixed Monitoring Systems

8.9.3.1

Fixed monitoring systems should be considered for enclosed areas that have a potential for hydrogen sulfide gas concentrations to exceed 10 ppm. Fixed monitoring systems are recommended for process or other areas where a release would result in a concentration of hydrogen sulfide above the IDLH level, which may result in a radius of exposure that may include dwellings, public and private occupancies, and places of assembly.

8.9.3.2

Temporary fixed monitoring systems shall be utilized during drilling and workover operations when a hydrogen sulfide hazard is or may be present.

8.9.3.3

Stand-alone temporary detection stations that transmit signals electronically or by hardwire may be utilized when fixed equipment is out of service or when deemed prudent for other temporary activities.

8.9.4

Personal Alarm Monitors

8.9.4.1

Personal alarm monitors (PAMs) or similar H_2S detection devices shall be used to supplement well-established work practices and respiratory protection.

8.9.4.2

PAMs shall be worn by **all** personnel assigned to work in areas where hydrogen sulfide is or may be present **and shall be worn such that the device or at least the sensing media is worn at or near the breathing zone (forward of the ears, within 12 inches of the nose and mouth)**

and outside the outermost layer of clothing.

8.9.4.3

PAMs shall not be used in lieu of other more reliable exposure control measures (e.g. tri-gas monitors) for confined space entry, emergency rescue, or for tasks involving H_2S-containing sources that have the potential for rapid increase of H_2S in excess of the IDLH.

8.9.4.4

The routine use of PAMs requires daily operational checks of the monitor, regular calibration checks of alarm settings (if required), and procedures to follow when alarm(s) sound(s).

8.9.4.5

Personal alarm monitors for use in high noise environments shall include provisions for a vibrating alarm, or shall be mounted on the hard hat or shirt collar to assure detection of alarm activation.

8.9.4.6

When PAMs are used for tasks involving H_2S levels potentially in excess of the exposure limits, the work procedure shall include:

• Instructions to exit the area when the alarm(s) sound(s); and Re-entry only with appropriate respiratory protection and backup personnel or by conducting air monitoring to confirm that exposure levels are acceptable.

8.10 Eye and Skin Protection

8.10.1 Personal protective equipment shall be worn where appropriate to prevent eye and skin contact with liquids containing hydrogen sulfide and eye irritation from exposure to airborne concentrations of H_2S (below the OEL).

8.10.1.1 Gloves - Gloves made of nitrile rubber or neoprene, or other suitable materials approved to be used for protection of the hands against absorption of hydrocarbons.

8.10.1.2 Goggles - Non-vented goggles should be worn if the concentration of hydrogen sulfide is not sufficient to warrant the use of a respirator but eye irritation exists. Goggles should also be used when handling hydrocarbons containing dissolved hydrogen sulfide if there is any possibility of splashing the material into the eyes.

8.10.1.3 Chemical Protective Clothing - Where atmospheres with high concentrations of hydrogen sulfide exist, chemical protective clothing may be necessary to prevent irritation to damp exposed skin. This would normally only be a concern during emergency operations since entry into this type of atmosphere would not be undertaken under normal circumstances.

8.11 First Aid

8.11.1 Where exposure to H_2S in excess of the IDLH is foreseeable, emergency response personnel shall be trained in first aid and cardiopulmonary resuscitation (CPR). When facilities are located remotely from emergency medical services, consideration should be given to the feasibility of maintaining oxygen on hand and providing it to personnel if overcome by hydrogen sulfide.

8.12 Rescue Personnel

8.12.1 Rescue personnel, when required by this standard, shall be provided with appropriate respiratory protection and other equipment as deemed necessary for the task involved. This may include retrieval lines, wrist cuffs, or other retrieval and emergency equipment. Non-entry rescue methods shall be used whenever feasible.

8.13 Emergency Evacuation Plan

8.13.1 Each work location where exposure to hydrogen sulfide is possible shall have an emergency evacuation plan, an emergency response plan, or where required, an emergency contingency plan outlining the procedures to follow in the event of a sudden release of hydrogen sulfide.

8.13.2 CAS and contractor personnel shall be familiar with the provisions contained in the plan and it shall be reviewed with personnel prior to initial assignment to the job and whenever changes are made to the plan(s). The plan should address the identification of emergency evacuation routes and areas of safe refuge, methods or signals to alert personnel of an emergency condition, reporting procedures and any other emergency procedures specific to the location.

8.14 Fire Protection

8.14.1 Adequate measures shall be taken to eliminate the risk of fire and explosion on any site where hydrogen sulfide may be present. If hot work is to be undertaken, a safe work permit shall be issued, in accordance with the hot work requirements and the CAS Safe Work Permit Standard, prior to performing the task.

9. Requirements By Area or Situation

9.1 H_2S Area - An area, well, or other facility capable of having ambient H_2S concentrations reaching or exceeding 10 ppm. For an H_2S area, the following requirements shall apply:

9.1.1

The use of a Personal Alarm Monitor for hydrogen sulfide gas is required for all workers at all times while on location. When working under supplied air, personal alarm monitors for H_2S are not required; however, area monitoring must be conducted to confirm that the IDLH is not exceeded.

9.1.1.1

Casual visitors to H_2S areas are not required to have a PAM and must be escorted by properly equipped personnel.

9.1.1.2

Casual visitors **are not allowed** in areas where there is a situation or work activity that may result in ambient H_2S concentrations of 10 ppm or greater.

9.1.2

Hydrogen sulfide training is required for all employees and contractor personnel working in H_2S areas.

9.1.2.1

Casual visitors are not required to have H_2S training; however, they should be familiar with emergency evacuation procedures.

9.1.3
Respiratory protection for emergency escape shall be readily available where egress is limited or restricted.
9.1.4
If the hydrogen sulfide concentration reaches or exceeds 10 ppm at any time while personnel are on the location, all personnel shall evacuate to a safe area. Personnel shall not re-enter the area without an approved positive-pressure self-contained breathing apparatus or supplied-air (airline) respirator with a full-face piece and emergency egress bottle (minimum 5 minute air supply), unless the concentration is reduced to below 10 ppm.
9.1.4.1 One or more standby personnel are required while working under air.
9.1.5
No beards or similar facial hair (except approved moustaches, see the Respiratory Protection Standard) is permitted in these areas. Casual visitors need not be clean shaven.
9.1.6
One or more wind indicators shall be visible at the location and no ignition sources are allowed except by permit.
9.1.7
Personnel shall be familiar with emergency evacuation or contingency plans, including safe areas of refuge.
9.1.8
Fixed monitoring equipment shall be provided and maintained at continuously manned facilities. Fixed monitoring equipment should be considered for unmanned facilities. See Section 8.9.3.

9.1.9
Signage shall be provided at the entrance(s) to the area, as appropriate, to read as follows:
9.2 High H_2S Situation – A temporary situation where the ambient concentration of hydrogen sulfide is 100 ppm or greater.
9.2.1
If the ambient concentration of hydrogen sulfide is 100 ppm or greater, only specially approved tasks and emergency operations shall be permitted; all of the previously mentioned H_2S area requirements apply and regular work activities will not be permitted unless the concentration is reduced below 100 ppm by ventilation or other engineering controls.
9.2.2
A Safe Work Permit shall be completed and reviewed prior to undertaking work in a high H_2S situation.
9.2.3
All personnel working in a high H_2S situation shall be supervised by a CAS representative who is competent by virtue of training and experience. Any safety deficiencies noted shall be immediately communicated to the CAS representative for immediate correction and/or temporary interruption of the work.
9.2.4

Continuous monitoring for explosive atmospheres (hydrogen sulfide or hydrocarbon) with an approved instrument that alarms at 10% of the lower explosive limit is required.

9.2.5

Approved respiratory protection shall be utilized.

9.2.6

Rescue provisions and equipment are required onsite, including communication systems with the person(s) performing the work.

CAUTION

Hazardous Area

Hydrogen Sulfide
(Poisonous Gas)
Authorized Personnel Only

9.2.6.1

Personnel who will be expected to perform a rescue shall be adequately equipped, trained, and physically able to perform a rescue operation if needed.

9.2.6.2

Rescue personnel may also perform the standby duties.

9.2.6.3

Where applicable, the provisions of the Confined Space Entry Standard and the Emergency Response Plan shall be referenced for additional requirements.

9.2.7

Contractor personnel shall not be utilized in high H_2S situations unless specifically trained for the hazardous work.

9.2.8

Wind indicators shall be clearly visible at all times and no ignition sources are allowed.

9.2.9

Personnel shall be familiar with emergency evacuation/contingency plans, including areas of safe refuge.

A. ATTACHMENTS

A.3.3.2

New Mexico Oil Conservation Division Rule 118

TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 15 OIL AND GAS
PART 11 HYDROGEN SULFIDE GAS

19.15.11.1 ISSUING AGENCY: Energy, Minerals and Natural Resources Department, Oil Conservation Division.
[19.15.11.1 NMAC - N, 12/1/08]

19.15.11.2 SCOPE: 19.15.11 NMAC applies to a person subject to the division's jurisdiction, including a person engaged in drilling, stimulating, injecting into, completing, working over or producing an oil, gas or carbon dioxide well or a person engaged in gathering, transporting, storing, processing or refining of oil, gas or carbon dioxide. 19.15.11 NMAC does not exempt or otherwise excuse surface waste management facilities the division permits pursuant to 19.15.36 NMAC from more stringent conditions on the handling of hydrogen sulfide required of such facilities by 19.15.36 NMAC or more stringent conditions in permits issued pursuant to 19.15.36 NMAC, nor shall the facilities be exempt or otherwise excused from the requirements set forth in 19.15.11 NMAC by virtue of permitting under 19.15.36 NMAC.
[19.15.11.2 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.3 STATUTORY AUTHORITY: 19.15.11 NMAC is adopted pursuant to the Oil and Gas Act, NMSA 1978, Section 70-2-6, Section 70-2-11 and Section 70-2-12.
[19.15.11.3 NMAC - N, 12/1/08]

19.15.11.4 DURATION: Permanent.
[19.15.11.4 NMAC - N, 12/1/08]

19.15.11.5 EFFECTIVE DATE: December 1, 2008, unless a later date is cited at the end of a section.
[19.15.11.5 NMAC - N, 12/1/08]

19.15.11.6 OBJECTIVE: To require oil and gas operations be conducted in a manner that protects the public from exposure to hydrogen sulfide gas.
[19.15.11.6 NMAC - N, 12/1/08]

15.11.7 DEFINITIONS:

A. "ANSI" means the American national standards institute.

B. "Area of exposure" means the area within a circle constructed with a point of escape at its center and the radius of exposure as its radius.

C. "Dispersion technique" is a mathematical representation of the physical and chemical transportation characteristics, dilution characteristics and transformation characteristics of hydrogen sulfide gas in the atmosphere.

D. "Escape rate" means the maximum volume (Q) that is used to designate the possible rate of escape of a gaseous mixture containing hydrogen sulfide, as set forth in 19.15.11 NMAC.

(1) For existing gas facilities or operations, the escape rate is calculated using the maximum daily rate of the gaseous mixture produced or handled or the best estimate thereof. For an existing gas well, the escape rate is calculated using the current daily absolute open flow rate against atmospheric pressure or the best estimate of that rate.

(2) For new gas operations or facilities, the escape rate is calculated as the maximum anticipated flow rate through the system. For a new gas well, the escape rate is calculated using the maximum open-flow rate of offset wells in the pool or reservoir, or the pool or reservoir average of maximum open-flow rates.

(3) For existing oil wells, the escape rate is calculated by multiplying the producing gas/oil ratio by the maximum daily production rate or the best estimate of the maximum daily production rate.

(4) For new oil wells, the escape rate is calculated by multiplying the producing gas/oil ratio by the maximum daily production rate of offset wells in the pool or reservoir, or the pool or reservoir average of the producing gas/oil ratio multiplied by the maximum daily production rate.

(5) For facilities or operations not mentioned, the escape rate is calculated using the actual flow of the gaseous mixture through the system or the best estimate of the actual flow of the gaseous mixture through the system.

E. "GPA" means the gas processors association.

F. "LEPC" means the local emergency planning committee established pursuant to the Emergency Planning and Community Right-To-Know Act, 42 U.S.C. section 11001.

G. "NACE" means the national association of corrosion engineers.

H. "Potentially hazardous volume" means the volume of hydrogen sulfide gas of such concentration that:

(1) the 100-ppm radius of exposure includes a public area;

(2) the 500-ppm radius of exposure includes a public road; or

(3) the 100-ppm radius of exposure exceeds 3000 feet.

I. "Public area" means a building or structure that is not associated with the well, facility or operation for which the radius of exposure is being calculated and that is used as a dwelling, office, place of business, church, school, hospital or government building, or a portion of a park, city, town, village or designated school bus stop or other similar area where members of the public may reasonably be expected to be

present.

J. "Public road" means a federal, state, municipal or county road or highway.

K. "Radius of exposure" means the radius constructed with the point of escape as its starting point and its length calculated using the following Pasquill-Gifford derived equation, or by such other method as the division may approve:

(1) for determining the 100-ppm radius of exposure: $X = [(1.589)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psi absolute and 60 degrees fahrenheit);

(2) for determining the 500-ppm radius of exposure: $X = [(0.4546)(\text{hydrogen sulfide concentration})(Q)]^{(0.6258)}$, where "X" is the radius of exposure in feet, the "hydrogen sulfide concentration" is the decimal equivalent of the mole or volume fraction of hydrogen sulfide in the gaseous mixture and "Q" is the escape rate expressed in cubic feet per day (corrected for standard conditions of 14.73 psi absolute and 60 degrees fahrenheit);

(3) for a well being drilled, completed, recompleted, worked over or serviced in an area where insufficient data exists to calculate a radius of exposure but where hydrogen sulfide could reasonably be expected to be present in concentrations in excess of 100 ppm in the gaseous mixture, a 100-ppm radius of exposure equal to 3000 feet is assumed.

[19.15.11.7 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.8 REGULATORY THRESHOLD:

A. Determination of hydrogen sulfide concentration.

(1) Each person shall determine the hydrogen sulfide concentration in the gaseous mixture within wells, facilities or operations either by testing (using a sample from each well, facility or operation); testing a representative sample; or using process knowledge in lieu of testing. If the person uses a representative sample or process knowledge, the concentration derived from the representative sample or process knowledge shall be reasonably representative of the hydrogen sulfide concentration within the well, facility or operation.

(2) The person shall conduct the tests used to make the determination referred to in Paragraph (1) of Subsection A of 19.15.11.8 NMAC in accordance with applicable ASTM or GPA standards or by another division-approved method.

(3) If the person conducted a test prior to January 31, 2003 that otherwise meets the requirements of Paragraphs (1) and (2) of Subsection A of 19.15.11.8 NMAC, new testing is not required.

(4) If a change or alteration may materially increase the hydrogen sulfide concentration in a well, facility or operation, the person shall make a new determination in accordance with 19.15.11 NMAC.

B. Concentrations determined to be below 100 ppm. If the hydrogen sulfide concentration in a given well, facility or operation is less than 100 ppm, the person is not required to take further actions pursuant to 19.15.11 NMAC.

C. Concentrations determined to be above 100 ppm.

(1) If the person determines the hydrogen sulfide concentration in a given well, facility or operation is 100 ppm or greater, then the person shall calculate the radius of exposure and comply with applicable requirements of 19.15.11 NMAC.

(2) If calculation of the radius of exposure reveals that a potentially hazardous volume is present, the person shall provide results of the hydrogen sulfide concentration determination and the calculation of the radius of exposure to the division. For a well, facility or operation, the person shall accomplish the determination, calculation and submission 19.15.11.8 NMAC requires before operations begin.

D. Recalculation. The person shall calculate the radius of exposure if the hydrogen sulfide concentration in a well, facility or operation increases to 100 ppm or greater. The person shall also recalculate the radius of exposure if the actual volume fraction of hydrogen sulfide increases by a factor of 25 percent in a well, facility or operation that previously had a hydrogen sulfide concentration of 100 ppm or greater. If calculation or recalculation of the radius of exposure reveals that a potentially hazardous volume is present, the person shall provide the results to the division within 60 days.

[19.15.11.8 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.9 HYDROGEN SULFIDE CONTINGENCY PLAN:

A. When required. If a well, facility or operation involves a potentially hazardous volume of hydrogen sulfide, the person shall develop a hydrogen sulfide contingency plan that the person will use to alert and protect the public in accordance with the Subsections B through I of 19.15.11.9 NMAC.

B. Plan contents.

(1) API guidelines. The person shall develop the hydrogen sulfide contingency plan with due consideration of paragraph 7.6 of the guidelines in the API publication Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide, RP-55, most recent edition, or with due consideration to another division-approved standard.

(2) Required contents. The hydrogen sulfide contingency plan shall contain information on the following subjects, as appropriate to the well, facility or operation to which it applies.

(a) Emergency procedures. The hydrogen sulfide contingency plan shall contain information on emergency procedures the person will follow in the event of a release and shall include, at a minimum, information concerning the responsibilities and duties of personnel during the emergency, an immediate action plan as described in the API document referenced in Paragraph (1) of Subsection B of 19.15.11.9 NMAC, and telephone numbers of emergency responders, public agencies, local government and other appropriate public authorities. The plan shall also include the locations of potentially affected public areas and public roads and shall describe proposed evacuation routes, locations of road blocks and procedures for notifying the public, either through direct telephone notification using telephone number lists or by means of mass

notification and reaction plans. The plan shall include information on the availability and location of necessary safety equipment and supplies.

(b) Characteristics of hydrogen sulfide and sulfur dioxide. The hydrogen sulfide contingency plan shall include a discussion of the characteristics of hydrogen sulfide and sulfur dioxide.

(c) Maps and drawings. The hydrogen sulfide contingency plan shall include maps and drawings that depict the area of exposure and public areas and public roads within the area of exposure.

(d) Training and drills. The hydrogen sulfide contingency plan shall provide for training and drills, including training in the responsibilities and duties of essential personnel and periodic on-site or classroom drills or exercises that simulate a release, and shall describe how the person will document the training, drills and attendance. The hydrogen sulfide contingency plan shall also provide for training of residents as appropriate on the proper protective measures to be taken in the event of a release, and shall provide for briefing of public officials on issues such as evacuation or shelter-in-place plans.

(e) Coordination with state emergency plans. The hydrogen sulfide contingency plan shall describe how the person will coordinate emergency response actions under the plan with the division and the New Mexico state police consistent with the New Mexico hazardous materials emergency response plan.

(f) Activation levels. The hydrogen sulfide contingency plan shall include the activation level and a description of events that could lead to a release of hydrogen sulfide sufficient to create a concentration in excess of the activation level.

C. Plan activation. The person shall activate the hydrogen sulfide contingency plan when a release creates a hydrogen sulfide concentration greater than the activation level set forth in the hydrogen sulfide contingency plan. At a minimum, the person shall activate the plan whenever a release may create a hydrogen sulfide concentration of more than 100 ppm in a public area, 500 ppm at a public road or 100 ppm 3000 feet from the site of release.

D. Submission.

(1) Where submitted. The person shall submit the hydrogen sulfide contingency plan to the division.

(2) When submitted. The person shall submit a hydrogen sulfide contingency plan for a new well, facility or operation before operations commence. The hydrogen sulfide contingency plan for a drilling, completion, workover or well servicing operation shall be on file with the division before operations commence and may be submitted separately or along with the APD or may be on file from a previous submission. A person shall submit a hydrogen sulfide contingency plan within 180 days after the person becomes aware or should have become aware that a public area or public road is established that creates a potentially hazardous volume where none previously existed.

(3) Electronic submission. A filer who operates more than 100 wells or who operates an oil pump station, compressor station, refinery or gas plant shall submit each hydrogen sulfide contingency plan in electronic format. The file may submit the hydrogen sulfide contingency plan through electronic mail, through an Internet filing or by delivering electronic media to the division, so long as the electronic submission is compatible with the division's systems.

E. Failure to submit plan. A person's failure to submit a hydrogen sulfide contingency plan when required may result in denial of an application for permit to drill, cancellation of an allowable for the subject well or other enforcement action appropriate to the well, facility or operation.

F. Review, amendment. The person shall review the hydrogen sulfide contingency plan any time a subject addressed in the plan materially changes and make appropriate amendments. If the division determines that a hydrogen sulfide contingency plan is inadequate to protect public safety, the division may require the person to add provisions to the plan or amend the plan as necessary to protect public safety.

G. Retention and inspection. The hydrogen sulfide contingency plan shall be reasonably accessible in the event of a release, maintained on file at all times and available for division inspection.

H. Annual inventory of contingency plans. On an annual basis, each person required to prepare one or more hydrogen sulfide contingency plans pursuant to 19.15.11 NMAC shall file with the appropriate local emergency planning committee and the state emergency response commission an inventory of the wells, facilities and operations for which plans are on file with the division and the name, address and telephone number of a point of contact.

I. Plans required by other jurisdictions. The person may submit a hydrogen sulfide contingency plan the BLM or other jurisdiction require that meets the requirements of 19.15.11.9 NMAC to the division in satisfaction of 19.15.11.9 NMAC.

[19.15.11.9 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.10 SIGNS, MARKERS: For each well, facility or operation involving a hydrogen sulfide concentration of 100 ppm or greater, the person shall install and maintain signs or markers that conform with the current ANSI standard Z535.1-2002 (Safety Color Code), or some other division-approved standard. The sign or marker shall be readily readable, and shall contain the words "poison gas" and other information sufficient to warn the public that a potential danger exists. The person shall prominently post signs or markers at locations, including entrance points and road crossings, sufficient to alert the public that a potential danger exists.

[19.15.11.10 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.11 PROTECTION FROM HYDROGEN SULFIDE DURING DRILLING, COMPLETION, WORKOVER AND WELL SERVICING OPERATIONS:

A. API standards. The person shall conduct drilling, completion, workover and well servicing operations involving a hydrogen sulfide concentration of 100 ppm or greater with due consideration to the guidelines in the API publications Recommended Practice for Oil and Well Servicing and Workover Operations Involving Hydrogen Sulfide, RP-68, and Recommended Practices for Drilling and Well Servicing Operations Involving Hydrogen Sulfide, RP-49, most recent editions, or some other division-approved standard.

B. Detection and monitoring equipment. Drilling, completion, workover and well servicing operations involving a hydrogen sulfide

concentration of 100 ppm or greater shall include hydrogen sulfide detection and monitoring equipment as follows.

(1) Each drilling and completion site shall have an accurate and precise hydrogen sulfide detection and monitoring system that automatically activates visible and audible alarms when the hydrogen sulfide's ambient air concentration reaches a predetermined value the operator sets, not to exceed 20 ppm. The operator shall locate a sensing point at the shale shaker, rig floor and bell nipple for a drilling site and the doghouse, rig floor and circulating tanks or shale shaker for a completion site.

(2) For workover and well servicing operations, the person shall locate one operational sensing point as close to the well bore as practical. Additional sensing points may be necessary for large or long-term operations.

(3) The operator shall provide and maintain as operational hydrogen sulfide detection and monitoring equipment during drilling when drilling is within 500 feet of a zone anticipated to contain hydrogen sulfide and continuously thereafter through all subsequent drilling.

C. Wind indicators. Drilling, completion, workover and well servicing operations involving a hydrogen sulfide concentration of 100 ppm or greater shall include wind indicators. The person shall have equipment to indicate wind direction present and visible at all times. The person shall install at least two devices to indicate wind direction at separate elevations that visible from all principal working areas at all times. When a sustained hydrogen sulfide concentration is detected in excess of 20 ppm at a detection point, the person shall display red flags.

D. Flare system. For drilling and completion operations in an area where it is reasonably expected that a potentially hazardous hydrogen sulfide volume will be encountered, the person shall install a flare system to safely gather and burn hydrogen-sulfide-bearing gas. The person shall locate flare outlets at least 150 feet from the well bore. Flare lines shall be as straight as practical. The person shall equip the flare system with a suitable and safe means of ignition. Where noncombustible gas is to be flared, the system shall provide supplemental fuel to maintain ignition.

E. Well control equipment. When the 100 ppm radius of exposure includes a public area, the following well control equipment is required.

(1) Drilling. The person shall install a remote-controlled well control system that is operational at all times beginning when drilling is within 500 vertical feet of the formation believed to contain hydrogen sulfide and continuously thereafter during drilling. The well control system shall include, at a minimum, a pressure and hydrogen-sulfide-rated well control choke and kill system including manifold and blowout preventer that meets or exceeds the specifications in API publications Choke and Kill Systems, 16C and Blowout Prevention Equipment Systems for Drilling Wells, RP 53 or other division-approved specifications. The person shall use mud-gas separators. The person shall test and maintain these systems pursuant to the specifications referenced, according to the requirements of 19.15.11 NMAC, or as the division otherwise approves.

(2) Completion, workover and well servicing. The person shall install a remote controlled pressure and hydrogen-sulfide-rated well control system that meets or exceeds API specifications or other division-approved specifications that is operational at all times during a well's completion, workover and servicing.

F. Mud program. Drilling, completion, workover and well servicing operations involving a hydrogen sulfide concentration of 100 or greater shall use a hydrogen sulfide mud program capable of handling hydrogen sulfide conditions and well control, including de-gassing.

G. Well testing. Except with prior division approval, a person shall conduct drill-stem testing of a zone that contains hydrogen sulfide in a concentration of 100 ppm or greater only during daylight hours and not permit formation fluids to flow to the surface.

H. If hydrogen sulfide encountered during operations. If hydrogen sulfide was not anticipated at the time the division issued a permit to drill but is encountered during drilling in a concentration of 100 ppm or greater, the operator shall satisfy the requirements of 19.15.11 NMAC before continuing drilling operations. The operator shall notify the division of the event and the mitigating steps that the operator has or is taking as soon as possible, but no later than 24 hours following discovery. The division may grant verbal approval to continue drilling operations pending preparation of a required hydrogen sulfide contingency plan.

[19.15.11.11 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.12 PROTECTION FROM HYDROGEN SULFIDE AT OIL PUMP STATIONS, PRODUCING WELLS, TANK BATTERIES AND ASSOCIATED PRODUCTION FACILITIES, PIPELINES, REFINERIES, GAS PLANTS AND COMPRESSOR STATIONS:

A. API standards. A person shall conduct operations at oil pump stations and producing wells, tank batteries and associated production facilities, refineries, gas plants and compressor stations involving a hydrogen sulfide concentration of 100 ppm or greater with due consideration to the guidelines in the API publication Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide, RP-55, latest edition or some other division-approved standard.

B. Security. A person shall protect well sites and other unattended, fixed surface facilities involving a hydrogen sulfide concentration of 100 ppm or greater from public access by fencing with locking gates when the location is within 1/4 mile of a public area. For the purposes of Subsection B of 19.15.11.12 NMAC, a surface pipeline is not considered a fixed surface facility.

C. Wind direction indicators. Oil pump stations, producing wells, tank batteries and associated production facilities, pipelines, refineries, gas plants and compressor stations involving a hydrogen sulfide concentration of 100 ppm or greater shall have equipment to indicate wind direction. The person shall install wind direction equipment that is visible from all principal working areas at all times.

D. Control equipment. When the 100 ppm radius of exposure includes a public area, the following additional measures are required.

(1) The person shall install and maintain in good operating condition safety devices, such as automatic shut-down devices, to prevent hydrogen sulfide's escape. Alternatively, the person shall establish safety procedures to achieve the same purpose.

(2) A well shall possess a secondary means of immediate well control through the use of an appropriate christmas tree or downhole completion equipment. The equipment shall allow downhole accessibility (reentry) under pressure for permanent well control.

E. Tanks or vessels. The person shall chain each stair or ladder leading to the top of a tank or vessel containing 300 ppm or more

of hydrogen sulfide in the gaseous mixture or mark it to restrict entry.
[19.15.11.12 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.13 PERSONNEL PROTECTION AND TRAINING: The person shall provide persons responsible for implementing a hydrogen sulfide contingency plan training in hydrogen sulfide hazards, detection, personal protection and contingency procedures.
[19.15.11.13 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.14 STANDARDS FOR EQUIPMENT THAT MAY BE EXPOSED TO HYDROGEN SULFIDE: Whenever a well, facility or operation involves a potentially hazardous hydrogen sulfide volume, the person shall select equipment with consideration for both the hydrogen sulfide working environment and anticipated stresses and shall use NACE Standard MR0175 (latest edition) or some other division-approved standard for selection of metallic equipment or, if applicable, use adequate protection by chemical inhibition or other methods that control or limit hydrogen sulfide's corrosive effects.
[19.15.11.14 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.15 EXEMPTIONS: A person may petition the director or the director's designee for an exemption to a requirement of 19.15.11 NMAC. A petition shall provide specific information as to the circumstances that warrant approval of the exemption requested and how the person will protect public safety. The director or the director's designee, after considering all relevant factors, may approve an exemption if the circumstances warrant and so long as the person protects public safety.
[19.15.11.15 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

19.15.11.16 NOTIFICATION OF THE DIVISION: The person shall notify the division upon a release of hydrogen sulfide requiring activation of the hydrogen sulfide contingency plan as soon as possible, but no more than four hours after plan activation, recognizing that a prompt response should supersede notification. The person shall submit a full report of the incident to the division on form C-141 no later than 15 days following the release.
[19.15.11.16 NMAC - Rp, 19.15.3.118 NMAC, 12/1/08]

HISTORY of 19.15.11 NMAC:

History of Repealed Material: 19.15.3 NMAC, Drilling (filed 10/29/2001) repealed 12/1/08.

NMAC History:
That applicable portion of 19.15.3 NMAC, Drilling (Section 118) (filed 10/29/2001) was replaced by 19.15.11 NMAC, Hydrogen Sulfide Gas, effective 12/1/08.

Attachment L

Commitment from Devon to provide produced water

CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

June 3, 2010

Subject: Letter of commitment from Devon Energy Corporation to supply produced water

Don Mayberry, manager of the Artesia Office of Devon Energy Corporation has instructed Greg McGowen, Production Engineer, to write and submit a letter stating that Devon Energy Corporation will provide produced water for this project from the Shakespeare 20 Federal, Well #3.

CAS does expect to be in possession of this letter on or before June 10, 2010.

Don Mayberry can confirm this verbal commitment, and can be reached by phone at 575-748-0164.

Attachment M

Liner specification sheet

SMOOTH LLDPE GEOMEMBRANE (ENGLISH UNITS)

Property	Test Method	Minimum Average Values 30 mil	40 mil	60 mil	80 mil
Thickness, mils	ASTM D 5199				
minimum average		30	40	60	80
lowest individual reading		27	36	54	72
Sheet Density, g/cc (max.)	ASTM D 1505/D 792	0.939	0.939	0.939	0.939
Tensile Properties[1]	ASTM D 6693				
1. Break Strength, lb/in		114	152	228	304
2. Break Elongation, %		800	800	800	800
2% Modulus, lb/in^2 (max.)	ASTM D 5323	60,000	60,000	60,000	60,000
Tear Resistance, lb	ASTM D 1004	16	22	33	44
Puncture Resistance, lb	ASTM D 4833	42	56	84	112
Axi-Symetric Break Strain, %	ASTM D 5617	30	30	30	30
Carbon Black Content[2], %	ASTM D 1603	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596		--Note 3--		
Oxidative Induction Time (OIT)					
Standard OIT, minutes	ASTM D 3895	100	100	100	100
Oven Aging at 85°C	ASTM D 5721				
High Pressure OIT - % retained after 90 days	ASTM D 5885	60	60	60	60
UV Resistance[4]	GRI GM11				
High Pressure OIT[5] - % retained after 1600 hrs	ASTM D 5885	35	35	35	35
Seam Properties	ASTM D 6392 (@ 2 in/min)				
1. Shear Strength, lb/in		45	60	90	120
2. Peel Strength, lb/in - Hot Wedge		38	50	75	100
- Extrusion Fillet		34	44	66	88
Roll Dimensions					
1. Width (feet):		23	23	23	23
2. Length (feet):		1,000	750	500	375
3. Area (square feet):		23,000	17,250	11,500	8,625
4. Gross weight (pounds, approx.):		3,435	3,435	3,435	3,435

1 Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 2.0 inches.
2 Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.
3 Carbon black dispersion for 10 different views: Nine in Categories 1 and 2 with one allowed in Category 3.
4 The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
5 UV resistance is based on percent retained value regardless of the original HP-OIT value.

1. GENERAL REQUIREMENTS

1.1 Scope

The following describes parameters for the manufacture, supply, and installation of Poly-Flex polyethylene geomembranes. All procedures, operations, and methods shall be in strict accordance with the engineer's specifications, plans, and drawings.

1.2 Qualifications of Contractor Work Activities

1.2.1 Manufacturing

The manufacturer shall have at least five (5) years continuous experience in manufacturing polyethylene geomembrane and/or experience totaling 10,000,000 square feet of manufactured polyethylene geomembrane.

1.2.2 Installation

The installation contractor shall be the manufacturer or a dealer trained to install the manufacturer's geomembrane.

Installation shall be performed under the constant direction of a field installation supervisor who shall remain on site and be responsible, throughout the liner installation, for liner layout, seaming, testing, repairs, and all other activities by the Installer. The field installation supervisor shall have installed or supervised the installation of a minimum of 2,000,000 square feet of polyethylene geomembrane. Seaming shall be performed under the direction of a master seamer (who may also be the field installation supervisor) who has seamed a minimum of 2,000,000 square feet of polyethylene geomembrane, using the same type of seaming apparatus specified for this project. The field installation supervisor and/or master seamer shall be present whenever seaming is performed.

1.3 Submittals

1.3.1 Manufacturer

The manufacturer shall provide the following information:

A. Submittals with Bid Documents

1. List of material properties.
2. Manufacturing quality control program.

B. Submittals After Contract Award, Prior to Liner Installation

1. Copy of quality control certificates issued by the resin supplier.
2. Copy of quality control certificates for the geomembranes in conformance with Section 2.4.3.

1.3.2 Installation Contractor

The installer shall provide the following written information:

A. Submittals With Bid Documents

A list of completed facilities, totaling a minimum of 2,000,000 square feet, for which the installer has installed polyethylene geomembrane. For each installation, the following information shall be provided:

a. Name and purpose of facility, location, and date of installation.

b. Name of owner, design engineer, manufacturer, and name and telephone number of contact at

the facility who can discuss the project.

c. Thickness and quantity of the installed geomembrane.

B. Submittals by Successful Bidder Prior to Commencement of Installation

1. Proposed installation panel layout.
2. Resume of the field installation supervisor and master seamer.

1.4 Meeting

A daily meeting shall be held at the work area just prior to commencement of the work to discuss work activities. The earthwork contractor, the liner installer and the inspector shall be present.

1.5 Warranty

A written Warranty shall be obtained from the manufacturer (for material) and the installation contractor (for workmanship). These documents shall warrant both the quality of the material and workmanship for a specified duration of time.

2. MATERIAL SPECIFICATIONS

2.1 Materials

1. The geomembrane shall be High-Density Polyethylene (HDPE) or Linear Low Density Polyethylene (LLDPE).
2. Gasket material shall be neoprene, closed cell medium, 1/4-inch thick, 2 inches wide with adhesive on one side, or other compatible gasket materials as required.
3. Metal battens or banding and hardware shall be stainless steel.
4. Sealant shall be General Electric Silicone, RTV 103, or equivalent.

2.2 Geomembrane Raw Materials

The geomembrane shall be manufactured of polyethylene resins produced in the United States and shall be compounded and manufactured specifically for the intended purpose. The resin manufacturer shall certify each lot for the following properties.

The natural polyethylene resin without the carbon black shall meet the following requirements:

Property	Test Method	HDPE Requirements	LLDPE Requirements
Density, g/cc	ASTM D 4883, ASTM D 1505, or ASTM D 792	0.935 - 0.940	0.915 - 0.926
Melt Index, g/10 min.	ASTM D 1238 Condition E	<0.4	<0.6

2.3 Rolls

The geomembrane shall be a minimum 23.0 ft seamless width, as manufactured by Poly-Flex, Inc. (2000 W. Marshall Dr., Grand Prairie, TX 75051, 888-765-9359). Carbon black shall be added to the resin if the resin is not compounded for ultra-violet resistance.

The surface of the smooth geomembrane shall not have striations, roughness, pinholes, or bubbles.

The geomembrane shall be supplied in rolls. Labels on each roll shall identify the thickness of the material, the length and width of the roll, lot and roll numbers, and name of manufacturer.

Applicable Test Methods

ASTM International

ASTM D 792	Specific gravity (relative density) and density of plastics by displacement
ASTM D 1004	Initial tear resistance of plastic sheeting
ASTM D 1238	Flow rates of thermoplastics by extrusion plastometers
ASTM D 1505	Density of plastics by the Density-Gradient technique
ASTM D 1603	Carbon black in olefin plastics
ASTM D 1898	Sampling of plastics
ASTM D 3895	Test method for oxidative induction time of polyolefins by thermal analysis
ASTM D 4833	Index Puncture Resistance of geotextiles, geomembranes and related products
ASTM D 4883	Density of polyethylene by the Ultrasound technique
ASTM D 5199	Test method for measuring nominal thickness of geotextiles and geomembrane
ASTM D 5323	Determination of 2% secant modulus for polyethylene geomembranes
ASTM D 5397	Procedure to perform a single point notched constant tensile load - Appendix (SP-NCTL) test
ASTM D 5596	Test method for microscopic evaluation of the dispersion of carbon black in polyolefin geosynthetics
ASTM D 5617	Multi-axial tension test for geosynthetics
ASTM D 5721	Practice for air-oven aging of polyolefin geomembranes
ASTM D 5885	Test method for oxidative induction time of polyolefin geosynthetics by high pressure differential scanning calorimetry
ASTM D 5994	Test method for measuring the core thickness of textured geomembranes
ASTM D 6392	Determining the integrity of nonreinforced geomembrane seams produced using thermo-fusing methods
ASTM D 6693	Determining tensile properties of nonreinforced polyethylene and nonreinforced flexible polypropylene geomembranes
ASTM D7466	Standard Test Method for Measuring the Asperity Height of Textured Geomembrane

Geosynthetic Research Institute (GRI)

GRI GM 10	Specification for the stress crack resistance of geomembrane sheet
GRI GM 11	Accelerated weathering of geomembranes using a florescent UVA-condensation exposure device

The geomembrane rolls shall meet the following specifications:

SMOOTH LLDPE GEOMEMBRANE (ENGLISH UNITS)

Property	Test Method	Minimum Average Values 30 mil	40 mil	60 mil	80 mil
Thickness, mils	ASTM D 5199				
minimum average		30	40	60	80
lowest individual reading		27	36	54	72
Sheet Density, g/cc (max.)	ASTM D 1505/D 792	0.939	0.939	0.939	0.939
Tensile Properties[1]	ASTM D 6693				
1. Break Strength, lb/in		114	152	228	304
2. Break Elongation, %		800	800	800	800
2% Modulus, lb/in^2 (max.)	ASTM D 5323	60,000	60,000	60,000	60,000
Tear Resistance, lb	ASTM D 1004	16	22	33	44
Puncture Resistance, lb	ASTM D 4833	42	56	84	112
Axi-Symetric Break Strain, %	ASTM D 5617	30	30	30	30
Carbon Black Content[2], %	ASTM D 1603	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596		–Note 3–		
Oxidative Induction Time (OIT)					
Standard OIT, minutes	ASTM D 3895	100	100	100	100
Oven Aging at 85°C	ASTM D 5721				
High Pressure OIT - % retained after 90 days	ASTM D 5885	60	60	60	60
UV Resistance[4]	GRI GM11				
High Pressure OIT[5] - % retained after 1600 hrs	ASTM D 5885	35	35	35	35
Seam Properties	ASTM D 6392 (@ 2 in/min)				
1. Shear Strength, lb/in		45	60	90	120
2. Peel Strength, lb/in - Hot Wedge		38	50	75	100
- Extrusion Fillet		34	44	66	88
Roll Dimensions					
1. Width (feet):		23	23	23	23
2. Length (feet):		1,000	750	500	375
3. Area (square feet):		23,000	17,250	11,500	8,625
4. Gross weight (pounds, approx.):		3,435	3,435	3,435	3,435

1 Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Break elongation is calculated using a gauge length of 2.0 inches.
2 Other methods such as ASTM D 4218 or microwave methods are acceptable if an appropriate correlation can be established.
3 Carbon black dispersion for 10 different views: Nine in Categories 1 and 2 with one allowed in Category 3.
4 The condition of the test should be 20 hr. UV cycle at 75°C followed by 4 hr. condensation at 60°C.
5 UV resistance is based on percent retained value regardless of the original HP-OIT value.

2.4 Quality Control Specifications

2.4.1 Raw Materials

A. Resin

All resins for use in geomembrane must pass a candidate pre-approval process before being eligible for use. Each incoming railcar shall be sampled by compartment with the following testing performed and compared to the manufacturer's specifications:

1. Density: ASTM D 1505.
2. Melt Index: ASTM D 1238.
3. Oxidative Induction Time (OIT): ASTM D 3895.

B. Additives

All incoming materials are to be tested and approved prior to use with the following testing performed and compared to the manufacturer's specifications:

1. Carbon Black Content: ASTM D 1603.
2. Oxidative Induction Time (OIT): ASTM D 3895.

2.4.2 Finished Product: During Production

A. Inspection

Performed on each roll during manufacturing.

1. Appearance

Sheet surface appearance shall be monitored for flaws.

2. Thickness

A full width sample shall be cut from the end of each roll for thickness measurement.

B. Roll Identification

Four tags per roll shall be used.

1. Outside the core.
2. On the core plug.
3. On the roll surface.
4. On the production roll sample.

C. Out-of-Spec. Material

Any roll not meeting the specification for any of the above inspections shall be separated from other rolls and placed on hold.

2.4.3 Manufacturer's Quality Control & Quality Assurance Testing

A. Sampling

Full width samples shall be taken as retains from the end of each roll to the manufacturer's laboratory.

B. Testing

The geomembrane quality control testing shall meet the following frequency requirements:

Property	Test Method	Testing Frequency (min.)
Thickness (smooth sheet) (textured sheet)	ASTM D 5199 ASTM D 5994	per roll
Asperity Height (textured sheet only) Alternate the measurement side for double-sided textured sheet.	ASTM D 7466	every second roll
Sheet Density	ASTM D 1505/D 792	200,000 lb (90,000 kg)
Tensile Properties 1. Yield Strength (HDPE only) 2. Break Strength 3. Yield Elongation (HDPE only) 4. Break Elongation	ASTM D 6693	20,000 lb (9,000 kg)
2% Modulus (LLDPE only)	ASTM D 5323	per each formulation
Tear Resistance	ASTM D 1004	45,000 lb (20,000 kg)
Puncture Resistance	ASTM D 4833	45,000 lb (20,000 kg)
Axi-Symetric Break Strain (LLDPE only)	ASTM D 5617	per each formulation
Stress Crack Resistance (HDPE only)	ASTM D 5397 (App.)	per GRI GM10
Carbon Black Content	ASTM D 1603	20,000 lb (9,000 kg)
Carbon Black Dispersion	ASTM D 5596	45,000 lb (20,000 kg)
Oxidative Induction Time (OIT) Standard OIT	ASTM D 3895	200,000 lb (90,000 kg)
Oven Aging at 85°C High Pressure OIT	ASTM D 5721 ASTM D 5885	per each formulation
UV Resistance High Pressure OIT	GRI GM11 ASTM D 5885	per each formulation

C. Welding Rod

A sample of welding rod shall be tested at the frequency of once per 25 rolls of welding rod. The following tests shall be performed on the sample:

1. Diameter	ASTM D 5199
2. Density	ASTM D 1505
3. Melt Index	ASTM D 1238
4. Carbon Black Content	ASTM D 1603

D. Reporting

Results from the testing shall be reviewed by the quality control manager. Material that does not meet specifications shall be identified and placed on hold. The test data shall then be transferred to the product data file for roll certification.

3. GEOMEMBRANE INSTALLATION

3.1 Materials Logistics

3.1.1 Transportation and On-site Storage

The geomembrane rolls shall be shipped by flatbed trailer to the job site. The geomembrane shall be stored so as to be protected from puncture, dirt, grease, moisture and excessive heat. Damaged material shall be stored separately for repair or replacement. The rolls shall be stored on a prepared smooth surface (not wooden pallets) and should not be stacked more than two rolls high.

3.2 Earthwork

3.2.1 General

The owner or his representative (soil quality assurance inspector) shall inspect the subgrade preparation. Prior to liner installation the subgrade shall be compacted in accordance with the project specifications. Weak or compressible areas which cannot be satisfactorily compacted should be removed and replaced with properly compacted fill. All surfaces to be lined shall be smooth, free of all foreign and organic material, sharp objects, or debris of any kind. The subgrade shall provide a firm, unyielding foundation with no sharp changes or abrupt breaks in grade. Standing water or excessive moisture shall not be allowed.

The installer, on a daily basis, shall approve the surface on which the geomembrane will be installed. After the supporting soil surface has been approved, it shall be the installer's responsibility to indicate to the inspector any changes to its condition that may require repair work.

3.2.2 Anchor Trench

The anchor trench shall be excavated to the line, grade, and width shown on the project construction drawings, prior to liner system placement. Slightly rounded corners shall be provided in the trench to avoid sharp bends in the geomembrane.

3.3 Method of Placement

The rolls shall be deployed using a spreader bar assembly attached to a loader bucket or by other methods approved by the project engineer.

The installer shall be responsible for the following:

1. Equipment or tools shall not damage the geomembrane during handling, transportation and deployment.
2. Personnel working on the geomembrane shall not smoke or wear damaging shoes.
3. The method used to unroll the panels shall not cause scratches or crimps in the geomembrane and shall not damage the supporting soil.
4. Adequate loading (e.g., sand bags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels).

3.3.1 Weather Conditions

Geomembrane deployment shall proceed between ambient temperatures of 32° F and 104° F. Placement can proceed below 32° F only after it has been verified by the inspector that the material can be seamed according to the specification. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog, rain, dew) or in the presence of excessive winds, as determined by the installation supervisor.

3.4 Field Seaming

Approved seaming processes are fusion and extrusion welding. On side slopes, seams shall be oriented in the general direction of maximum slope, i.e., oriented down, not across the slope. In corners and odd-shaped geometric locations, the number of field seams shall be minimized.

No base T-seam shall be closer than 5 feet from the toe of the slope. Seams shall be aligned with the least possible number of wrinkles and "fishmouths". If a fishmouth or wrinkle is found, it shall be relieved and cap-stripped.

3.4.1 Seam Overlap

Geomembrane panels must have a finished minimum overlap of 4 inches for fusion welding and 6 inches for extrusion welding.

Cleaning solvents may not be used unless the product is approved by the liner manufacturer.

3.4.2 Test Seams

Field test seams shall be conducted on the liner to verify that seaming conditions are satisfactory. Test seams shall be conducted at the beginning of each seaming period and at least once every 4 hours, for each seaming apparatus and personnel used that day.

All test seams shall be made in contact with the subgrade. Welding rod used for extrusion welding shall have the same properties as the resin used to manufacture the geomembrane. The test seam samples shall be 10 feet long for fusion welding and 3 feet long for extrusion welding with the seam centered lengthwise. Three specimens shall be cut from each end of the test seams by the inspector. The inspector shall use a tensiometer to test 3 specimens for shear and 3 specimens for peel. Each specimen shall be one inch wide with a grip separation of 4 inches plus the width of the seam. The seam shall be centered between the clamps. The rate of grip separation shall be 2 inches per minute.

3.4.3 Assessment of Seam Test Results

For both smooth and textured seams the strength of two out of three 1.0 inch (25 mm) wide strip specimens should meet or exceed values given in this specification. The third must meet or exceed 80% of the given values. The shear percent elongation should exceed 50%. The assumed gauge length is considered to be the unseamed sheet material on either side of the welded area. Elongation measurements should be omitted for field testing. In addition, the peel separation should not exceed 25% based on the proportion of area of separated bond to the area of the original bonding. Regarding the locus-of-break patterns of the different seaming methods in shear and peel, the following are unacceptable break codes per their description in the ASTM D 6392. In this regard, SIP is an acceptable break code.

Unacceptable Break Codes

Hot Wedge: AD and AD-BRK > 25%

Extrusion Fillet: AD1, AD2 and AD-Weld (unless strength is achieved)

3.4.4 Non-Destructive Seam Testing

The installer shall non-destructively test all field seams over their full length.

A. Vacuum Box Testing

Equipment for testing extrusion seams shall be comprised of the following:

1. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
2. Soapy solution in a plastic bucket with a mop.

The following procedures shall be followed by the installer:

1. Excess sheet overlap shall be trimmed away.
2. Wet a strip of geomembrane approximately 12 inches wide by the length of box with the soapy solution.
3. Place the box over the wetted area and compress.
4. Create a vacuum of 3 - 5 psi.
5. Ensure that a leak tight seal is created.
6. For a period of approximately 10 seconds, examine the geomembrane through the viewing window for the presence of animated soap bubbles.
7. If no animated bubbles appear after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap and repeat the process.
8. All areas where animated soap bubbles appear shall be marked, repaired and then retested.

The following procedures shall apply to locations where seams cannot be non-destructively tested.

1. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.
2. If the seam cannot be tested prior to final installation, the seams shall be spark tested according to the spark tester manufacturer's procedures.

B. Air Pressure Testing (For Double Fusion Seams Only)

Equipment for testing double fusion seams shall be comprised of the following:

1. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi.
2. A pressure gauge equipped with a sharp hollow needle.

The following procedures shall be followed by the installer:

1. Seal one end of the seam to be tested.
2. Insert needle or other approved pressure feed device through the sealed end of the channel created by the double wedge fusion weld.
3. Energize the air pump to verify the unobstructed passage of air through the channel.

4. Seal the other end of the channel.
5. Energize the air pump to a pressure between 25 and 30 psi, close valve, allow 2 minutes for the injected air to come to equilibrium in the channel, and sustain pressure for approximately 5 minutes.
6. If loss of pressure exceeds 4 psi, or pressure does not stabilize, locate faulty area, repair and retest.
7. If pressure does not drop below the acceptable value after five minutes, cut the air channel open at the opposite end from the pressure gauge. The air channel should deflate immediately indicating that the entire length of the seam has been tested.

3.4.5 Destructive Seam Testing

Destructive seam testing should be minimized to preserve the integrity of the liner. The installer shall provide the inspector with one destructive test sample per project specifications (usually once per 500 feet of seam length) from a location specified by the inspector.

A. Sampling Procedure

In order to obtain test results prior to completion of liner installation, samples shall be cut by the installer as the seaming progresses. The installer shall also record the date, location, and pass or fail description. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately patched and vacuum tested.

B. Size and Disposition of Samples

The samples shall be 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three equal-length pieces, one to be given to the inspector, one to be given to the owner and one to the installer.

C. Field Laboratory Testing

The inspector shall test ten 1-inch wide specimens from his sample, five specimens for shear strength and five for peel strength.

D. Independent Laboratory Testing

The owner, at his discretion and expense, may send seam samples to a laboratory for testing. The test method and procedures to be used by the independent laboratory shall be the same as used in field testing.

E. Procedures for Destructive Test Failure

The following procedures shall apply whenever a sample fails the field destructive test:

1. The installer shall cap strip the seam between the failed location and any passed test locations.
2. The installer can retrace the welding path to an intermediate location (usually 10 feet from the location of the failed test), and take a sample for an additional field test. If this test passes, then the seam shall be cap stripped between that location and the original failed location. If the test fails, then the process is repeated.
3. Over the length of seam failure, the installer shall either cut out the old seam, reposition the panel and reseam, or add a cap strip.

3.4.6 Defects and Repairs

All seams and non-seam areas of the geomembrane shall be inspected by the inspector for defects, holes, blisters,

undispersed raw materials, and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of inspection.

A. Evaluation

Each suspect location in seam and non-seam areas shall be non-destructively tested as appropriate in the presence of the inspector. Each location that fails the non-destructive testing shall be marked by the inspector, and repaired accordingly.

B. Repair Procedures

1. Defective seams shall be cap stripped or replaced.
2. Small holes shall be repaired by extrusion welding a bead of extrudate over the hole. If the hole is larger than 1/4 inch, it shall be patched.
3. Tears shall be repaired by patching. If the tear is on a slope or an area susceptible to stress and has a sharp end it must be rounded prior to patching.
4. Blisters, large cuts and undispersed raw materials shall be repaired by patches.
5. Patches shall be completed by extrusion welding. The weld area shall be ground no more than 10 minutes prior to welding. No more than 10% of the thickness shall be removed by grinding. Welding shall commence where the grinding started and must overlap the previous seam by at least 2 inches. Reseaming over an existing seam without regrinding shall not be permitted. The welding shall restart by grinding the existing seam and rewelding a new seam.

   Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects.

C. Verification of Repairs

Each repair shall be non-destructively tested. Repairs that pass the non-destructive test shall be taken as an indication of an adequate repair. Failed tests indicate that the repair shall be repeated and retested until passing test results are achieved.

The inspector shall keep daily documentation of all non-destructive and destructive testing. This documentation shall identify all seams that initially failed the test and include evidence that these seams were repaired and successfully retested.

3.5 Cover Material and Backfilling of Anchor Trench

The geomembrane shall be covered as soon as possible. The covering operation shall not damage the geomembrane. The cover soil material shall be free of foreign and organic material, sharp objects, or debris of any kind, which could potentially damage the geomembrane. No construction equipment or machinery shall operate directly on the geomembrane. The use of lightweight machinery (i.e., generator, etc.) with low ground pressure is allowed.

The anchor trench shall be backfilled by the earthwork contractor. Trench backfill material shall be placed and compacted in accordance with the project specifications.

Care shall be taken when backfilling the trenches to prevent any damage to the geomembrane. If damage occurs, it shall be repaired prior to backfilling.

3.6 Geomembrane Acceptance

The installer shall retain all ownership and responsibility for the geomembrane until accepted by the owner.

Final acceptance is when all of the following conditions are met:

1. Installation is finished.
2. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.

END OF SECTION

Attachment N

OCD Release Notification Guidelines

TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 15 OIL AND GAS
PART 29 RELEASE NOTIFICATION

19.15.29.1 ISSUING AGENCY: Energy, Minerals and Natural Resources Department, Oil Conservation Division.
[19.15.29.1 NMAC - N, 12/1/08]

19.15.29.2 SCOPE: 19.15.29 NMAC applies to persons engaged in oil and gas development and production within New Mexico.
[19.15.29.2 NMAC - N, 12/1/08]

19.15.29.3 STATUTORY AUTHORITY: 19.15.29 NMAC is adopted pursuant to the Oil and Gas Act, NMSA 1978, Section 70-2-6, Section 70-2-11 and Section 70-2-12.
[19.15.29.3 NMAC - N, 12/1/08]

19.15.29.4 DURATION: Permanent.
[19.15.29.4 NMAC - N, 12/1/08]

19.15.29.5 EFFECTIVE DATE: December 1, 2008, unless a later date is cited at the end of a section.
[19.15.29.5 NMAC - N, 12/1/08]

19.15.29.6 OBJECTIVE: To require persons who operate or control the release or the location of the release to report the unauthorized release of oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixtures of those chemicals or contaminants that occur during drilling, producing, storing, disposing, injecting, transporting, servicing or processing and to establish reporting procedures.
[19.15.29.6 NMAC - N, 12/1/08]

19.15.29.7 DEFINITIONS:

A. "Major release" means:

(1) an unauthorized release of a volume, excluding gases, in excess of 25 barrels;

(2) an unauthorized release of a volume that:

(a) results in a fire;

(b) will reach a watercourse;

(c) may with reasonable probability endanger public health; or

(d) results in substantial damage to property or the environment;

(3) an unauthorized release of gases in excess of 500 MCF; or

(4) a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

B. "Minor release" means an unauthorized release of a volume, greater than five barrels but not more than 25 barrels; or greater than 50 MCF but less than 500 MCF of gases.
[19.15.29.7 NMAC - Rp, 19.15.3.116 NMAC, 12/1/08]

19.15.29.8 RELEASE NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall notify the division of unauthorized release occurring during the drilling, producing, storing, disposing, injecting, transporting, servicing or processing of oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixture of the chemicals or contaminants, in accordance with the requirements of 19.15.29 NMAC.

B. The person operating or controlling either the release or the location of the release shall notify the division in accordance with 19.15.29 NMAC with respect to a release from a facility of oil or other water contaminant, in such quantity as may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

[19.15.29.8 NMAC - Rp, 19.15.3.116 NMAC, 12/1/08]

19.15.29.9 REPORTING REQUIREMENTS: The person operating or controlling either the release or the location of the release shall provide notification of releases in 19.15.29.8 NMAC as follows.

A. The person shall report a major release by giving both immediate verbal notice and timely written notice pursuant to Subsections A and B of 19.15.29.10 NMAC.

B. The person shall report a minor release by giving timely written notice pursuant to Subsection B of 19.15.29.10 NMAC.

[19.15.29.9 NMAC - Rp, 19.15.3.116 NMAC, 12/1/08]

19.15.29.10 CONTENTS OF NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall provide immediate verbal notification within 24 hours of discovery to the division district office for the area within which the release takes place. In addition, the person shall provide immediate verbal notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief. The notification shall provide the information required on form C-141.

B. The person operating or controlling either the release or the location of the release shall provide timely written notification within 15 days to the division district office for the area within which the release occurs by completing and filing form C-141. In addition, the person shall provide timely written notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief within 15 days after the release is discovered. The written notification shall verify the prior verbal notification and provide appropriate additions or corrections to the information contained in the prior verbal notification.

[19.15.29.10 NMAC - Rp, 19.15.3.116 NMAC, 12/1/08]

19.15.29.11 CORRECTIVE ACTION: The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.

[19.15.29.11 NMAC - Rp, 19.15.3.116 NMAC, 12/1/08]

HISTORY of 19.15.29 NMAC:

History of Repealed Material: 19.15.3 NMAC, Drilling (filed 10/29/2001) repealed 12/1/08.

NMAC History:

That applicable portion of 19.15.3 NMAC, Drilling (Section 116) (filed 10/29/2001) was replaced by 19.15.29 NMAC, Release Notification, effective 12/1/08.

Attachment O

OCD Remediation Guidelines

TITLE 19 NATURAL RESOURCES AND WILDLIFE
CHAPTER 15 OIL AND GAS
PART 30 REMEDIATION

19.15.30.1 ISSUING AGENCY: Energy, Minerals and Natural Resources Department, Oil Conservation Division.
[19.15.30.1 NMAC - N, 12/1/08]

19.15.30.2 SCOPE: 19.15.30 NMAC applies to persons engaged in oil and gas development and production within New Mexico.
[19.15.30.2 NMAC - N, 12/1/08]

19.15.30.3 STATUTORY AUTHORITY: 19.15.30 NMAC is adopted pursuant to the Oil and Gas Act, NMSA 1978, Sections 70-2-6, 70-2-11 and 70-2-12.
[19.15.30.3 NMAC - N, 12/1/08]

19.15.30.4 DURATION: Permanent.
[19.15.30.4 NMAC - N, 12/1/08]

19.15.30.5 EFFECTIVE DATE: December 1, 2008, unless a later date is cited at the end of a section.
[19.15.30.5 NMAC - N, 12/1/08]

19.15.30.6 OBJECTIVE: To abate pollution of subsurface water so that ground water of the state that has a background concentration of 10,000 mg/l or less TDS is either remediated or protected for use as domestic, industrial and agricultural water supply, and to remediate or protect those segments of surface waters that are gaining because of subsurface-water inflow for uses designated in the water quality standards for interstate and intrastate surface waters in New Mexico, 20.6.4 NMAC; and abate surface-water pollution so that surface waters of the state are remediated or protected for designated or attainable uses as defined in the water quality standards for interstate and intrastate surface waters in New Mexico, 20.6.4 NMAC.
[19.15.30.6 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.7 DEFINITIONS: [RESERVED]
[See 19.15.2.7 NMAC for definitions.]

19.15.30.8 PREVENTION AND ABATEMENT OF WATER POLLUTION:

A. If the background concentration of a water contaminant exceeds the standard or requirement of Subsections A, B or C of 19.15.30.9 NMAC, the responsible person shall abate the pollution to the background concentration.

B. The standards and requirements set forth in of Subsections A, B or C of 19.15.30.9 NMAC are not intended as maximum ranges and concentrations for use, and nothing contained in 19.15.30.9 NMAC limits the use of waters containing higher ranges and concentrations.
[19.15.30.8 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.9 ABATEMENT STANDARDS AND REQUIREMENTS:

A. The responsible person shall abate the vadose zone so that water contaminants in the vadose zone will not with reasonable probability contaminate ground water or surface water, in excess of the standards in Subsections B and C of 19.15.30.9 NMAC, through leaching, percolation or other transport mechanisms, or as the water table elevation fluctuates.

B. The responsible person shall abate ground-water pollution at a place of withdrawal for present or reasonably foreseeable future use, where the TDS concentration is 10,000 mg/l or less, to conform to the following standards:

(1) toxic pollutants as defined in 20.6.2.7 NMAC shall not be present; and

(2) the standards of 20.6.2.3103 NMAC shall be met.

C. The responsible person shall abate surface-water pollution to conform to the water quality standards for interstate and intrastate surface waters in New Mexico, 20.6.4 NMAC.

D. The division shall not consider subsurface-water and surface-water abatement complete until eight consecutive quarterly samples, or an alternate lesser number of samples the director approves, from the compliance sampling stations the director approved meet the abatement standards in Subsections A, B and C of 19.15.30.9 NMAC. The division shall consider abatement of water contaminants measured in solid-matrix samples of the vadose zone complete after one-time sampling from compliance stations the director approves.

E. Technical infeasibility.

(1) If a responsible person is unable to meet the abatement standards set forth in Subsections A and B of 19.15.30.9 NMAC using commercially accepted abatement technology pursuant to an approved abatement plan, the responsible person may propose that abatement standards compliance is technically infeasible.

(a) The director may consider technical infeasibility proposals involving the use of experimental abatement technology.

(b) The responsible person may demonstrate technical infeasibility by a statistically valid extrapolation of the decrease in concentrations of a water contaminant over the remainder of a 20 year period, such that projected future reductions during that time would be less than 20 percent of the concentration at the time the responsible person proposes technical infeasibility. A statistically valid decrease cannot be demonstrated by fewer than eight consecutive quarters.

(c) The technical infeasibility proposal shall include a substitute abatement standard for those contaminants that is technically feasible. The responsible person shall meet abatement standards for other water contaminants not demonstrated to be technically infeasible.

(2) The director shall not approve a proposed technical infeasibility demonstration for a water contaminant if its concentration is greater than 200 percent of the abatement standard for the contaminant.

(3) If the director cannot approve any or all portions of a proposed technical infeasibility demonstration because the water contaminant concentration is greater than 300 percent of the abatement standard for each contaminant, the responsible person may further pursue the issue of technical infeasibility by filing a petition with the division seeking approval of alternate abatement standards pursuant to Subsection F of 19.15.30.9 NMAC.

F. Alternative abatement standards.

(1) At any time during or after the stage 2 abatement plan's submission, the responsible person may file a petition seeking approval of alternative abatement standards for the standards set forth in Subsections A and B of 19.15.30.9 NMAC. The division may approve alternative abatement standards if the petitioner demonstrates that:

(a) either compliance with the abatement standards is not feasible, by the maximum use of technology within the responsible person's economic capability; or there is no reasonable relationship between the economic and social costs and benefits, including attainment of the standards set forth in 19.15.30.9 NMAC to be obtained;

(b) the proposed alternative abatement standards are technically achievable and cost-benefit justifiable; and

(c) compliance with the proposed alternative abatement standard will not create a present or future hazard to public health or undue damage to property.

(2) The responsible person shall file a written petition with the division's environmental bureau chief. The petition may include a transport, fate and risk assessment in accordance with accepted methods, and other information as the petitioner deems necessary to support the petition. The petition shall:

(a) state the petitioner's name and address;

(b) state the date of the petition;

(c) describe the facility or activity for which the petitioner seeks the alternate abatement standards;

(d) state the address or description of the property upon which the facility is located;

(e) describe the water body or watercourse the release affected;

(f) identify the abatement standard from which petitioner wishes to vary;

(g) state why the petitioner believes that compliance with 19.15.30 NMAC will impose an unreasonable burden upon the petitioner's activity;

(h) identify the water contaminant for which the petitioner proposes the alternative standard;

(i) state the alternative standard the petitioner proposes;

(j) identify the three-dimensional body of water pollution for which the petitioner seeks approval; and

(k) state the extent to which the abatement standards set forth in 19.15.30.9 NMAC are now, and will in the future be, violated.

(3) The division's environmental bureau chief shall review the petition and, within 60 days after receiving the petition, submit a written recommendation to the director to approve, approve subject to conditions or disapprove any or all of the proposed alternative abatement standards. The recommendation shall include the reasons for the division's environmental bureau chief's recommendation. The division's environmental bureau chief shall submit a copy of the recommendation to the petitioner by certified mail.

(4) If the division's environmental bureau chief recommends approval, or approval subject to conditions, of any or all of the proposed alternative abatement standards, the division shall hold a public hearing on those standards. If the division's environmental bureau chief recommends disapproval of any or all of the proposed alternative abatement standards, the petitioner may submit a request to the director, within 15 days after the recommendation's receipt, for a public hearing on those standards. If the petitioner does not submit a timely request for hearing, the recommended disapproval shall become a final decision of the director and shall not be subject to review.

(5) If the director grants a public hearing, the division shall conduct the hearing in accordance with division hearing procedures.

(6) Based on the record of the public hearing, the division shall approve, approve subject to condition or disapprove any or all of the proposed alternative abatement standards. The division shall notify the petitioner by certified mail of its decision and the reasons for the decision.

[19.15.30.9 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.10 MODIFICATION OF ABATEMENT STANDARDS: If applicable abatement standards are modified after the division approves the abatement measures, the abatement standards that are in effect at the time that the division approved the abatement measures shall be the abatement standards for the duration of the abatement action, unless the director determines that compliance with those standards may with reasonable probability create a

present or future hazard to public health or the environment. In an appeal of the director's determination that additional actions are necessary, the director shall have the burden of proof.
[19.15.30.10 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.11 ABATEMENT PLAN REQUIRED:

A. Unless otherwise provided by 19.15.30 NMAC responsible persons who are abating, or who are required to abate, water pollution in excess of the standards and requirements set forth in 19.15.30.9 NMAC shall do so pursuant to an abatement plan the director approves. When the director has approved an abatement plan, the responsible person's actions leading to and including abatement shall be consistent with the abatement plan's terms and conditions.

B. In the event of a transfer of the ownership, control or possession of a facility for which an abatement plan is required or approved, where the transferor is a responsible person, the transferee also shall be considered a responsible person for the abatement plan's duration, and may jointly share the responsibility to conduct the actions 19.15.30 NMAC requires with other responsible persons.

(1) The transferor shall notify the transferee in writing at least 30 days prior to the transfer that the division has required or approved an abatement plan for the facility, and shall deliver or send by certified mail to the director a copy of the notification together with a certificate or other proof that the transferee has received the notification.

(2) The transferor and transferee may agree to a designated responsible person who shall assume the responsibility to conduct the actions 19.15.30 NMAC requires. The responsible persons shall notify the director in writing if a designated responsible person is agreed upon.

(3) If the director determines that the designated responsible person has failed to conduct the actions 19.15.30 NMAC requires, the director shall notify all responsible persons of this failure in writing and allow them 30 days, or longer for good cause shown, to conduct the required actions before setting a show cause hearing requiring those responsible persons to appear and show cause why they should not be ordered to comply, a penalty should not be assessed, a civil action should not be commenced in district court or the division should not take other appropriate action.

C. If the source of the water pollution to be abated is a facility that operated under a discharge plan, the director may require the responsible person to submit a financial assurance plan that covers the estimated costs to conduct the actions the abatement plan requires. Such a financial assurance plan shall be consistent with financial assurance requirements the division adopts.
[19.15.30.11 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.12 EXEMPTIONS FROM ABATEMENT PLAN REQUIREMENT:

A. Except as provided in Subsection B of 19.15.30.12 NMAC, 19.15.30.11 NMAC and 19.15.30.13 NMAC do not apply to a person who is abating water pollution:

(1) from an underground storage tank, under the authority of the New Mexico environmental improvement board's underground storage tank rules, 20.5 NMAC, or in accordance with the Ground Water Protection Act, NMSA 1978, Section 74-6B-1 *et seq.*;

(2) under the EPA's authority pursuant to either the Federal Comprehensive Environmental Response, Compensation and Liability Act, and amendments, or RCRA;

(3) pursuant to the New Mexico environmental improvement board's hazardous waste management rule, 20.4.1 NMAC;

(4) under the authority of the United States nuclear regulatory commission or the United States department of energy pursuant to the Atomic Energy Act;

(5) under the authority of a ground-water discharge plan the director approved, provided that such abatement is consistent with the requirements and provisions of 19.15.30.8 NMAC, 19.15.30.9 NMAC, Subsections C and D of 19.15.30.13 NMAC, 19.15.30.14 NMAC and 19.15.30.19 NMAC;

(6) under the authority of a letter of understanding, settlement agreement or administrative order on consent or other agreement signed by the director or director's designee prior to March 15, 1997, provided that abatement is being performed in compliance with the terms of the letter of understanding, settlement agreement or administrative order or other agreement on consent; and

(7) on an emergency basis, or while abatement plan approval is pending, or in a manner that will likely result in compliance with the standards and requirements set forth in 19.15.30.9 NMAC within one year after notice is required to be given pursuant to 19.15.29.9 NMAC provided that the division does not object to the abatement action.

B. If the director determines that abatement of water pollution subject to Subsection A of 19.15.30.12 NMAC will not met the standards of Subsections B and C of 19.15.30.9 NMAC, or that additional action is necessary to protect health, welfare, environment or property, the director may notify a responsible person, by certified mail, to submit an abatement plan pursuant to 19.15.30.11 NMAC and Subsection A of 19.15.30.14 NMAC. The notification shall state the reasons for the director's determination. In an appeal of the director's determination under Subsection B of 19.15.30.12 NMAC, the director shall have the burden of proof.
[19.15.30.12 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.13 ABATEMENT PLAN PROPOSAL:

A. Except as provided for in 19.15.30.12 NMAC a responsible person shall, within 60 days of receipt of the director's written notice that the division requires an abatement plan, submit an abatement plan proposal to the director for approval. The responsible person may submit stage 1 and stage 2 abatement plan proposals together. For good cause shown, the director may allow for a total of 120 days to prepare and submit the abatement plan proposal.

B. Voluntary abatement.

(1) A person wishing to abate water pollution in excess of the standards and requirements set forth in 19.15.30.9 NMAC may submit a stage 1 abatement plan proposal to the director for approval. Following the director's approval of a final site investigation report prepared pursuant to stage 1 of an abatement plan, a person may submit a stage 2 abatement plan proposal to the director for approval.

(2) Following approval of a stage 1 or stage 2 abatement plan proposal under Paragraph (1) of Subsection B of 19.15.30.13 NMAC the person submitting the approved plan shall be a responsible person under 19.15.30 NMAC for the purpose of performing the approved stage 1 or stage 2 abatement plan. Nothing in 19.15.30 NMAC precludes the director from applying 19.15.29.11 NMAC to a responsible person if applicable.

C. Stage 1 abatement plan. The stage 1 of the abatement plan's purpose is to design and conduct a site investigation that adequately defines site conditions, and provide the data necessary to select and design an effective abatement option. Stage 1 of the abatement plan may include the following information depending on the media affected, and as needed to select and implement an expeditious abatement option:

(1) descriptions of the site, including a site map, and of site history including the nature of the release that caused the water pollution, and a summary of previous investigations;

(2) site investigation work plan that defines:

(a) site geology and hydrogeology; the vertical and horizontal extent and magnitude of vadose-zone and ground-water contamination; subsurface hydraulic conductivity; transmissivity, storativity and rate and direction of contaminant migration; inventory of water wells inside and within one mile from the perimeter of the

three-dimensional body where the standards set forth in Subsection C of 19.15.30.9 NMAC are exceeded; and location and number of wells the pollution actually or potentially affects; and

(b) surface water hydrology, seasonal stream flow characteristics, ground water/surface water relationships, the vertical and horizontal extent and magnitude of contamination and impacts to surface water and stream sediments; the magnitude of contamination and impacts on surface water may be, in part, defined by conducting a biological assessment of fish, benthic macro invertebrates and other wildlife populations; seasonal variations should be accounted for when conducting these assessments;

(3) monitoring program, including sampling stations and frequencies, for the abatement plan's duration that may be modified, after the director's approval, as the responsible person creates additional sampling stations;

(4) quality assurance plan, consistent with the sampling and analytical techniques listed in Subsection B of 20.6.2.3107 NMAC and with 20.6.4.14 NMAC of the water quality standards for interstate and intrastate surface waters in New Mexico, for all work to be conducted pursuant to the abatement plan;

(5) a schedule for stage 1 abatement plan activities, including the submission of summary quarterly progress reports, and the submission, for the director's approval, of a detailed final site investigation report; and

(6) additional information that may be required to design and perform an adequate site investigation.

D. Stage 2 abatement plan.

(1) A responsible person shall submit a stage 2 abatement plan proposal to the director for approval within 60 days, or up to 120 days for good cause shown, after the director's approval of the final site investigation report prepared pursuant to stage 1 of the abatement plan. The responsible person may submit a stage 1 and 2 abatement plan proposal together. Stage 2 of the abatement plan's purpose is to select and design, if necessary, an abatement option that, when implemented, results in attainment of the abatement standards and requirements set forth in 19.15.30.9 NMAC, including post-closure maintenance activities.

(2) Stage 2 of the abatement plan should include, at a minimum, the following information:

(a) a brief description of the current situation at the site;

(b) development and assessment of abatement options;

(c) a description, justification and design, if necessary, of the preferred abatement option;

(d) modification, if necessary, of the monitoring program the director approved pursuant to stage 1 of the abatement plan, including the designation of pre- and post-abatement-completion sampling stations and sampling frequencies to be used to demonstrate compliance with the standards and requirements set forth in 19.15.30.9 NMAC;

(e) site maintenance activities, if needed, the responsible person proposes to perform after abatement activities terminate;

(f) a schedule for the duration of abatement activities, including the submission of summary quarterly progress reports;

(g) a public notification proposal designed to satisfy the requirements of Subsections B and C of 19.15.30.15 NMAC; and

(h) additional information that may be reasonably required to select, describe, justify and design an effective abatement option.

[19.15.30.13 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.14 OTHER REQUIREMENTS:

A. A responsible person shall allow the director's authorized representative upon presentation of proper credentials and with reasonable prior notice to:

(1) enter the facility at reasonable times;

(2) inspect and copy records an abatement plan requires;

(3) inspect treatment works, monitoring and analytical equipment;

(4) sample wastes, ground water, surface water, stream sediment, plants, animals or vadose-zone material including vadose-zone vapor;

(5) use monitoring systems and wells under the responsible person's control in order to collect samples of media listed in Paragraph (4) of Subsection A of 19.15.30.14 NMAC; and

(6) gain access to off-site property the responsible person does not own or control, but is accessible to the responsible person through a third-party access agreement, provided that the agreement allows it.

B. A responsible person shall provide the director, or director's representative, with at least four working days advance notice of sampling to be performed pursuant to an abatement plan, or a well plugging, abandonment or destruction at a facility where the division has required an abatement plan.

C. A responsible person wishing to plug, abandon or destroy a monitoring or water supply well within the perimeter of the three-dimensional body where the standards set forth in Subsection B of 19.15.30.9 NMAC are exceeded, at a facility where the division has required an abatement plan, shall propose such action by certified mail to the director for approval, unless the state engineer's approval is required. The responsible person shall design the proposed action to prevent water pollution that could result from water contaminants migrating through the well or bore hole. The proposed action shall not take place without the director's written approval, unless the responsible person does not receive written approval or disapproval within 30 days after the date the director receives the proposal.

[19.15.30.14 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.15 PUBLIC NOTICE AND PARTICIPATION:

A. Prior to public notice, the applicant shall give written notice, as approved by the division, of stage 1 and stage 2 abatement plans to the following persons:

(1) surface owners of record within one mile of the perimeter of the geographic area where the standards and requirements set forth in 19.15.30.9 NMAC are exceeded;

(2) the county commission where the geographic area where the standards and requirements set forth in 19.15.30.9 NMAC are exceeded is located;

(3) the appropriate city officials if the geographic area where the standards and requirements set forth in 19.15.30.9 NMAC are exceeded is located or is partially located within city limits or within one mile of the city limits;

(4) those persons, the director identifies, who have requested notification, who shall be notified by mail;

(5) the New Mexico trustee for natural resources, and other local, state or federal governmental agencies affected, as the director identifies, which shall be notified by certified mail;

(6) the governor or president of a tribe, pueblo or nation if the geographic area where the standards and requirements set forth in 19.15.30.9 NMAC are exceeded is located or is partially located within tribal boundaries or within one mile of the tribal boundaries, who shall be notified by certified mail;

(7) the director may extend the distance requirements for notice if the director determines the proposed abatement plan has the potential to adversely impact public health or the environment at a distance greater than one mile. The director may require additional notice as needed. The applicant shall furnish a copy and proof of the notice to the division.

B. Within 15 days after the division determines that a stage 1 abatement plan or a stage 2 abatement plan is administratively complete, the responsible person shall issue public notice in a division-approved form in a newspaper of general circulation in the county in which the release occurred, and in a newspaper of general

circulation in the state. For the purposes of Subsection B of 19.15.30.15 NMAC, an administratively complete stage 1 abatement plan is a document that satisfies the requirements of Subsection C of 19.15.30.13 NMAC and an administratively complete stage 2 abatement plan is a document that satisfies the requirements of Paragraph (2) of Subsection D of 19.15.30.13 NMAC. The public notice shall include, as approved in advance by the director:

(1) the responsible person's name and address;

(2) the location of the proposed abatement;

(3) a brief description of the source, extent and estimated volume of release; whether the release occurred into the vadose zone, ground water or surface water; and a description of the proposed stage 1 or stage 2 abatement plan;

(4) a brief description of the procedures the director followed in making a final determination;

(5) a statement that the public may view a copy of the abatement plan at the division's Santa Fe office or at the division's district office for the area in which the release occurred, and a statement describing how the public can access the abatement plan electronically from a division-maintained site if such access is available;

(6) a statement that the division will accept the following comments and requests for consideration if the director receives them within 30 days after the date of publication of the public notice:

(a) written comments on the abatement plan; and

(b) for a stage 2 abatement plan, written requests for a public hearing that include reasons why a hearing should be held; and

(7) an address and phone number at which interested persons may obtain further information.

C. A person seeking to comment on a stage 1 abatement plan, or to comment or request a public hearing on a stage 2 abatement plan, shall file written comments or hearing requests with the division within 30 days after the date of public notice, or within 30 days after the director receives a proposed significant modification of a stage 2 abatement plan. Requests for a public hearing shall set forth the reasons why a hearing should be held. The division shall hold a public hearing if the director determines that there is significant public interest or that the request has technical merit.

D. The division shall distribute notice of an abatement plan's filing with the next division and commission hearing docket following the plan's receipt.

[19.15.30.15 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.16 DIRECTOR APPROVAL OR NOTICE OF DEFICIENCY OF SUBMITTALS:

A. The director shall, within 60 days after receiving an administratively complete stage 1 abatement plan, a site investigation report, a technical infeasibility demonstration or an abatement completion report approve the document, or notify the responsible person of the document's deficiency, based upon the information available.

B. If the division does not hold a public hearing pursuant to Subsection C of 19.15.30.15 NMAC then the director shall, within 90 days after receiving a stage 2 abatement plan proposal, approve the plan, or notify the responsible person of the plan's deficiency, based upon the information available.

C. If the division holds a public hearing pursuant to Subsection C of 19.15.30.15 NMAC then the director shall, within 60 days after receiving the required information, approve stage 2 of the abatement plan proposal, or notify the responsible person of the plan's deficiency, based upon the information contained in the plan and the information submitted at the hearing.

D. If the director notifies a responsible person of a deficiency in a site investigation report, or in a stage 1 or stage 2 abatement plan proposal, the responsible person shall submit a modified document to cure the deficiencies the director specifies within 30 days after receiving the notice of deficiency. The responsible person is in violation of 19.15.30 NMAC if the responsible person fails to submit a modified document within the required

time, or if the responsible person does not in the modified document make a good faith effort to cure the deficiencies the director specified.

E. Provided that the responsible person meets the other requirements of 19.15.30 NMAC and provided further that stage 2 of the abatement plan, if implemented, shall result in the standards and requirements set forth in 19.15.30.9 NMAC being met within a schedule that is reasonable given the site's particular circumstances, the director shall approve the plan.

[19.15.30.16 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.17 INVESTIGATION AND ABATEMENT: A responsible person who receives the division's approval for stage 1 or stage 2 of an abatement plan shall conduct investigation, abatement, monitoring and reporting activities in compliance with 19.15.30 NMAC and according to the terms and schedules contained in the approved abatement plans.

[19.15.30.17 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.18 ABATEMENT PLAN MODIFICATION:

A. The division may modify an approved abatement plan at the responsible person's written request in accordance with 19.15.30 NMAC with the director's written approval.

B. If data the responsible person submitted pursuant to monitoring requirements specified in the approved abatement plan or other information available to the director indicates that the abatement action is ineffective, or is creating unreasonable injury to or interference with health, welfare, environment or property, the director may require a responsible person to modify an abatement plan within the shortest reasonable time so as to effectively abate water pollution that exceeds the standards and requirements set forth in 19.15.30.9 NMAC, and to abate and prevent unreasonable injury to or interference with health, welfare, environment or property.

[19.15.30.18 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.19 COMPLETION AND TERMINATION:

A. The division shall consider abatement complete when the responsible person meets the standards and requirements set forth in 19.15.30.9 NMAC. At that time, the responsible person shall submit an abatement completion report, documenting compliance with the standards and requirements set forth in 19.15.30.9 NMAC, to the director for approval. The abatement completion report also shall propose changes to long-term monitoring and site maintenance activities, if needed, to be performed after the abatement plan's termination.

B. Provided that the responsible person meets the other requirements of 19.15.30 NMAC and provided further that the responsible person has met the standards and requirements set forth in 19.15.30.9 NMAC, the director shall approve the abatement completion report. When the director approves the abatement completion report, the director shall also notify the responsible person in writing that the abatement plan is terminated.

[19.15.30.19 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.20 DISPUTE RESOLUTION: In the event of a technical dispute regarding the requirements of 19.15.29 NMAC, 19.15.30.9 NMAC, 19.15.30.12 NMAC, 19.15.30.13 NMAC, 19.15.30.18 NMAC or 19.15.30.19 NMAC, including notices of deficiency, the responsible person may notify the director by certified mail that a dispute has arisen, and the responsible person desires to invoke the dispute resolution provisions of 19.15.30.20 NMAC provided that the responsible person shall send the notification within 30 days after the responsible person receives the director's decision that causes the dispute. Upon the notification, the deadlines affected by the technical dispute shall be extended for a 30 day negotiation period, or for a maximum of 60 days if approved by the director for good cause shown. During this negotiation period, the director or the director's designee and the responsible

person shall meet at least once. A mutually agreed upon third part may facilitate the meeting, but the third party shall assume no power or authority granted or delegated to the director by the Oil and Gas Act or by the division or commission. If the dispute remains unresolved after the negotiation period, the director's decision shall be final.
[19.15.30.20 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

19.15.30.21 APPEALS FROM DIRECTOR'S AND DIVISION'S DECISIONS:

A. If the director

(1) determines that an abatement plan is required pursuant to 19.15.29.11 NMAC;

(2) approves or provides notice of deficiency of a proposed abatement plan, technical infeasibility demonstration or abatement completion report; or

(3) modifies or terminates an approved abatement plan

the director shall provide written notice of the action by certified mail to the responsible person and other persons who participated in the action.

B. A person who participated in the action before the director and that the action listed in Subsection A of 19.15.30.21 NMAC adversely affects may file a petition requesting a hearing before a division examiner.

C. The person shall make the petition in writing and file it with the division within 30 days after receiving notice of the director's action. The petition shall specify the portions of the action to which the petitioner objects, certify that the person has mailed or hand-delivered a copy of the petition to the director and to the applicant or permittee if the petitioner is not the applicant or permittee and have attached a copy of the action for which the person seeks review. Unless a person makes a timely petition for hearing, the director's action is final.

D. The hearing before the division shall be conducted in the same manner as other division hearings.

E. The petitioner shall pay the cost of the court reporter for the hearing.

F. A party adversely affected by a division order pursuant to a hearing held by a division examiner, shall have a right to have the matter heard de novo before the commission.

G. The appeal provisions do not relieve the owner, operator or responsible person of their obligations to comply with federal or state laws including regulations or rules.
[19.15.30.21 NMAC - Rp, 19.15.1.19 NMAC, 12/1/08]

HISTORY of 19.15.30 NMAC:

History of Repealed Material: 19.15.1 NMAC, General Provisions and Definitions (filed 04/27/2001) repealed 12/1/08.

NMAC History:
That applicable portion of 19.15.1 NMAC, General Provisions and Definitions (Section 19) (filed 04/27/2001) was replaced by 19.15.30 NMAC, Remediation, effective 12/1/08.

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson
Governor

Jon Goldstein
Cabinet Secretary

Jim Noel
Deputy Cabinet Secretary

Mark Fesmire
Division Director
Oil Conservation Division

May 24, 2010

Jody Harris
Industry Standard Technology Corporation, d/b/a Controlled Aqua Systems
3801 West Country Club Road
Roswell, New Mexico 88201

RE: Request for Additional Information – Application Review for a Proposed Produced Water Treatment Facility
Industry Standard Technology Corporation, d/b/a Controlled Aqua Systems
Location: (Unit Letters G and H) SE/4, N2/4, Section 16, Township 18 South, Range 26 East, NMPM
Eddy County, New Mexico

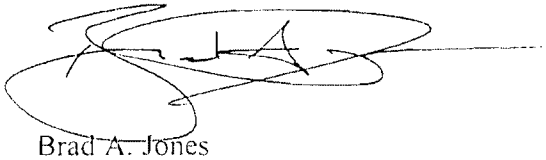
Dear Mr. Harris:

The Oil Conservation Division (OCD) has reviewed Controlled Aqua Systems' (CAS) application dated April 7, 2010, and revisions and additions dated April 15, 2010 for a produced water treatment facility located in the SE/4, N/2 of Section 16, Township 18 South, Range 26 East NMPM, Eddy County, New Mexico. The review of the submittal is to determine if any additional information or modifications may be required before considering deeming the permit application complete. The application has been determined to be incomplete. Therefore, the OCD requests additional information.

Enclosed is a list of items that must be addressed prior to completing the review. Once the information is submitted, the OCD will determine if additional information is required. The OCD recommends that all corrections, additions, and modifications to the application be reviewed and cross-referenced before they are submitted, in order to verify that all responses correlate and coincide with each other throughout the application.

If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3487 or brad.a.jones@state.nm.us.

Sincerely,



Brad A. Jones
Environmental Engineer

BAJ/baj

Attachment: Request for Additional Information

cc: OCD District II Office, Artesia w/ attachment

Request for Additional Information
Controlled Aqua Systems
Produced Water Treatment Facility
May 24, 2010

Application for Produced Water Treatment Facility, Page 1:

Please provide the address for the proposed produced water treatment facility.

Location:
The current legal description provided in the application is SE ¼ of N 2/4 of Section 16, Township 18S, Range 26E. Please verify and clarify the proposed location of the produced water treatment facility. Also, please provide maps that illustrate and confirm the proposed location.

Please refer to treated produced water as "treated produced water" rather than "clean water." "Clean water" is not a defined regulatory term and is not applicable to this submittal.

Based upon our meeting, the OCD was informed that the source of produce water received at the proposed treatment facility would be from a SWD operated by Devon. The OCD requested that a letter from Devon be provided in the application packet which would indicate Devon's acknowledgment that Devon agrees to provide produced water to CAS for treatment and reuse. The OCD was unable to locate any such letter. Please provide a copy of the requested letter and clearly identify the source of the produced water in the first bullet.

Based upon our meeting, the OCD was informed that the treated produced water will only be provided to the Center of Excellence for Hazardous Materials Management (CHEMM) for their algae/bio-fuel project. The second bullet on the first page of this section states "The clean water will be used in facilities approved by the Oil Conservation Division to receive such water." This language is contrary to the proposal presented to OCD and agreed upon in the meeting. Please clarify and modify the language to coincide with the proposal presented to OCD.

The third bullet on the first page of this section states "The clean water will meet or exceed OCD standards as issued for this permit." Based upon our meeting, the OCD was informed that the treated produced water will only be provided to CEHMM for their algae/bio-fuel project. Since CHEMM's algae/bio-fuel project will require double-lined ponds with a leak detection system for containment, the quality of the treated produced water will be based upon CEHMM's needs. Please identify the standard of treatment that CEHMM requires to operate their algae/bio-fuel project.

In the fourth bullet on the first page of this section, please indentify all of the waste streams and identify the facility in which each waste stream will be taken for disposal. Please provide the facility name, permit number, and/or API number.

In the fifth bullet on the first page of this section, please identify how the separated solids (BS&W) from the de-watering unit and any waste filters will be transported for disposal.

Attachment B, Process Description:

Page 1, Item 3:

Please provide details regarding the introduction of ozone gas within the process vessels. Please indicate if the residual ozone gas is captured and reused or if it is allowed to off-gas during its use. If the residual ozone gas is not captured and reused, please provide a letter from the New Mexico Environment Department's Air Quality Bureau indicating their assessment and conclusion regarding air permitting.

Page 3, Item 13:

Please indentify the landfill or landfills, by name and permit number, in which CAS proposes to dispose of the separated solids. Also, please discuss CAS's responsibility to ensure that a form C-138 accompanies the waste material and is provided to the surface waste management facility operator upon receipt of the waste pursuant to Subsection F of 19.15.36.13 NMAC. Please identify the authorization/approval required for a licensed oilfield waste hauler as identified in Subsection C of 19.15.34.8 NMAC and Subsection D of 19.15.36.13 NMAC to transport such waste material.

Pages 3 and 4, Monitoring:

Please discuss the frequency in which CAS proposes to test the influent (untreated/raw produced water) and the finished effluent (treated produced water) for the 20.6.2.3103 NMAC constituents in order to demonstrate and confirm the level or efficiency of the treatment process. Please indicate where each of the samples, influent and effluent, will be obtained.

Please discuss CAS's compliance with the hydrogen sulfide assessment and monitoring requirements regarding tanks and vessels pursuant to Subsection E of 19.15.11.12 NMAC. If other applicable provisions of 19.15.11 NMAC, please identify and address.

The drip pans indentified in the last paragraph of this section, *Monitoring*, are considered to be sumps, as defined in Subsection H of 19.15.17.7 NMAC. Please address the operational requirements of Subsection E of 19.15.17.12 NMAC. Also, please provide and reference the location of a sump design drawing that illustrates the design specifications identified in Subsection H of 19.15.17.7 NMAC.

Page 3, Berm:

The OCD requires operator to place above ground tanks on impermeable pads and surround the tanks with lined berms or other impermeable secondary containment system having a capacity at least equal to one and one-third times the capacity of the largest tank, or, if the tanks are interconnected, of all interconnected tanks. Operators are not required to provide secondary containment for tanks that contain fresh water and that are clearly so labeled and that are located outside the drum and container, process, maintenance, material, and waste storage areas. Please demonstrate compliance to requirement above.

Attachment C, Cross-section Diagram of Berm Construction Design:

Please provide a construction and design plan that addresses the installation of the bermed containment area. The construction and design plan should demonstrate compliance of the following requirements:

- The bermed containment area shall have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear. The operator shall construct the bermed containment area so that the slopes are no steeper than two horizontal feet to one vertical foot (2H:1V). The appropriate division may approve an alternative to the slope requirement if the operator demonstrates that it can construct and operate the bermed containment area in a safe manner to prevent contamination of fresh water and protect public health and the environment.
- The operator shall design and construct the bermed containment area with a geomembrane liner. The geomembrane liner shall consist of 60-mil string reinforced LLDPE or equivalent liner material that the appropriate division approves. The geomembrane liner shall be composed of an impervious, synthetic material that is resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions. The liner material shall be resistant to ultraviolet light. Liner compatibility shall comply with EPA SW-846 method 9090A.
- The operator shall minimize liner seams and orient them up and down, not across a slope. The operator shall use factory welded seams where possible. Prior to field seaming, the operator shall overlap liners four to six inches and orient seams parallel to the line of maximum slope, *i.e.*, oriented along, not across, the slope. The operator shall minimize the number of field seams in corners and irregularly shaped areas. Qualified personnel shall perform field seaming. The operator shall weld field liner seams.
- Construction shall avoid excessive stress-strain on the liner.
- Geotextile is required under the liner where needed to reduce localized stress-strain or protuberances that may otherwise compromise the liner's integrity.
- The operator shall anchor the edges of all liners in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 18 inches deep.

Berm Construction Diagram:

Please provide the following information on the construction diagram:

- Berm height and widths (at the existing surface and the top of the berm)
- Liner subgrade thickness (the liner subgrade conditions should exist the extent of the liner – which would include the interior side slopes)
- Protective soil layer (for liner) thickness
- Anchor trench width
- Liner material description should have a clarifying statement that any "equivalent" must be demonstrated and approved by the OCD prior to installation
- The manufacturer' liner specifications for the proposed 60-mil string reinforced LLDPE liner material.

Berm Layout Diagram:

The illustration demonstrates the presence of sumps which are located underneath and at the end of each truck load/off-load connection. Please provide a design diagram for the proposed sumps. Pursuant to Subsection H of 19.15.17.7 NMAC, a sump "means an impermeable vessel,

or a collection device incorporated within a secondary containment system, with a capacity less than 500 gallons, which remains predominantly empty, serves as a drain or receptacle for de minimis releases on an intermittent basis and is not used to store, treat, dispose of or evaporate products or wastes." Please provide a design diagram for the proposed sumps that satisfies the requirements identified above.

Attachment D, Closure and Post-Closure Plan:

The OCD was unable to locate a closure plan within the application packet. Please provide a closure plan for the bermed impoundment and the sumps that is based upon the closure requirements for a permanent pit pursuant to Subsections C, G, H, I, J, and K of 19.15.17.13 NMAC. A post-closure plan is not required for the proposed facility.

This section did include a quote from Backhoe Services, Inc. which suggests that it is "bid to: clean up and restore location to its original condition." The bid does not indicate the tasks that will be performed to complete the closure. Please explain the purpose of the document and what it represents.

Attachment D, Best management plan to ensure protection of fresh water, public health, safety, and the environment:

Best Management Practices:

The first bullet indicates that the "water loading and off-loading taps will have drip sumps provided." Please a design diagram for the proposed sumps. Pursuant to Subsection H of 19.15.17.7 NMAC, a sump "means an impermeable vessel, or a collection device incorporated within a secondary containment system, with a capacity less than 500 gallons, which remains predominantly empty, serves as a drain or receptacle for de minimis releases on an intermittent basis and is not used to store, treat, dispose of or evaporate products or wastes." Please provide a design diagram for the proposed sumps that satisfies the requirements identified above.

The first sub-bullet of the third bullet addresses the volume of the bermed area. The OCD requires operator to place above ground tanks on impermeable pads and surround the tanks with lined berms or other impermeable secondary containment system having a capacity at least equal to one and one-third times the capacity of the largest tank, or, if the tanks are interconnected, of all interconnected tanks. Operators are not required to provide secondary containment for tanks that contain fresh water and that are clearly so labeled and that are located outside the drum and container, process, maintenance, material, and waste storage areas. Please demonstrate compliance to requirement above.

In the second sub-bullet of the third bullet, please provide a clarifying statement that any liner "equivalent" must be demonstrated and approved by the OCD prior to installation. Also, please reference the location of the manufacturer' liner specifications for the proposed 60-mil string reinforced LLDPE liner material.

In the sixth bullet, please identify that the mechanism that each produced water hauler must possess in order to demonstrate that they have the authority to haul produced water and other oilfield waste material. Please review to the requirements of 19.15.34 NMAC for guidance.

In the seventh bullet, please identify the proposed disposal facilities by facility name, facility permit number, and/or API number.

Please address the recordkeeping requirements for the proposed facility. Please provide a copy of the facility inspection sheet. Please discuss the use and provide a copy of a form C-138 for which generators of waste are required to provide surface waste management facility operators upon delivery and acceptance of any waste material, pursuant to Subsection F of 19.15.36.13 NMAC.

Please address the proper labeling of tanks pursuant to the requirements of Subsection B of 19.15.18.16 NMAC.

Also, please discuss what actions will be implemented if a release occurs. Please demonstrate compliance of the release notification and corrective action provisions of 19.15.29 NMAC and 19.15.30 NMAC.

CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

April 7, 2010

To: Brad Jones, OCD
Subject: Application for Produced Water Treatment Facility
From: Tim Coakley, Jody Harris

Mr. Jones:

Please find enclosed a draft of the proposal from CAS for the Application for Produced Water Treatment Facility to be located at the CEHMM facility in Atoka, NM.

Please note that there are some Attachments that are placeholders for documents that have not been completed. These will be finalized in the following days.

If you have any questions, please feel free to contact me.

We look forward to hearing from you after you have had a chance to review this draft.

Sincerely,

Jody Harris
jharris@harrisdev.com
Office: 575-623-3201
Mobile: 575-208-4567

CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

April 15, 2010

To: Brad Jones, OCD
Subject: Application for Produced Water Treatment Facility
From: Tim Coakley, Jody Harris

Mr. Jones:

Please find enclosed amended sections of the draft of the proposal from CAS for the Application for Produced Water Treatment Facility originally sent to you on April 7, 2010

Enclosed you will find:

- An updated application summary (2 pages)
- An updated "Attachment D" separator sheet and a cost estimate for closing the site (2 pages)
- An updated "Attachment E" separator sheet and a best management practices (2 pages)
- And "Attachment F" separator sheet and a "Water transfer form" for receipt and release of produced water (2 pages)

If you have any questions, please contact me. We look forward to hearing from you on this.

Sincerely,

Jody Harris
jharris@harrisdev.com
Office: 575-623-3201
Mobile: 575-208-4567
Fax: 206-339-0014

CAS

3801 West Country Club Road Roswell, NM 88201
575-623-3201

Application for Produced Water Treatment Facility

April 7, 2010

Application for Produced Water Treatment Facility

Application: NEW

Type: Produced Water treatment Facility

Operator: Industry Standard Technology Corporation, dba Controlled Aqua Systems (CAS)

Address: 3801 W. Country Club, Roswell, NM 88201

Contact Person: Jody Harris Phone: 575-623-3201

Location: **SE 1/4** of **N 2/4** Section **16** Township **18S** Range **26E**

Industry Standard Technology Corporation DBA CAS proposes a Water treatment Facility for extracting clean water from oil field produced water.

- Produced water from area wells will be the source stream for the process.
- The clean water will be used in facilities approved by the Oil Conservation Division to receive such water.
- [The clean water will meet or exceed OCD standards as issued for this permit.]
- The "produced water concentrate" will be disposed of according to standard OCD approved procedures for produced water (19.15.34.11 NMAC).
- All produced water and produced water concentrate will be transported to and from the facility by OCD-approved C-133 transporters.

Index of Attachments:

Attachment A: Names and addresses of the applicant and principal officers and owners of 25 percent or more of the applicant. Specify the office held by each officer and identify the individual(s) primarily responsible for overseeing management of the facility.

Attachment B: Process description

Attachment C: Berm construction diagram

Attachment D: Closure and post closure plan, including a responsible third party

4/15/10

contractor's cost estimate, sufficient to close the water treatment facility in a manner that will protect fresh water, public health, safety and the environment.

Attachment E: a best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Attachment F: Water Transfer form for receipt and release of produced water

4/15/10

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Attachment A

Industry Standard Technology Corp.
dba Controlled Aqua Systems (CAS)

Address: 3801 W. Country Club Road
Roswell, NM 88201

Phone: 575-623-3201

Sole Owner/Officer - Timothy Coakley, President
2905 W 25th St
Roswell, NM 88201
Cell: 575-513-0201

Additional persons responsible for operations at site facility:

- Robert Archuleta - 1515 N. Missouri Ave., Roswell, NM 88201
- John Capehart - 601 Moore, Roswell, NM 88201
- Jody Harris - 407 N. York Ave., Hagerman, NM 88232

Attachment B

Process description

Process Flow Diagram for CAS Remediation Equipment

4-5-10

The descriptions below are referenced to the attached photographs of the produced water remediation system's equipment. Those photographs have been component named to correspond with the descriptions below.

The CAS system's primary function is to remediate oil and gas field produced waters by a process termed as progressive, selective, oxidation, isolation and functional removal of all contaminants present both in solution and in suspension of oil and gas produced waters to discharge levels in compliance with 3103 specifications.

The exact process knowhow is omitted from this disclosure and the focus of the document is on the input and outputs process and waste streams to and from all components.

An overview of the process design:

1. Produced waters are introduced to the CAS Remediation System via the **Pump Module** from **Produced Water Tank #1**. The primary function of the **Pump Module** it is to keep Process Vessel #1 at its operating level. In the case of "hot" (> 100 deg F) produced water, a closed loop cooling system (optional) which is located at the top of the trailer, may be connected in series, to facilitate the transfer of this heat to the atmosphere. The **Pump Module** functions as a metering device for the system. The Pump Module forwards every gallon of incoming produced water it receives to **Process Vessel #1**. Its waste products from the collection tank are routed to the **DWU** described in #13 below.

2. **Process vessel #1**- Is supplied by 5# compressed air, produced onboard the remediation system trailer. This compressed air is introduced to all of the liquid contained in **Process Vessel #1** by a proprietary mixing system. Suspended particles are agglomerated and routed to the **Dewatering System Unit (described in # 13 below)**, for separation. The collection of these suspended particles, as well as BS+W (Basin Sediment and Waste), are routed to the **Dewatering System Unit.** The remaining balance of the liquid continually flows in its entirety to **Process Vessel #2**. Level control is achieved by two separate means. *A high level in any Process Vessel will shut down the System Process Flow.

3. **Process Vessel #2** – is supplied ozone gas generated onboard **Process Trailer #2** . This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #2**. Agglomerated and separated particles and BS+W are

routed to the **Dewatering System Unit** . The remaining balance of the liquid continually flows in its entirety to **Process Vessel #3.**

4. **Process Vessel #3** – is supplied ozone gas generated onboard **Process Trailer #2** . This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #3.** Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #4.**

5. **Process Vessel #4**– is supplied ozone gas generated onboard **Process Trailer #2.** This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #4.** Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #4.**

6. **Process Vessel #5**– is supplied ozone gas generated onboard **Process Trailer #2.** This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #5.** Agglomerated and separated particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Vessel #6.**

7. **Process Vessel #6**– is supplied ozone gas generated onboard **Process Trailer #2.** This gas is completely introduced to the fluid being treated, by a proprietary system located inside of the vessel at the bottom of **Process Vessel #6.** Agglomerated and separated contaminant particles and BS+W are routed to the **Dewatering System Unit** . The remaining balance of the treated liquid continually flows in its entirety to **Process Trailer#2.**

8. **Process Trailer#2-** Contains the **Ozone Generating System,** (4) **Particle Filtration Systems,** a Total Organic Monitoring System (**TOC Analyzer**), a reverse osmosis system (**The R/O**), a reverse osmosis cleaning station and laboratory monitoring equipment for pH, TDS, Salinity and water flow. The trailer is powered by 480 3 phase electricity from **Process Trailer #1.**

9. **Ozone Generating** System – A self contained ozone generation system is contained within **Process Trailer#2.** It is routed to (5) Process Vessels as described above.

10. **TOC Analyzer -** A laboratory grade TOC analyzer is provided to monitor and sample the total organic carbon levels in the effluent of **Process Vessel #6.** This level is ideally maintained at 5 ppm or less

with an alarm function provided at 10 ppm that will cause the system on **Process Trailer #1** to go into recirculation mode, until the levels are reduced to the setpoint of the monitoring system.

11. **R/O** - A reverse osmosis system is provided to polish the treated water to standards required by the application being fed by the CAS Remediation System. The system has one liquid input supplied from the Activated Carbon Filter, and it has two discharge points. One is termed product water and it is routed from the R/O to the **CEHMM Water Storage Tank #1.** Reject water from the **R/O** is routed to the **Produced Water Return Tank** where it is transported to a licensed produced water disposal company. Backwash fluids from the R/O, when required, are routed to the Produced Water Return Tank. They are supplied from **CEHMM Water Storage Tank #1.**

12. Filtration Systems located in **Process Trailer #2** (4): Four back-washable permanent media filtration systems are contained within Process Trailer #2. All fluid discharged from Process Vessel #6 is passed in series through these four filters. One Activated Carbon Filter, also back-washable and permanent, is placed as a final polish before the input of the R/O. All backwash fluids passed from these filters are supplied from the **CEHMM Water Storage Tank #1,** and are routed to the **Dewatering System Unit (DWU)** for recovery and retreatment.

13. **Dewatering System Unit (DWU)**- The system is capable of containing all particles routed to the DWU by mechanical separation. Fluids routed to the DWU are recycled to Process Vessel #1. Separated solids are retained in the **DWU** and passed to a licensed oilfield waste handler to be routed to his approved landfill via a licensed waste handler vehicle.

14. **Produced Water Tank #1** - A 500 bbl fiberglass vessel .

15. **CEHMM Water Storage Tank #1 - a 500 bbl fiberglass tank.**

16. **Produced Water Return – 500 bbl fiberglass tank.**

Monitoring

Cleaned waters routed to the **CEHMM Water Storage Tank #1** are monitored locally by means of in place TDS and salinity monitoring systems installed permanently on the R/O.

Process Flow Diagram for CAS Remediation Equipment

4-5-10

Remediated produced waters from Process Vessel #6 are continuously monitored 10 times per hour when system is operating by the **TOC Analyzer.** Salinity and TDS readings are sampled by the operators periodically as the system is in operation.

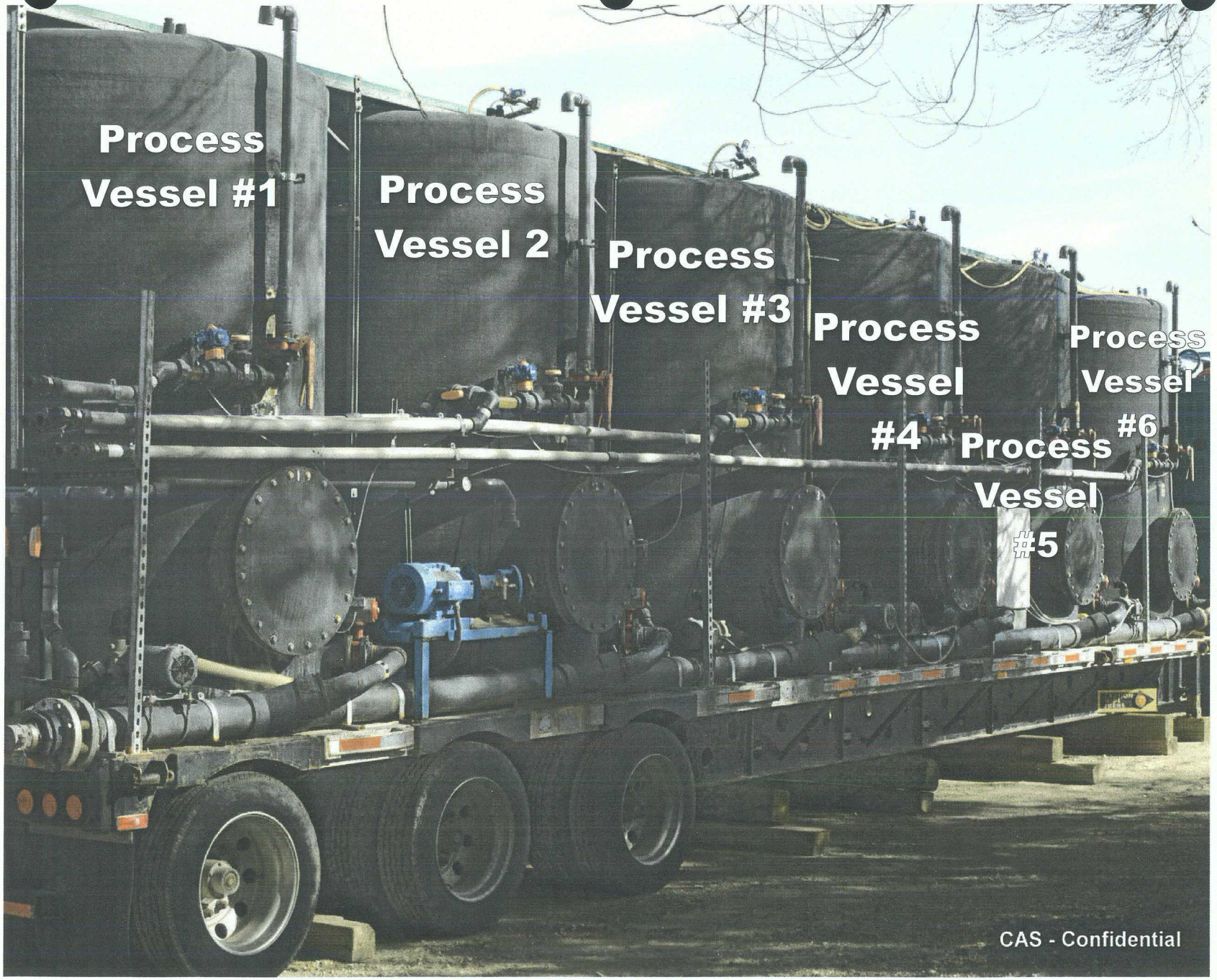
All vessel Water levels are continuously monitored by both electronic and mechanical means to insure that normal operating levels exist at all times during system operation. High fluid levels in any Process Vessel will cause the shutdown of the system preventing any input. Operators walk around the system hourly and are positioned so that any variations from normal operation can be seen immediately.

The **DWU 's water level** is also monitored and a high level will shutdown the system and cause an alarm to sound along with a flashing light.

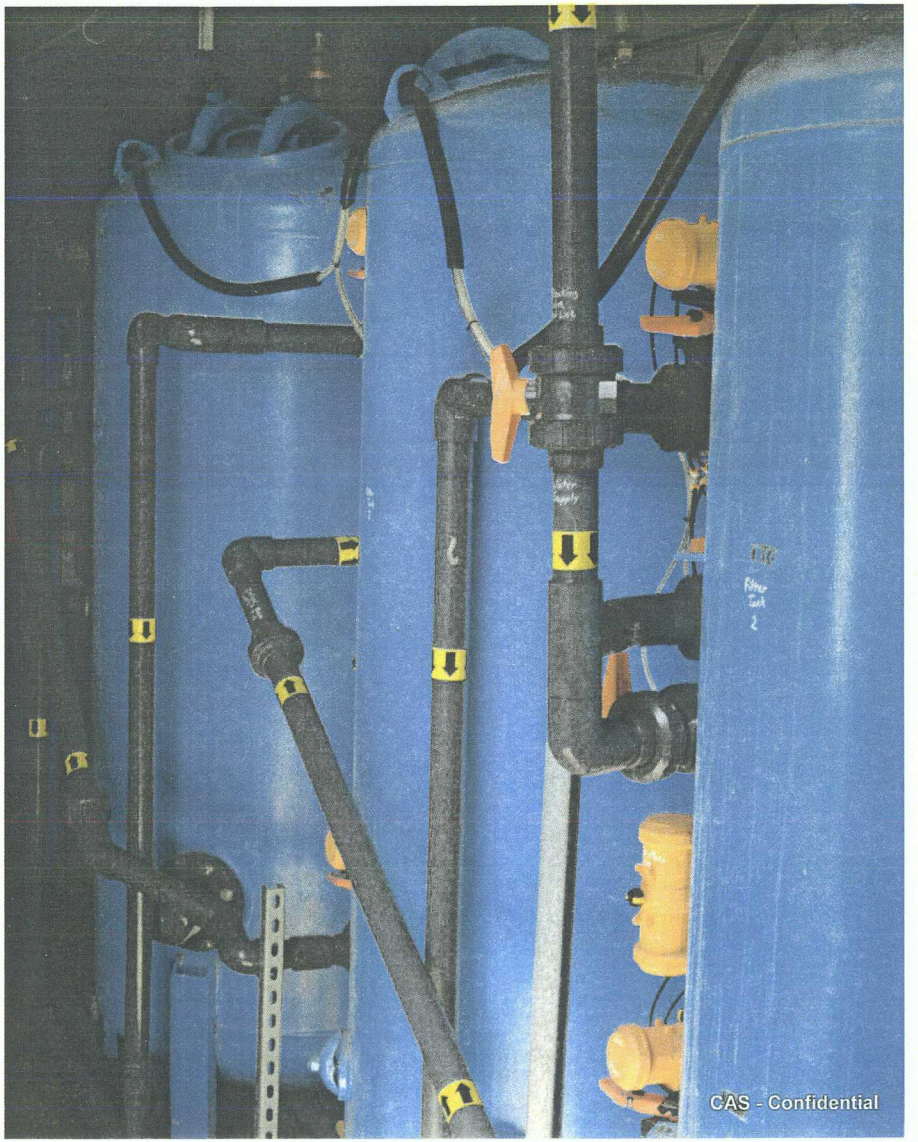
The CAS battery of four (4) 500 bbl tanks, which are located inside the berm, are continuously monitored both mechanically and visually for high levels.
Battery access extends beyond the berm and each access point is fitted with drip pans to catch and collect connection loss. An off-road turnout is provided to isolate produced water trucks from the berm and CEHMM production areas. This turnout will be protected by locked gates to minimize interference by uninvited people or animals during the unoccupied periods for the site.

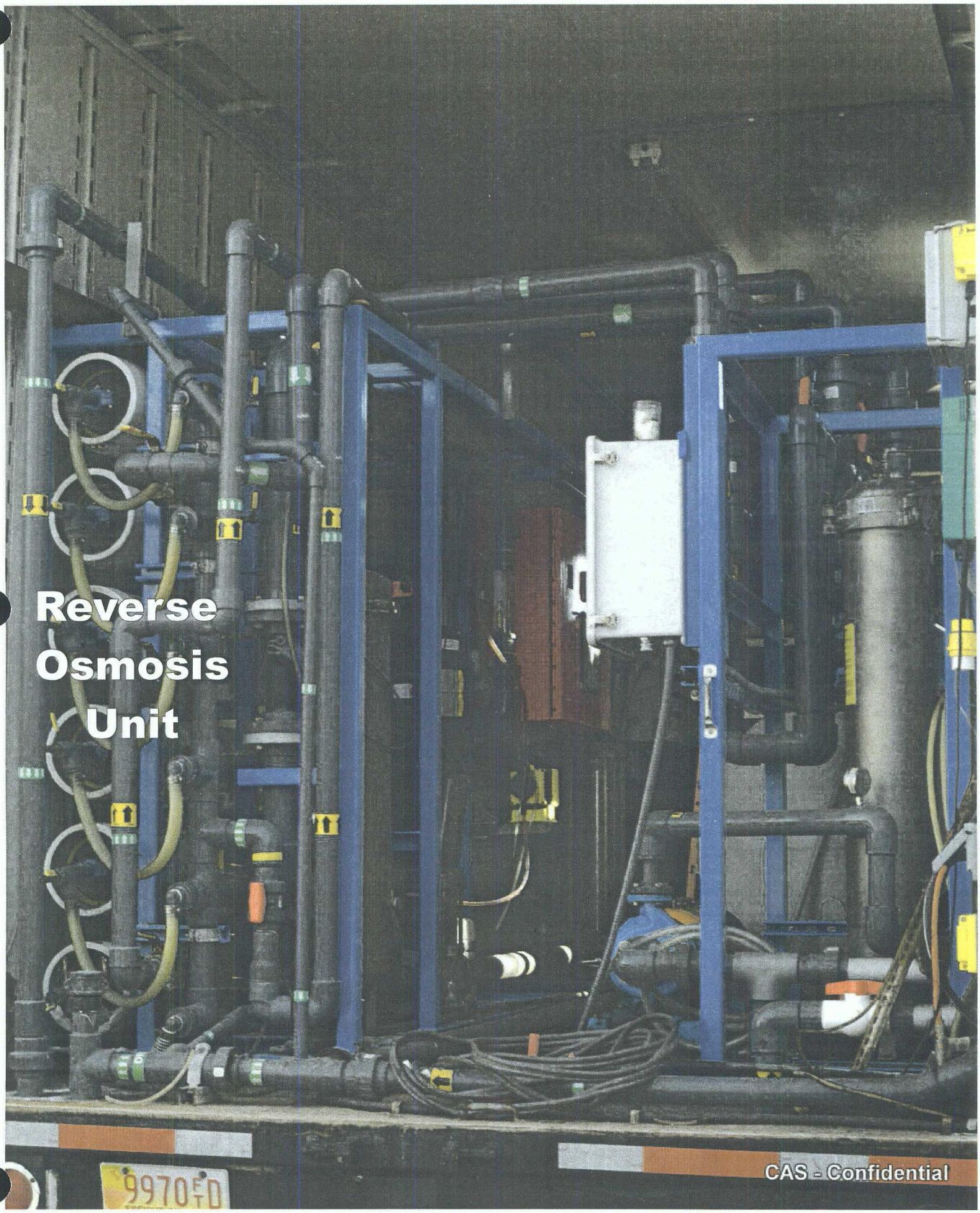
BERM

A 125' x 150' (id) berm, fitted with a 60 mil liner, detailed elsewhere in this submittal, has the capacity to hold 350% of the fluids contained in every system that is located inside the berm.


Process Vessel #1
Process Vessel 2
Process Vessel #3
Process Vessel #4
Process Vessel #5
Process Vessel #6
CAS - Confidential

Filtration Units



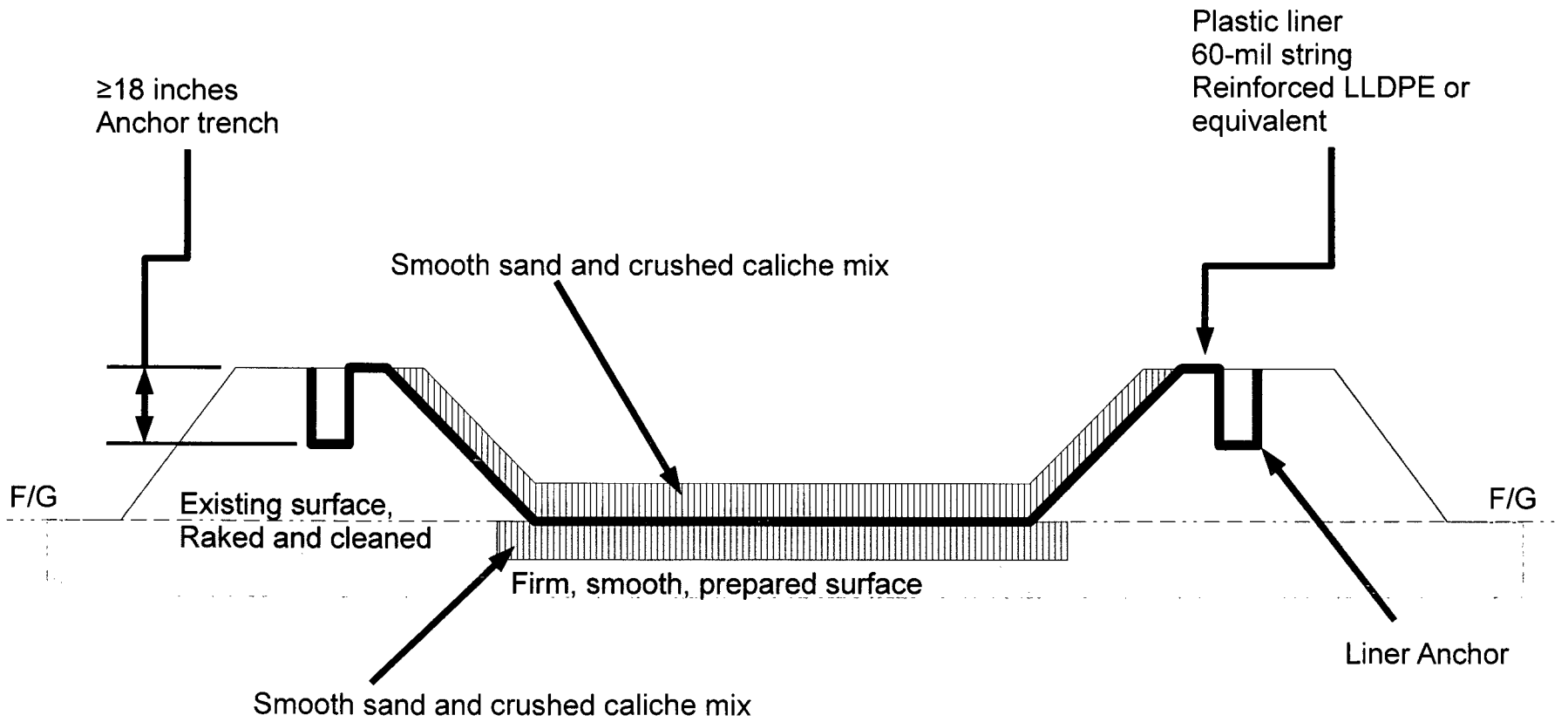

Reverse
Osmosis
Unit
CAS - Confidential

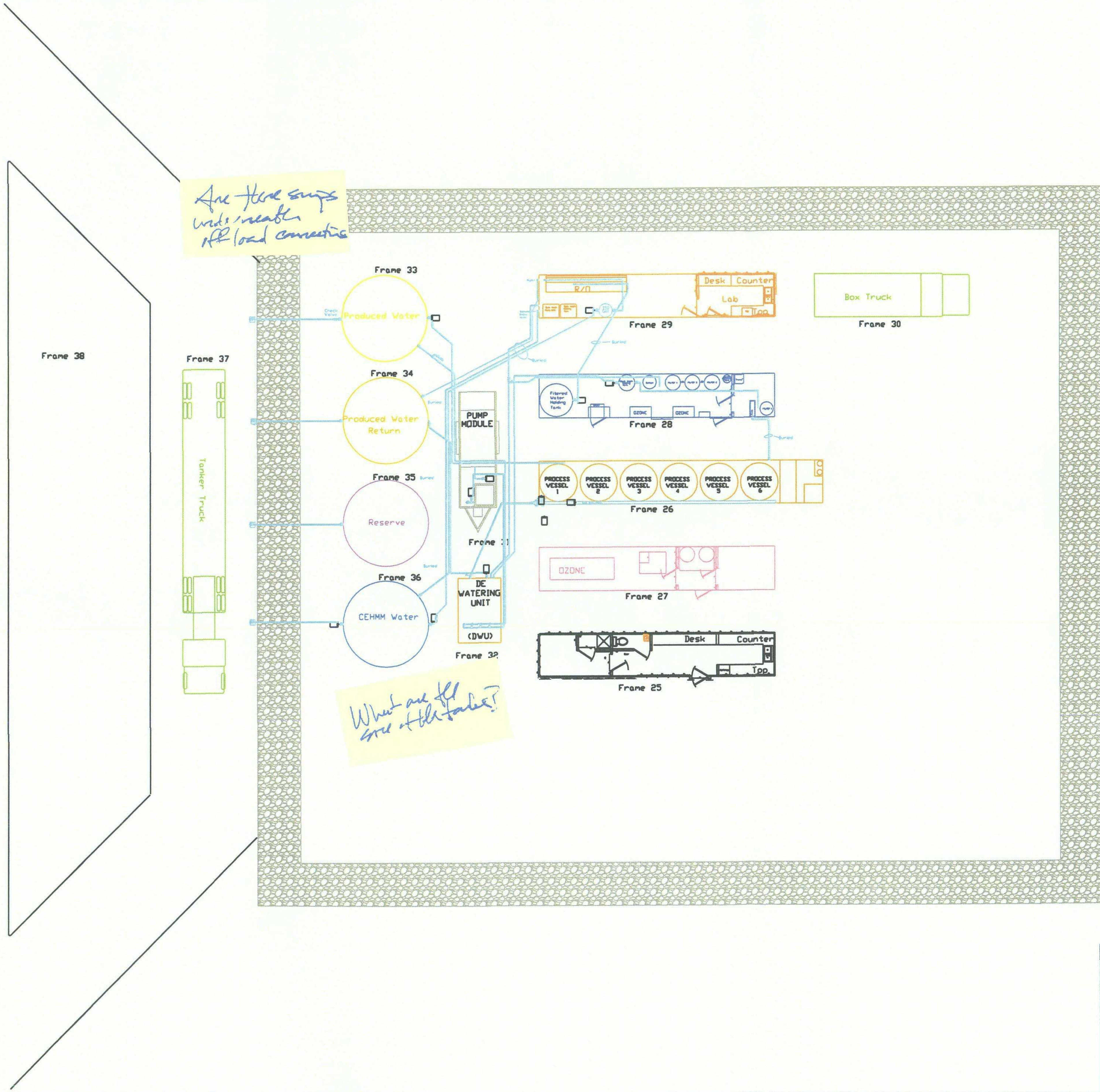
De-watering Unit

Attachment C

Cross-section diagram of berm construction design

Berm Construction Diagram
(drawing not to scale)




Frame 38
Frame 37
Tanker Truck
Frame 33
Produced Water
Frame 34
Produced Water Return
Frame 35
Reserve
Frame 36
CEHMM Water
PUMP MODULE
DE WATERING UNIT
(DWU)
Frame 32
Frame 29
R/O
Desk
Counter
Lab
Frame 30
Box Truck
Frame 28
OZONE
Frame 26
PROCESS VESSEL 1
PROCESS VESSEL 2
PROCESS VESSEL 3
PROCESS VESSEL 4
PROCESS VESSEL 5
PROCESS VESSEL 6
Frame 27
OZONE
Frame 25
Desk
Counter

C.A.S CONTROLLED AQUA SYSTEMS

CEHMM BERM LAYOUT

OD 133' X 158' ID 125' X 150'

Attachment D

Closure and post closure plan

4/15/10

BACKHOE Services, Inc.

P.O. Box 842
ARTESIA, NM 88211-0842
(575) 365-2356 Phone
(575) 365-2353 Fax
License # 58106

April 15, 2010

Controlled Aqua Systems
3801 W Country Club Rd
Roswell, NM 88201

Ref:Bid-NM State BIO Diesel Project

Mr. Harris,

We wish to submit the following bid to:

Clean up and restore location back to its original condition

Price $10,500.00

Plus Tax

Price difference 20 mill plastic liner vs 60 mill plastic liner .75¢ extra per square foot.

Thank you for the opportunity to submit this bid.

Sincerely,

Al Franco

BF/bf

4/15/10

Attachment D

Closure and post closure plan

[Plan and cost estimate to be submitted from an independent contractor]

Attachment E

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

4/15/10

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

Best Management Practices:

- Water loading and off-loading taps will have drip sumps provided
- Loading and off-loading drip sumps will be checked every 24 hours to monitor for valve leaks
- The treatment facility is located within the limits of a lined, bermed area,
    - The volume of the bermed area is aproximately 1500% the volume of the largest vessel,
    - The berm is lined with a 60 mil, string reinforced LLPDE or equivalent plastic liner
    - Liner is anchored in an anchor trench to ensure that the liner remains in place for the lifetime of the installation
- All of the produced water storage and treatment equipment is located within the lined, bermed area
- All water delivered to the facility or transported from the facility will be documented with a water transfer ticket.
- All water delivered to the facility or transported from the facility will be transported by a state approved produced water hauler.
- All water transported from the facility for disposal will be transported to a state approved produced water disposal site.
- All water transfer tickets will document the well which produced the water or the disposal well which received the water.

4/15/10

Attachment E

Best management practice plan to ensure protection of fresh water, public health, safety and the environment.

[Best management practice plan will be written later.]

Attachment F

Water transfer form for receipt and release of produced water

4/15/10

Water transfer form for receipt and release of produced water

Date: _____

Water received from producer:	Water released to disposal:
Well API#: _____	Well API#: _____

Volume of water transfered (bbl): _____

Water hauler: _____
(Copy of C-133 form must be produced on request)

4/15/10

Attachment F

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