

06/14/2019



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Wednesday, June 12, 2019
WELL WORK PERMIT
Vertical / New Drill

EAGLE NATRIUM LLC
POST OFFICE BOX 191
NEW MARTINSVILLE, WV 26155

Re: Permit approval for BW 20
47-051-02209-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: BW 20
Farm Name: EAGLE NATRIUM, LLC
U.S. WELL NUMBER: 47-051-02209-00-00
Vertical New Drill
Date Issued: 6/12/2019

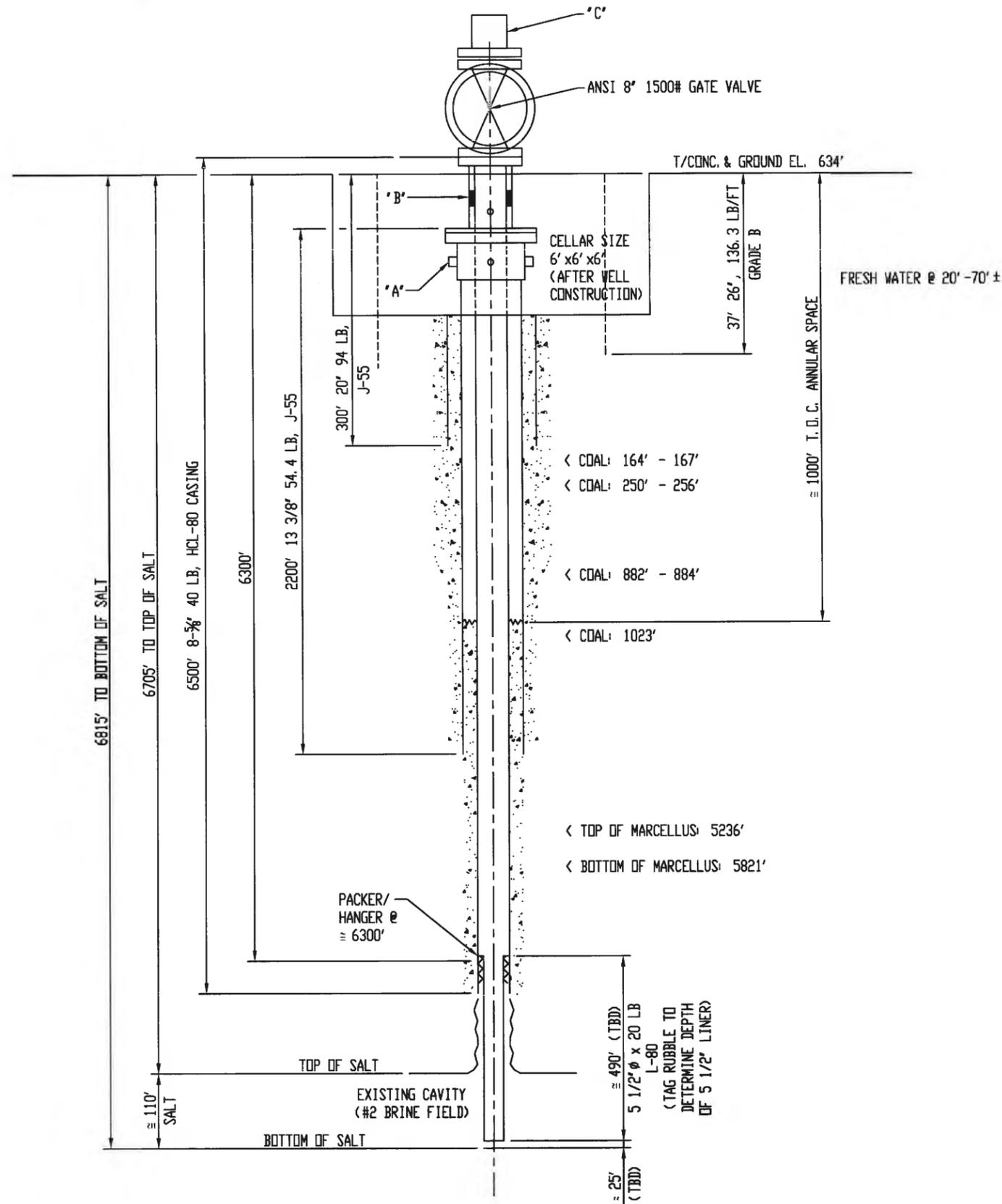
Promoting a healthy environment.

PERMIT CONDITIONS

West Virginia Code §22-6-11 allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code §22-6-20, which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
2. Pursuant to 35 CSR 4-19.1.a, at the request of the surface owner all water wells or springs within 1000 feet of the proposed well that are actually utilized for human consumption, domestic animals or other general use shall be sampled and analyzed.
3. Pursuant to 35 CSR 4-19.1.c, if the operator is unable to sample and analyze any water well or spring with one thousand (1,000) feet of the permitted well location, the Office of Oil and Gas requires the operator to sample, at a minimum, one water well or spring located between one thousand (1,000) feet and two thousand (2,000) feet of the permitted well location.
4. All pits must be lined with a minimum of 20 mil thickness synthetic liner.
5. In the event of an accident or explosion causing loss of life or serious personal injury in or about the well or while working on the well, the well operator or its contractor shall give notice, stating the particulars of the accident or explosion, to the oil and gas inspector and the Chief within twenty-four (24) hours.
6. During the surface casing and cementing process, in the event cement does not return to the surface, or any other casing string that is permitted to circulate cement to the surface and does not return to the surface, the oil and gas inspector shall be notified within twenty-four (24) hours
7. Well work activities shall not constitute a hazard to the safety of persons.
8. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.



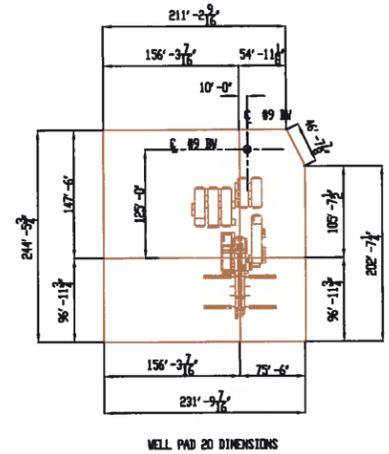
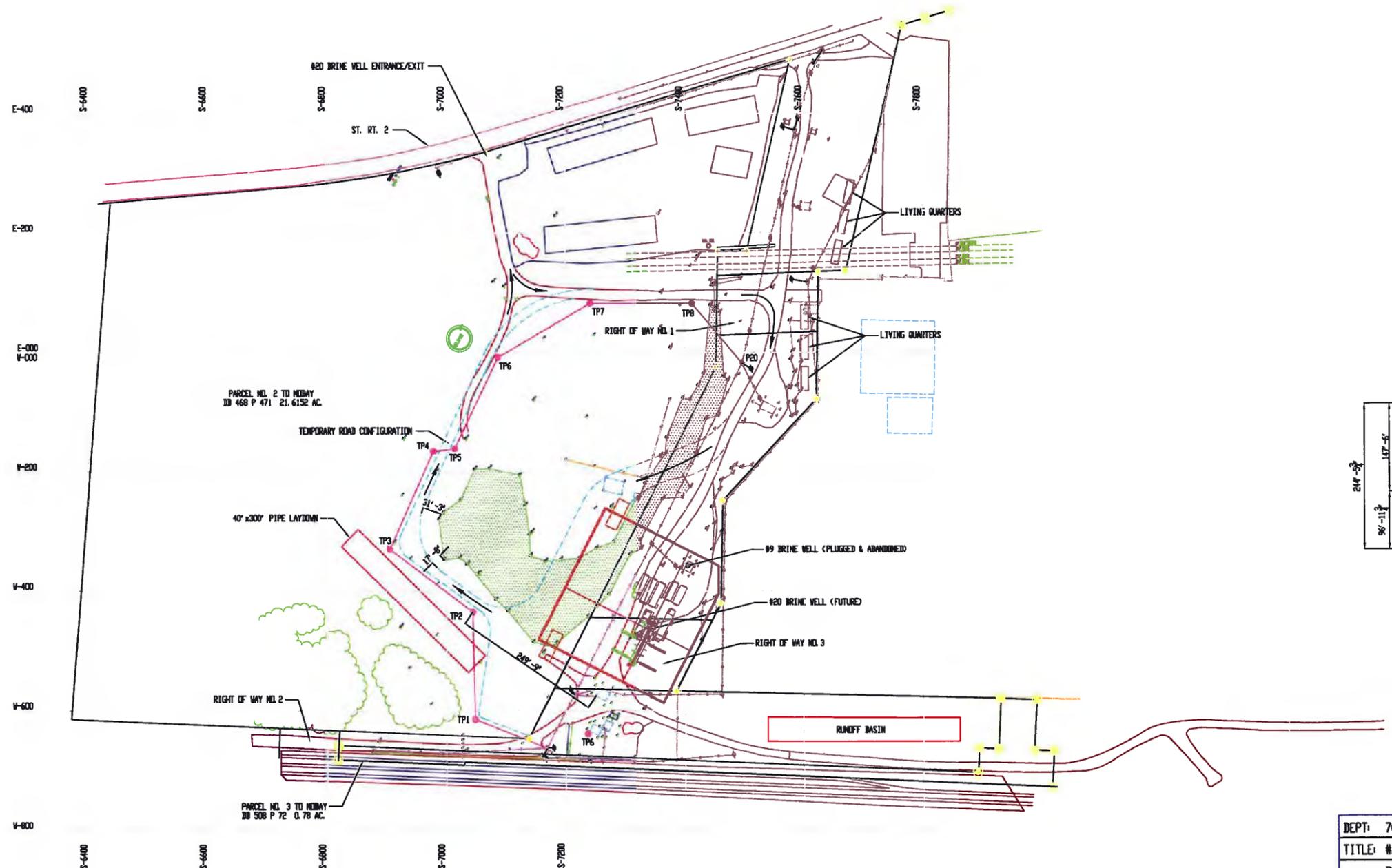
- CONDUCTOR PIPE - 26" CARBON STEEL, 1/2" WALL THICKNESS, 136.3 LB/FT, GRADE B, NOT CEMENTED, 37' APPROX.
- FRESH WATER PIPE - 20" J-55, 94 LB/FT, CEMENT TO SURFACE, 300'. (SURFACE CASING)
- INTERMEDIATE - 13-3/8" J-55, 54.5 LB/FT, 2200' APPROX., CEMENTED TO SURFACE, 8 RND. THRD. & SHORT COUPLED, RANGE 3, ERW..
- PRODUCTION - 8-5/8" HCL-80, 40 LB/FT, 6500' APPROX, CEMENTED TO 1000', 8 RND THRD. & LONG COUPLED, RANGE 3, SEAMLESS.
- LINER - 5-1/2" L-80, 20 LB/FT, NOT CEMENTED, 6300' TO 6790' APPROX.
- VALVE - TBD
- WELLHEAD "A" - TBD (BRADEN HEAD)
- PACKOFF SPOOL "B" - TBD
- TOP FLANGE "C" - TBD
- RING JOINT GASKET - TBD
- PACKER/HANGER - TBD

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Office of Oil and Gas
APR 25 2019
WV Department of
Environmental Protection

REV. BY	DATE	DESCRIPTION
C DMW	7/03/18	REVISED FRESH WATER PIPE DISTANCE TO 300'
B DMW	07/19/19	NEW NL 20 BRINE (INJECTION) WELL UPDATED
A DMW	07/03/18	NEW NL 20 BRINE (INJECTION) WELL

DEPT: 70 - BRINE	
TITLE: NL 20 BRINE (INJECTION) WELL (API #47-051-XXXX)	
DRAWING TYPE: MECHANICAL PROCESS EDPT	MPE
EQUIPMENT No: 7000-115-20	
DRAWN: DMW	DATE: 07/03/18
CHECKED: S. CLARK	DATE: 07/04/18
APP' V'D	DATE
SCALE: NONE	ACAD: YES
JOB No: P-470-H	REV
DWG: 70-2560	C





LEGEND

- PILE LINE
- FENCE
- PROP LINE
- TEMP. ROAD
- ALTERNATE ROAD

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WV Department of
Environmental Protection

DEPT: 70 - BRINE	
TITLE: #20 BRINE WELL	
DRILL RIG LOCATION / PROPOSED SITE LAYOUT	
DRAWING TYPE: .	
EQUIPMENT No: 7000-115-020	
DRAWN MAH	DATE 01/09/19
CHECKED .	DATE .
APP' VD .	DATE .
SCALE 1"=100'	ACAD YES
JOB No .	REV
DWG 70-0370	0

REV.	DATE	DESCRIPTION	DRWN.	CHKD.	APP'.
0	01/10/19	FOR PERMIT			MAH

REVISION RECORD

SNC-LAVALIN America
300 Woodcliff Dr, Suite 211
Canonsburg, Pa. 15317
(412) 363-9000

PROJECT NO.	AREA	DISC.	DOC.	DRAWING NUMBER	REVISION NUMBER
655604	0000	46	D3	0000	0

NOTES:
1. BACKGROUND TAKEN FROM SLS TPOI SURVEY OF NOVEMBER 2018.

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6, Section 8(d)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
PPG Industries, Inc.	Eagle Natrium, LLC	Eagle Natrium, LLC has a legal right to mine PPG Ind., Inc. salt per the Real Property Agreement dated January 22, 2013	DB 786/ Page 537

**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources
- WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

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Office of Oil and Gas

JUN 6 2019

**WV Department of
Environmental Protection**

Well Operator:
By: lts:

Eagle Natrium, LLC

J. Thomas Horan

Manager, Environmental Control

WW-2B1
(5-12)

Well No. No. 20 Brine Well (N/A)

West Virginia Department of Environmental Protection
Office of Oil and Gas

NOTICE TO SURFACE OWNERS

The well operator named below is preparing to file for a permit from the state to drill a new well. Before a well work permit can be filed with the Chief of the Office of Oil and Gas, the well operator is required to have given notice of the right to request water well or spring analytical testing. This notice shall be given to the owners or occupants of land which have a water well or spring being utilized for human consumption, domestic animals, or other general use and which is located within 1000 feet of the proposed well site.

With this form, the operator is giving you notice of your right to request analytical testing. The operator is required to sample and analyze the water wells or springs of all owners or occupants who request it. Therefore, if you wish to have your water well or spring tested, contact the operator named below.

All sampling shall be completed prior to drilling. Within thirty (30) days of the receipt of such sample analyses the operator shall submit the results to the Chief of the Office of Oil and Gas and to the owners or occupants who may have requested them.

Be advised, you have the right to sample and analyze any water supply at your own expense.

Listed below is the laboratory chosen by operator to perform analysis, and contractor chosen to collect sample.

Certified Laboratory Name N/A
Sampling Contractor N/A

Well Operator Eagle Natrium, LLC owns surface rights
Address 16339 Energy Rd., Proctor, WV 26055
There are no water wells or springs within 2000 ft. of new #20 Brine Well that are used for human consumption
Telephone or domestic animal consumption.

FOR OPERATOR'S USE ONLY: Below, or on an attached page, list those persons which were given this notice. Place an asterisk beside the one(s) that contacted you and requested sampling and analyses. If there were no requests made, indicate by underling which one you have selected to sample and analyze. If there are no water wells or springs within 1000 feet of the proposed site, the Chief may require the operator to test wells up to 2000 feet from the proposed site.

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Office of Oil and Gas
APR 25 2019
WV Department of
Environmental Protection

47-051-02209

EAGLE NATRIUM, LLC

11.69 AC. ±
WELL NO. BW 20

NAD '83 LATITUDE 39°45'00"

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Office of Oil and Gas

JUN 6 2019

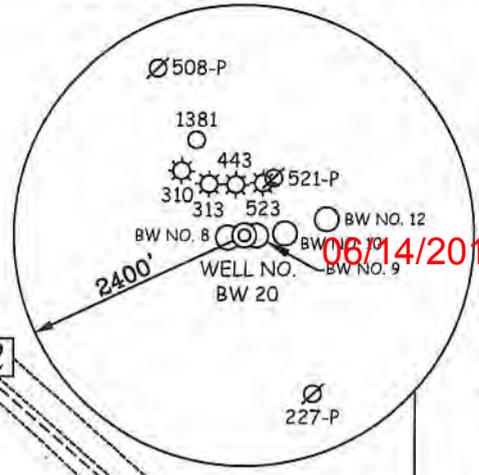
WV Department of
Environmental Protection

WELL NO. BW 20
STATE PLANE COORDINATES
NORTH ZONE (NAD '83)

N. 451,318.21
E. 1,592,493.81

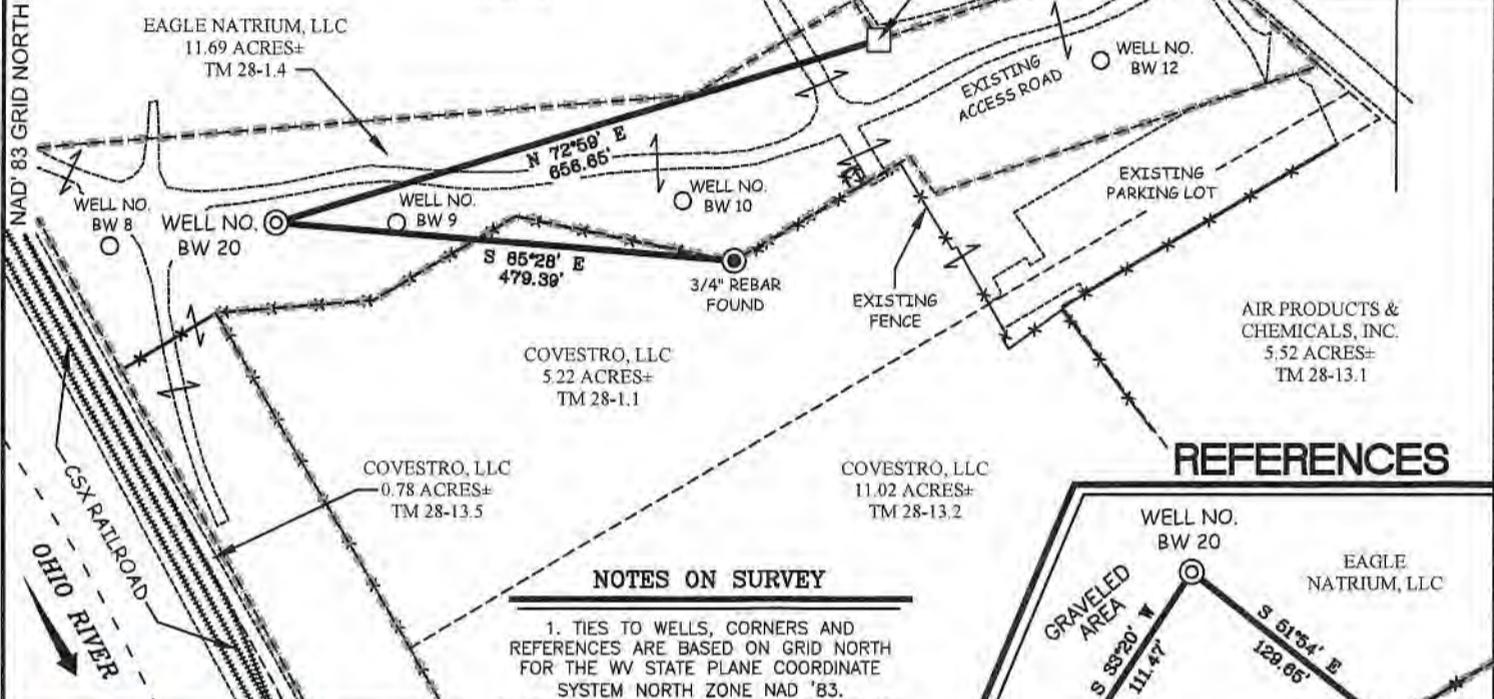
LAT=(N) 39.731419
LONG=(W) 80.837001

UTM (NAD '83)(METERS)
N. 4,397,960.789
E. 513,967.884

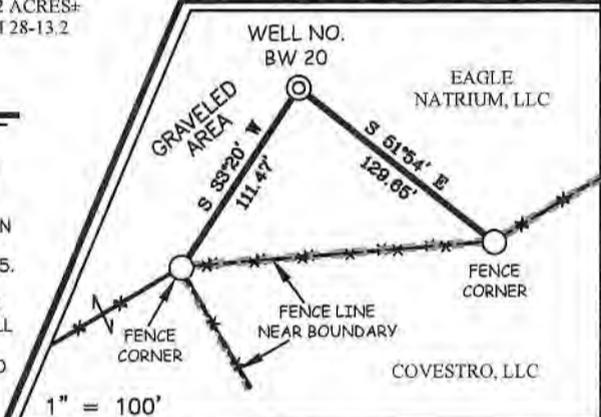


NAD '83 GRID NORTH

NAD '83 LONGITUDE 80°50'00"



REFERENCES



NOTES ON SURVEY

1. TIES TO WELLS, CORNERS AND REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '83.
2. TRACT BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 799 PAGE 387 AND A PREVIOUS SURVEY BY SLS IN 2004 - 2005.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF MARSHALL COUNTY IN OCTOBER, 2018.
4. WELL LAT./LONG. (NAD'83) ESTABLISHED BY DGPS(SURVEY GRADE).

SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26351 • (304) 482-5634
www.slsurveys.com

I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE NOVEMBER 5, 20 18
 REVISED 11/16/18, 6/06/19
 OPERATORS WELL NO. BW 20
 API WELL NO. 47 - 051 - 02209
 STATE 47 COUNTY 051 PERMIT 02209

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8874PBW20R2.dwg
 HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 200'

STATE OF WEST VIRGINIA
 DIVISION OF ENVIRONMENTAL PROTECTION
 OFFICE OF OIL AND GAS

WELL TYPE: OIL <input type="checkbox"/> GAS <input type="checkbox"/> INJECTION <input checked="" type="checkbox"/>	WASTE DISPOSAL <input type="checkbox"/>	IF "GAS" PRODUCTION <input type="checkbox"/> STORAGE <input type="checkbox"/> DEEP <input checked="" type="checkbox"/> SHALLOW <input type="checkbox"/>
LOCATION: GROUND	ELEVATION <u>634'</u>	WATERSHED <u>OHIO RIVER</u>
DISTRICT <u>FRANKLIN</u>	COUNTY <u>MARSHALL</u>	QUADRANGLE <u>NEW MARTINSVILLE 7.5'</u>
SURFACE OWNER <u>EAGLE NATRIUM, LLC</u>	ACREAGE <u>11.69 ±</u>	
ROYALTY OWNER <u>EAGLE NATRIUM, LLC</u>	ACREAGE <u></u>	
PROPOSED WORK: DRILL <input checked="" type="checkbox"/> CONVERT <input type="checkbox"/> DRILL DEEPER <input type="checkbox"/> REDRILL <input type="checkbox"/> FRACTURE OR STIMULATE <input type="checkbox"/> PLUG OFF OLD FORMATION <input type="checkbox"/> PERFORATE NEW FORMATION <input type="checkbox"/> PLUG AND ABANDON <input type="checkbox"/> CLEAN OUT AND REPLUG <input type="checkbox"/> OTHER <input type="checkbox"/>	PHYSICAL CHANGE IN WELL (SPECIFY) <u></u>	TARGET FORMATION <u>SALINA</u> ESTIMATED DEPTH <u>6,700' - 6,800'</u>

WELL OPERATOR EAGLE NATRIUM, LLC ADDRESS P.O. BOX 191 NEW MARTINSVILLE, WV 26155
 DESIGNATED AGENT J. THOMAS HORAN ADDRESS P.O. BOX 191 NEW MARTINSVILLE, WV 26155

COUNTY NAME
PERMIT



**Westlake
Chemical**

**BRINE WELL NO. 20
NATRIUM FACILITY**

**SPECIFICATION FOR
DRILLING & COMPLETION BRINE WELL No. 20**

LONQUIST



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Office of Oil and Gas

APR 25 2019

WV Department of
Environmental Protection

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391		
				Date: April 2018		
				Page: 2 of 24		
Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County			
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC			
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining			
INTRODUCTION:						
<p>Westlake Chemical Company ("Eagle Natrium, LLC") contracted Lonquist Field Service, LLC ("LFS") to develop a drilling prognosis and drilling cost estimate for a new brine well at their Marshall County, West Virginia Natrium Facility. The new Class III Solution Mine Well ("Brine Well No. 20") will be drilled and completed with 8-5/8" HCL-80 production casing into the Salina Formation and equipped with an 8" ANSI 1500 Master Valve, and 5-1/2" liner will be set 25ft from the bottom of the cavern.</p>						
<p>The new Class III brine well will include the following wellbore configuration:</p>						
<ul style="list-style-type: none"> • 26", 136.30Lbs/ft, Grade B, PE, Conductor Pipe – 37 ft (not installed just temporary) • 20", 94Lbs/ft, J-55, BTC, Surface Casing – 300 ft • 13-3/8", 54.5Lbs/ft, J-55, STC, Intermediate Casing – 2,200 ft • 8-5/8", 40Lbs/ft, HCL-80, LTC, Production Casing – 6,500 ft • 5-1/2", 20Lbs/ft, L-80, LTC, Liner with liner top packer – 6,300 ft to 6,790 ft (or 25 ft off the top of the rubble) • Top of Cavern – 6,705 ft • Cavern TD – 6,815 ft 						
<p>The drilling procedure and well configuration are based off of the attached proposed wellbore schematic. The following points outline main goals of the drilling operations:</p>						
<ul style="list-style-type: none"> • Survey and prepare the location (Non-Lonquist scope) • Drill mousehole and 26" conduction casing and rig down • Move in and rig up the drilling contractor, closed loop system, and air drilling equipment • Use 24" bit and air hammer to drill to 300' GL (320' RKB) • Run an openhole logging suite to confirm BGW depth and surface casing setting depth • Set 20" surface casing to 300' GL (320' RKB) and cement to surface. <ul style="list-style-type: none"> ○ To protect groundwater resources per WV DEP Office of Oil & Gas direction. • Run cased hole logging suite (CBL) • Use 17-1/2" bit and air hammer to drill Intermediate Casing hole down to approximately at 2,220' GL (2,240' RKB) • Run an openhole logging suite • Set 13-3/8" Intermediate Casing at 2,200' GL (2,220' RKB) and cement to surface. <ul style="list-style-type: none"> ○ Intermediate Casing recommended to protect certain geologic formations Mississippian formation (Big Injun, Weir, and Berea Sandstones) behind pipe. • Install the Bradenhead "A" section of Wellhead • Run cased hole logging suite (CBL) • Switch to salt saturated polymer based mud • Use 12-1/4" bit to drill Long String Production Casing hole to 6,520' GL (6,540' RKB) • Run and set 8-5/8" Long-String Production Casing to 6,500' GL (6520' RKB) and cement up to 1,000 ft from surface. <ul style="list-style-type: none"> ○ Production Casing recommended to protect certain geologic formations Marcellus Shale and Oriskany Sandstone behind pipe while drilling to TD. ○ Estimated open air string weight = 260,800 lb 						
PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391	
				Date: April 2018	
				Page: 3 of 24	
Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County		
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC		
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining		
<ul style="list-style-type: none"> • Install B-Section of Wellhead • Use 7-3/8" bit to drill out cement float collar, cement shoe, and to TD • Run 5-1/2" Liner from 6,300ft to 6,790 ft set on a packer. <ul style="list-style-type: none"> ◦ May not be able to set down to 6,790 ft and setting depth will be based on the TD of cavern. • Install final wellhead and 8" ANSI 1500 Master Valve • RDMO drilling rig. • Turn well over to Westlake Chemical 					
REGULATORY INFORMATION: <p>Brine Well No. 20 is regulated by the West Virginia Department of Environmental Protection (WV DEP) Office of Oil and Gas (OOG). The WV DEP Office of Oil & Gas will be notified and all activities approved of prior to commencing work activities.</p>					
SAFETY INFORMATION - VISION STATEMENT: <p>LFS believes that all accidents and incidents are preventable. Our corporate goal is to have zero incidents, accidents, or near misses. To further our commitment to safety, LFS has staffed a Safety Director, whose sole purpose is to identify and mediate possible safety concerns and to be a resource to advise on such safety issues. He will be involved in work safety plans, managing JSAs, and offering oversight on our daily safety meeting program. We require that all of our employees and subcontractors accept that philosophy and uphold the standards of LFS. Our field supervisors are well-control certified, with both site specific and industry required safety qualifications related to new well drilling and well workovers. LFS supervisors are responsible to complete pre-job meetings with the contractors and clients, obtain daily work permits, complete JSAs, safety meetings, review Emergency Response Plans, identify any unsafe practices or potential hazards, and implement corrective actions to minimize employee exposure. LFS implements a site specific safety plan that defines the scope of work and identifies the appropriate safety standards and responsibilities for applicable parties for each project performed. LFS will implement a complete HSE plan for all phases of the operation. Our goal is always to ensure compliance with all client needs, as well as all local, State, and Federal safety and environmental regulations.</p> <p>A work permit per tour, obtained from LFS, will be required, and well site safety meetings will be conducted at the beginning of each tour and at the beginning of critical operations by LFS supervisor prior to commencing any well work. All contractors involved during the tour or the critical operations will be required to attend the safety meeting, and all will be required to participate in the JSA process.</p> <p>The following safety gear and personal protective equipment are required:</p> <ul style="list-style-type: none"> • Hard Hat • Safety Glasses with side protection (shields or curvature) • Fire Retardant Clothing • Colored work vest when working within 150' of roads or near moving heavy equipment • Steel-toed Safety Shoes w/Ankle Support – Leather or Rubber • Gloves • Fall protection required – 4' or above • Any additional required safety equipment 					
RECEIVED Office of Oil and Gas APR 25 2019					
PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE
JRW	08/08/2018	ETB	08/08/2018		
Client: Westlake Chemical WV Department of Environmental Protection					

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391		
				Date: April 2018		
				Page: 4 of 24		
Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County			
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC			
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining			
<ul style="list-style-type: none"> • Tour and Critical Operation Safety Meeting • JSA Form – Completed per tour and prior to critical operations by all contractors present <p>Additional safety and housekeeping items include:</p> <ul style="list-style-type: none"> • A Hot Work Permit is REQUIRED to perform any work where an engine will be running • A copy of all hot-work permits will be kept on file • The LEL will be checked at the start of the workday and anytime work ceases for more than 30 minutes • All personnel will be required to complete at least once the safety orientation required by Westlake Chemical Natrium • Zero tolerance for any fluid release • Spills and releases to be reported to Westlake Chemical Natrium • Any Injuries and Near Misses are to be reported and investigated to/by LFS and Westlake Chemical Natrium • Vehicles to have company placards or logos • Good housekeeping standards • No Tobacco or Vapor Products on Westlake Chemical Property <p>A completed and detailed site specific safety plan along with a spill containment plan is being generated to accompany the drilling procedure, and it will be included with the final field package for the project.</p> <p>WORK PLAN:</p> <p>The daily work activities will commence after all permits have been acquired and the pre-tour safety meetings have been completed. All depths shown below are estimated depths and based on previous drilling operations. The well conditions and local geology will dictate the final setting depths of each casing string. The WV DEP Office of Oil & Gas will be contacted and plans submitted for any activity that deviates from the plan prescribed below.</p> <p>Location Preparation Recommendations</p> <ol style="list-style-type: none"> 1. Survey and stake the location and drilling pad area 328 feet x 164 feet to accommodate the drilling and support equipment. Install sufficient pilings, boards and mats, gravel, and culverts to create an all-weather location, as required. Construct roadways and turnarounds, as required. Construct a plastic-lined berm around the perimeter of the location for containment of storm water from the location. 2. Install sign on entrance road to the wellsite displaying the following information: <ol style="list-style-type: none"> a. Westlake Chemical, Lease Name, Well API #, District, Emergency Contact Information 3. Assure that Westlake Chemical Natrium Facility has depressurized the brine field below 500 psig. 						
PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391	
				Date: April 2018	
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Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County		
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC		
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining		

Pre-job Notifications

4. **Notify WV DEP Office of Oil & Gas (Office of Oil and Gas) 30 days prior (24 hrs at a minimum) to the commencement of drilling.**
 - a. WV DEP Office of Oil & Gas Contacts: 601 - 57th Street
Charleston, WV 25304
(304) 926-0450
 - b. An e-mail should be submitted to DEPOOGNOTIFY@wv.gov to notify the WV DEP OOG 30 days before drilling.
 - i. Detail the following: (Date the well will be spudded, drilling contractor name, and API well serial and lease numbers)
 - c. Contact the state inspector (James Nicholson) whose contact information is in the regulatory section of this procedure.

Conductor Casing

5. Move in and rig up conductor casing contractor, and auger out an 8ft diameter hole that is 10ft deep, and install a tin horn of corrugated steel for the cellar.
6. Drill mousehole, and auger a 26" diameter hole down to 37ft for the 26" conductor casing. Run 26" temporary conductor pipe down to 37ft leaving 3 feet above grade.
7. Tap a 4" LP outlet. Install a 4" LP nipple and ball valve for a drain.
8. Rig down and move out the conductor casing contractor.

Surface Casing

9. Move in the Drilling Rig and rig up on location. Perform a Rig Audit to check rig equipment against the drilling contract, and check all the safety equipment on the rig are in compliance with up to date inspections/certifications. Review the drill pipe and collars tubular inspection documentation. Move in and rig up air compressors, boosters, soap pump and all related equipment. Perform a Rig up with closed-loop mud system. Rig up cellar jets to remove water, mud, cement, and other debris as necessary. The drill cuttings and excess drilling fluids will be contained in roll-off boxes and frac tanks throughout the drilling operations. The drilling cuttings solids will be hauled to Republic disposal and drilling fluids "waste water" will be solidified at Quala disposal.
10. Conduct a pre-spud meeting including all Westlake Chemical representatives, WV DEP OOG state inspector, consultants, all contractor and service company representatives.
 - a. Anticipating 260,800 lb max hook load in air of 8-5/8" production casing for entire drilling job that will be discussed during spud meeting.
 - b. 24-hour operations
11. Weld on a piece of 26" casing for riser pipe, weld on 26" rotating head onto 26" riser. Nipple up 10" flowing to rotating head and Shale-Gas Separator (Mathena or equivalent).

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Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County		
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC		
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining		

12. Pick up drilling assembly BHA-1 consisting of: 24" air hammer bit, air hammer, rubber stabilizer, crossover (XO), 2 x 8" DC, crossover (XO), 4-1/2" drill pipe to surface. Air drill ahead to 300 feet BGL (320 feet RKB) leaving a 20 foot rat hole. Monitor air properties as per mud company recommendation. Perform a short wiper trip at casing depth. Pull out of hole (POOH) with BHA-1. If hole appears to be tight when POOH, then spot freshwater gel pill from TD to surface prior to running casing
 - d. Will be using air to drill surface hole. It is recommended that chemical additions be kept to a minimum to avoid issues with BGW.
13. **Notify WV DEP Office of Oil & Gas State Inspector 24 hours prior to running and cementing casing (See WV DEP Office of Oil & Gas Contacts in Step 3).**
14. Rig up wireline logging unit and perform openhole logging consisting of a multi-shot directional survey, HDIL resistivity log, density log, neutron log, gamma ray spectra log, temperature log, and optional 4-Arm caliper log. Rig down wireline unit.
15. Unload, inspect, strap, drift, and tally the surface casing. Rig up and run 300 ft GL (320 ft RKB assuming 20 ft KB) of 20", 94.0 ppf, J-55, STC casing as per the casing details table, with a down-jet float shoe, 42-foot shoe track, and float collar. Estimated dry air string weight is greater than 30,080 pounds. The float collar and float shoe will be made up, thread locked, and tested at the rig floor. Centralize the casing as follows: 1 centralizer on a stop ring at mid-joint on the float joint, 1 centralizer at the float collar, and 1 centralizer on the other joint.
16. Land the casing on the rig floor and centralize inside the openhole section. Install a cement head, loaded with a top and bottom cementing plug, on the 20", and pump casing volume with gel spearhead containing celloflake to break down wall cake. Slowly break circulation with freshwater. Once circulation has been established, circulate a minimum of two bottoms up prior to cementing.
17. Nipple down and suspend 10" flowline within the sub structure. Cut off the 26" rotating head, and pull the 26" conductor casing out of the hole.
18. Rig up cementing company and cement head. Cement the casing using an estimated 20% excess over the openhole annular volume (actual excess to be determined by final cement design program). Drop the bottom cementing plug. Pump fresh water spacer and 15.8 ppg cement as per final cementing program. Drop the cementing top plug and displace the cement with freshwater until the plug lands in the float collar. Bump plug and pressure up to 500 psi above the pump down pressure. Bleed off the pressure to ensure the floats are holding. Rig down the cementing company and wait on cement (WOC) a minimum of 8 hours.
19. **Notify WV DEP Office of Oil & Gas State Inspector 24 hours prior to running bond log on casing (See WV DEP Office of Oil & Gas Contacts in Step 3).**
20. Remove the 20" cement head or pack-off.
21. Move in and rig up the wireline unit, run a logging suite consisting of a minimum of a casing collar locator, gamma ray, and cement bond log., rig down and move out wireline unit
22. Cut and bevel the 20" surface casing to achieve proper height for flowline and rotating head. Tap a 2" LP outlet. Install a 2" LP nipple and ball valve for a drain.
23. Weld on 20" rotating head onto 20" riser surface casing. Nipple up 10" flowline to rotating head.

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Intermediate Casing

- 24. Pick up drilling assembly BHA-2 consisting of: BHA-2 consisting of: 17-1/2" air hammer bit, air hammer, rubber stabilizer, crossover (XO), 2 x 8" DC, crossover (XO), 4-1/2" drill pipe to surface. TIH blowing water out of the hole, and establish circulation on air mist / air foam.
- 25. Clean out the 20" Surface Casing to the top of the float collar. Drill out half of the float track, close the annular device, and perform a casing pressure test equivalent to 1,500 psi for 30 minutes. Actual test pressure will be equivalent to 0.5 x actual final cemented casing depth but NOT to exceed 1,500 psi and will be recalculated once casing is cemented. A passing pressure test is indicated with less than a 10% pressure drop from the original test pressure after a 30-minute time period. Drill out the remaining float track and drill 15 feet below the surface casing. Circulate and condition the hole. Close the annular device and test the casing seat to 0.7 psi per foot pressure gradient. Calculate the test pressure based on the actual casing depth and drilling fluid weight. NOTE: This second test is meant to test the integrity of the casing shoe as well as a semi-FIT – if overpressure concerns are identified this step may be eliminated.
- 26. Air Drill 17-1/2" hole to 2,220 feet (2,240 RKB) leaving a 20 foot rat hole. Monitor Air Mist / Air Foam properties as per mud company recommendations. Trip for new drill bits as required. If drilling slows to less than 10 fph, POOH and change bit. Perform wiper trips as drilling conditions require. Circulate and condition the hole. Take a single-shot survey every 500', minimum. Circulate and condition the hole. Run a directional gyroscopic survey or wellbore orientation tool. POOH with BHA-2. If hole appears to be tight when POOH, then spot freshwater gel pill from TD to surface prior to running casing
 - a. Call out mud logger at to start mud logging operations at 1,000 feet
 - b. Possible Water flow and Minor Oil may be encountered in the Big Injun formation. If wellbore becomes wet due to fluid influx and cannot be controlled by increasing Air Volume it is recommended to continue drilling with Air/ Mist / Foam system.
 - c. Injections of Drill Foam A are recommended to increase lifting capacity if water flow and tight hole are encountered and additional annular cleaning is required.
 - d. Control the presence of Foam in surface pits with additions of HBD 45 DeFoamer as required.
 - e. For increased annular stability while drilling with Air / Mist / Foam additions of QS – 42 Choline Chloride are recommended to be added to water at 1% VoL prior to utilization for misting
- 27. **Notify WV DEP Office of Oil & Gas 24 hours prior to running and cementing casing (See WV DEP Office of Oil & Gas Contacts in Step 3).**
- 28. Release mud logger until drilling recommences.
- 29. Rig up wireline logging unit and perform openhole logging consisting of a induction log, gamma ray, temperature/resistivity, compensated neutron, compensated Z-densilog, and 4-arm caliper.
- 30. Unload, inspect, strap, drift, and tally the surface casing. Rig up and run 2,220 feet of 13-3/8", 54.5 ppf, J-55, LTC casing as per the casing details table, with a down-jet float shoe, 42-foot shoe track, and float collar. Estimated dry air string weight is greater than 120,990 pounds. The float collar and float shoe will be made up, thread locked, and tested at the rig floor. Centralize the casing as follows: 1 centralizer on a stop ring at mid-joint on the float joint, 1 centralizer at the float collar, and 1 centralizer every 3 joints to surface.

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31. Land the casing on the rig floor and centralize inside the openhole section. Install a cement head, loaded with a top and bottom cementing plug, on the 13-3/8" casing, and pump casing volume with gel spearhead containing celloflake to break down wall cake. Slowly break circulation with freshwater. Once circulation has been established, circulate a minimum of two bottoms up prior to cementing.
32. Rig up cementing company, and install 13-3/8" cement head. Cement the casing using an estimated 20% excess over the openhole annular volume (actual excess to be determined by final cement design program). Drop the bottom cementing plug. Pump fresh water spacer and 15.8 ppg cement as per final cementing program. Drop the cementing top plug and displace the cement with freshwater until the plug lands in the float collar. Bump plug and pressure up to 500 psi above the pump down pressure. Bleed off the pressure to ensure the floats are holding. Rig down the cementing company and wait on cement (WOC) a minimum of 8 hours.
33. During cementing operations, open the 4" valve on the 20" surface casing and drain the cement from the 20" x 13-3/8" casing annulus. If no cement was circulated to surface during the primary operation, perform top out cementing job. If no indication of cement was seen at surface during cementing operations, a CBL or temperature log may be necessary to determine the actual top of the cement. Run 1" tubing into the 20" x 13-3/8" casing annulus to the appropriate depth BGL, and perform top-out cementing with the appropriate number of sks of class H cement with 2% calcium chloride accelerator. WOC for a minimum of 8 hours.
34. **Notify WV DEP Office of Oil & Gas 24 hours prior to running bond log on casing (See WV DEP Office of Oil & Gas Contacts in Step 3).**
35. Remove the 13-3/8" cement head or pack-off.
36. Move in and rig up the wireline unit, run a logging suite consisting of a minimum of a casing collar locator, gamma ray, and cement bond log, rig down and move out wireline unit
37. Nipple down and suspend 10" flowline within the sub structure. Cut off the 20" rotating head and release. Cut and remove 20" casing to the bottom of the cellar.
38. Make rough cut on the 13-3/8" casing at 9" below ground level, and remove 13-3/8" casing. Make final cut and bevel.
39. Weld on Wellhead "A" section 13-3/8" SOW X 13-5/8" 5M Bradenhead with 2-1/16" 5M SSO and 2-1/16" 5M Gate Valve onto the 13-3/8" casing. Pressure test the weld with oil to 80% of collapse pressure of 13-3/8' casing (904 psig).
40. Nipple up the BOP:
 - a. Mud Cross: (13-5/8" 5M X 13-5/8" 5M w/ 4-1/16" 5M outlets)
 - b. HCR Valves (4-1/16" 5M) and choke line to the choke manifold
 - c. BOP Double Ram (13-5/8" 5M X 13-5/8" 5M)
 - d. BOP Annular Preventer (13-5/8" 5M X 13-5/8" 5M)
41. Run in the hole with test plug (4-1/2" IF) and 1jt of 4-1/2" IF DP to the casing head and seat. Open casing head annulus valve. Pressure test pipe rams, blind rams, HCR valves, mud cross, and choke line to 200 psig low, 3,000 psig high for 15 minutes. Pressure test the Annular preventer to 200 psig low, and 3,000 psig high for 15 minutes. Pull test plug out of the hole.

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District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC										
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<p>42. Install 2-1/16" X 2" LP companion flange, 2" LP bull plug with 1/2" tap and needle valve with pressure gauge onto the 2-1/16" 5M Gate Valve on the Bradenhead.</p> <p>43. Nipple up the 13-5/8" 5M rotating head and reinstall the 10" flowline to the rotating head and drilling rig's flow box that connects to the shale shakers.</p> <p>Long String Production Casing</p> <p>44. Switch mud system to a Saturated Salt Water Polymer drilling mud system. System can be mudded up on the fly by circulating the annulus and surface tanks filled with brine water provided by Westlake Chemical's Natrium Facility. Rig down and release air drilling equipment of air compressors, boosters, soap pump and all related equipment.</p> <p>45. Pick up drilling packed hole assembly BHA-3 consisting of: 12-1/4" tricone, bit sub, 12-1/8" stabilizer, 1x 8" Short 10ft DC, 12" stabilizer, vibration dampener, 1x 8" DC, 12" inch stabilizer, 1 x 8" DC, XO, 6 x 6-1/4" DC, XO, and 4-1/2" IF DP as depth allows. RIH and load hole with 10 ppg brine and establish circulation.</p> <p style="margin-left: 40px;">a. Test all BOP preventers, valves and choke lines every trip. Actuate ram preventers every trip on drill pipe every trip, and actuate annular at least once a week on drill pipe.</p> <p style="margin-left: 40px;">b. NEVER close preventers when there is no pipe in the hole</p> <p>46. Clean out the 13-3/8" Intermediate Casing to the top of the float collar. Drill out half of the float track, close the annular device, and perform a casing pressure test equivalent to 1,500 psi for 30 minutes. Actual test pressure will be equivalent to 0.5 x actual final cemented casing depth but NOT to exceed 1,500 psi and will be recalculated once casing is cemented. A passing pressure test is indicated with less than a 10% pressure drop from the original test pressure after a 30-minute time period. Drill out the remaining float track and drill 15 feet below the intermediate casing. Circulate and condition the hole. Close the annular device and test the casing seat to 0.7 psi per foot pressure gradient. Calculate the test pressure based on the actual casing depth and drilling fluid weight. NOTE: This second test is meant to test the integrity of the casing shoe as well as a semi-FIT – if overpressure concerns are identified this step may be eliminated.</p> <p>47. Drill 12-1/4" hole to 6,520 feet BGL (6,540 feet RKB) leaving 20 foot rat hole. Monitor mud properties as per mud company recommendations. Trip for new drill bits as required. Perform wiper trips at 2,000', 3,000', 4,000', 5,000', and 6,000', or as drilling conditions require. Circulate and condition the hole. Take a single-shot survey every 500', minimum. Circulate and condition the hole. Run a directional gyroscopic survey or wellbore orientation tool. POOH with BHA-3.</p> <p style="margin-left: 40px;">a. Call out mud logger to recommence mud logging operations</p> <p style="margin-left: 40px;">a. Mud Weight of 10.2 – 10.4 (maximum of 14 ppg, and 12 ppg used on Brine Well No. 14) as required</p> <p style="margin-left: 80px;">i. If pressure is encountered while drilling increase mud weight with additions of Calcium Carbonate</p> <p style="margin-left: 40px;">b. Funnel Viscosity of 38 - 42 seconds and Low Plastic Viscosity 10-25 cP</p> <p style="margin-left: 40px;">c. pH of 9.5 – 10.5,</p> <p style="margin-left: 40px;">d. Yield Point Yield Point at 8 — 22 lb/100 ft2</p> <p style="margin-left: 40px;">e. Fluid Loss less than 10 cc's/30 min</p> <p style="margin-left: 40px;">f. Chloride 188,821 mg/L</p> <p style="margin-left: 40px;">g. Casing point will be 10' below the Oriskany Sandstone</p>													
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API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining			
<p>48. Notify WV DEP Office of Oil & Gas 24 hours prior to running and cementing casing (See WV DEP Office of Oil & Gas Contacts in Step 3).</p> <p>49. Rig up an openhole logging unit and run a logging suite consisting of a minimum of a dual induction, density, compensated neutron, gamma ray, spontaneous potential, and borehole volume caliper log. Rig down the logging equipment.</p> <p>50. Perform a wiper trip to the total depth using the BHA-3 assembly. Circulate and condition 3 hole volumes and run viscous sweeps to ensure the hole is clean. Pull out of the hole and lay down BHA-3.</p> <p>51. Unload, inspect, strap, drift, and tally the long string production casing. Rig up and run 6,520 feet (6,540 feet RKB) of 8-5/8", 40.00 ppg, HCL-80, LTC casing as per the casing details table, with a down-jet float shoe, 40-foot shoe track, and float collar. "Tack weld" top of the casing on the first two joints. Estimated dry air string weight is greater than 248,800 pounds. The float collar and float shoe will be made up, tack welded, and tested at the rig floor. Centralize the casing as follows: 1 centralizer on a stop ring at mid-joint on float joint, 1 centralizer at the float collar, 1 centralizer every 7 joints up to 1,000 from surface.</p> <p>52. Land the casing with casing at thr rig floor and centralize inside the intermediate casing. Install a cement head, loaded with a top plug, opening plug and bottom cementing plug, on the 8-5/8" casing, and slowly break circulation with drilling mud. Once circulation has been established, circulate a minimum of two bottoms up prior to cementing.</p> <p>53. Rig up cementing company. BHST is estimated to be approximately TBD (to be confirmed by OH logs). Cement the casing using 20% excess over the openhole annular volume (actual excess to be determined by final cement design program), and as determined by the X-Y caliper log. The top of cement is planned to be 1,000' BGL. Drop the bottom cementing plug. Pump 8.2ppg Bentonite Pill gel spacer and 15.2 ppg lower density premium cement (NeoCem) as per final cementing program. Drop the cementing top plug and displace the cement with freshwater until the plug lands in the float collar. Bump plug and pressure up to 500 psi above the pump down pressure. Bleed off the pressure to ensure the floats are holding. Rig down the cementing company and wait on cement (WOC) a minimum of 8 hours.</p> <p>54. Notify WV DEP Office of Oil & Gas 24 hours prior to running bond log on casing (See WV DEP Office of Oil & Gas Contacts in Step 3).</p> <p>55. Release mud logger until drilling recommences.</p> <p>56. Remove the 8-5/8" cement head or pack-off.</p> <p>57. Move in and rig up the wireline unit, run a logging suite consisting of a minimum of a casing collar locator, gamma ray, and cement bond log, rig down and move out wireline unit</p> <p>58. Nipple down and suspend 10" flowline within the sub structure. Nipple down the rotating head. Nipple down the BOP stack and hoist BOP hoist under rig floor.</p> <p>59. Make rough cut on the 8-5/8" casing and laydown. Make final cut and bevel, and install packing in casing head and around 8-5/8" casing.</p> <p>60. Nipple up Wellhead "B" section 13-5/8" 5M X 9" 5M casing spool with 2-1/16" 5M SSO and 2-1/16" 5M Gate Valve. Torque all bolt using hydraulic torque wrench to proper torque spec. Pressure test packing and "void" to 5,000 psi for 15 min with oil.</p>						
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61. Nipple up the DSA: (9" 5M X 13-5/8" 5M), and then lower the BOP stack onto the DSA. Torque all bolt using hydraulic torque wrench to proper torque spec. Nipple up HCR Valves (4-1/16" 5M) and choke line to the choke manifold.
62. Run in the hole with test plug (4-1/2" IF) and 1jt of 4-1/2" IF DP to the casing head and seat. Open casing spool and casing head valves. Pressure test pipe rams, blind rams, HCR valves, mud cross, and choke line to 200 psig low, 4,000 psig high for 15 minutes. Pressure test the Annular preventer to 200 psig low, and 2,500 psig high for 15 minutes. Ensure that the casing spool and casing head valves are open while testing to ensure that the test plug is holding. Pull test plug out of the hole.
63. Install 2-1/16" X 2" LP companion flange, 2" LP bull plug with 1/2" tap and needle valve with pressure gauge onto the 2-1/16" 5M Gate Valve on the casing spool.
64. Nipple up the 13-5/8" 5M rotating head and reinstall the 10" flowline to the rotating head and drilling rig's flow box that connects to the shale shakers.

Openhole Section

65. Pretreat Salt Saturated Mud System used to drill the sidetrack with Sodium Bicarbonate to remove cement contamination.
66. Pick up drilling packed hole assembly BHA-4 consisting of: 7-3/8" roller cone bit, bit sub, 7-1/4" stabilizer, 1x 5-1/4" Short 10ft DC, 7-1/8" stabilizer, vibration dampener, 1x 5-1/4" DC, 7-1/8" inch stabilizer, 14 x 5-1/4" DCs, XO, and 4-1/2" IF DP as depth allows. RIH and load hole with 10 ppg brine and establish circulation.
 - a. **Test all BOP preventers, valves and choke lines every trip. Actuate ram preventers every trip on drill pipe every trip, and actuate annular at least once a week on drill pipe.**
 - b. **NEVER close preventers when there is no pipe in the hole**
67. Clean out the 8-5/8" Production Casing to the top of the float collar. Drill out half of the float track, close the annular device, and perform a casing pressure test equivalent to 1,500 psi for 30 minutes. Actual test pressure will be equivalent to 0.5 x actual final cemented casing depth but NOT to exceed 1,500 psi and will be recalculated once casing is cemented. A passing pressure test is indicated with less than a 10% pressure drop from the original test pressure after a 30-minute time period. Drill out the remaining float track and drill 15 feet below the surface casing. Circulate and condition the hole. Close the annular device and test the casing seat to 0.7 psi per foot pressure gradient. Calculate the test pressure based on the actual casing depth and drilling fluid weight. NOTE: This second test is meant to test the integrity of the casing shoe as well as a semi-FIT – if overpressure concerns are identified this step may be eliminated.

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68. Drill 7-3/8" hole to TD of 6,815 feet BGL. Monitor mud properties as per mud company recommendations. In the event losses may be experience when drilling into the Salina formation, continue maintain circulating volume with further additions Saturated Salt Water and mix and pump NewZan D sweeps as required to clean the annulus. Trip for new drill bits as required. Perform wiper trips as drilling conditions require. Circulate and condition the hole if possible. Take a single-shot survey every 500', minimum. Circulate and condition the hole. Run a directional gyroscopic survey or wellbore orientation tool. POOH with BHA-4.

- a. Call out mud logger to recommence mud logging operations
- a. Mud Weight of 10.2 – 10.4 (maximum of 14 ppg, and 12 ppg used on Brine Well No. 14)
 - i. If pressure is encountered while drilling increase mud weight with additions of Calcium Carbonate as required
- b. Funnel Viscosity of 38 - 42 seconds and Low Plastic Viscosity 10-25 cP
- c. pH of 9.5 – 10.5,
- d. Yield Point Yield Point at 8 — 22 lb/100 ft2
- e. Fluid Loss less than 10 cc's/30 min
- f. Chloride 188,821 mg/L

Liner Section

1. Unload, inspect, strap, drift, and tally the long string production casing. Rig up and run 490 feet of 5-1/2", 20lbs/ft, L-80, LTC, as per the casing details table from 6,300 ft to 6,790 ft on 4-1/2" IF DP. Estimated dry air string of casing and drill pipe weight is not greater than 135,800 pounds. Set liner at 6,300 ft with the bottom at 6,790 ft which is 25 feet off the bottom of the cavern TD. If the liner is unable to reach TD then set liner higher up in the 8-5/8" production casing.
2. Pull out of the hole with drill pipe, and laydown drill pipe and drill collars that are in the derrick.
3. Make up 8-5/8" retrievable storm packer test plug and set at 90' GL to stop the well from flowing so that the BOP can be nipped down and final wellhead installed.
4. Nipple down the 13-5/8" 5M BOP Stack and DSA, and nipple up the 8" ANSI 1500 mater valve, and install the final wellhead components based on wellhead schematic. Torque all bolt using hydraulic torque wrench to proper torque spec.
5. TIH to retrieve 8-5/8" retrievable storm packer test plug, and pull out of the hole and laydown same. Close 8" ANSI 1500 master valve
6. Rig down and move out drilling rig.

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Reporting Information

Daily Reports – Email or Fax

- Stephen Clark
- Ed McLaughlin
- Dick Lonquist
- Eric Busch
- Joshua Willis

Final Reports – Email and Hard Copy

- Stephen Clark
- Lonquist & Company, LLC

Final Reports to include:

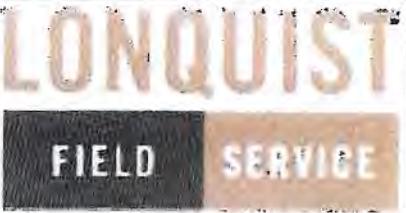
- Daily Reports
- Well Schematics
- Well Completion Report
- Well Logs
- Photos

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JRW	08/08/2018	ETB	08/08/2018		

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391	
				Date: April 2018	
				Page: 14 of 24	
Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County		
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC		
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining		

Well Owner

Eagle Natrium, LLC
16339 Energy Road, Proctor
West Virginia, 26055

- Stephen M. Clark, P.E. – Owner's Representative
 - Telephone – 304.455.2200, Ext. 3318
 - Cell – 304.266.8264
 - Email – Stephen.Clark@Westlake.com

Regulatory

West Virginia
Department of Environmental Protection
Office of Oil and Gas
601 - 57th Street
Charleston, WV 25304
(304) 926-0450

- Jeff McLaughlin – Permitting - Vertical Wells/Plugging - Technical Analyst
 - Telephone – 304-926-0499, ext.1614
 - Email – Jeffrey.W.McLaughlin@wv.gov
- James Nicholson – WVDEP Office of Oil and Gas Inspector for Marshall (051)
 - Telephone – 304-552-3874
 - Email – James.I.Nicholson@wv.gov

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5		Project No: F1391
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				Page: 15 of 24
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District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC	
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining	

Contractor

Lonquist Field Service, LLC
1001 McKinney, Suite 1650
Houston, TX 77002

- Richard Lonquist – President
 - Telephone – (512) 699-1527
 - Fax – (512) 732-9816
 - Email – richard@lonquist.com
- Eric Busch – Sr. Vice President
 - Office – (713) 559-9953
 - Mobile – (832) 216-0785
 - Fax – (713) 559-9959
 - Email – eric@lonquist.com
- Rob Crews – Vice President
 - Office – (713) 559-9955
 - Mobile – (713) 320-2278
 - Fax – (713) 559-9959
 - Email – rob@lonquist.com
- Joshua Willis – Petroleum Engineer
 - Office – (713) 559-9954
 - Mobile – (832) 592-3791
 - Fax – (713) 559-9959
 - Email – joshua@lonquist.com
- Joshua Willis – Petroleum Engineer
 - Office – (713) 559-9954
 - Mobile – (832) 592-3791
 - Fax – (713) 559-9959
 - Email – joshua@lonquist.com
- Charles Graves – Petroleum Engineer
 - Mobile – (713) 202-1159
 - Fax – (713) 559-9959
 - Email – charles@lonquist.com
- Gerald Ardoin – Senior Completion Supervisor
 - Mobile – (337) 296-1791
 - Fax – (713) 559-9959
 - Email – gerald@lonquist.com
- Justin Duckworth – Senior Completion Supervisor
 - Mobile – (601) 940-0988
 - Fax – (713) 559-9959
 - Email – justin@lonquist.com

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PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
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LONQUIST

FIELD SERVICE

**Westlake Chemical
Natrium Facility
Brine Well No. 20
Drilling and Completion Procedure
Rev. 5**

Project No: F1391

Date: April 2018

Page: 16 of 24

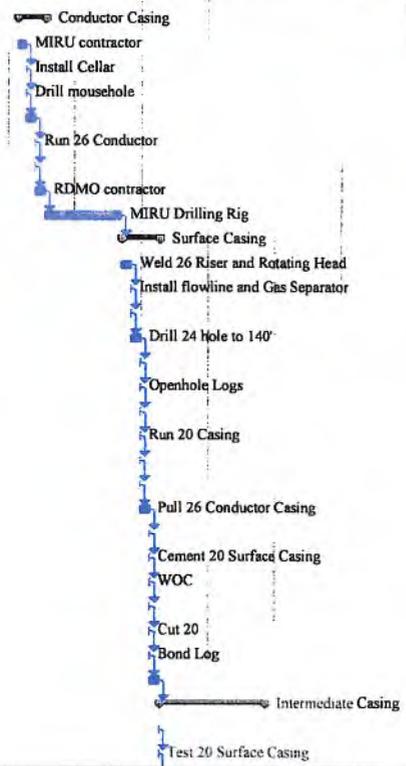
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District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC
API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining

PROPOSED SCHEDULE

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

**Brine Well No. 20
Proposed Drilling & Completion Schedule
8/8/2018**

ID	Task Name	Duration	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
0	Brine Well 20 - Drilling Schedule	56 days										
1	Conductor Casing (not installed)	3 days										
2	MIRU conductor casing contractor	0.25 days										
3	Auger out cellar and install	0.5 days										
4	Drill mousehole	0.25 days										
5	Auger out 26 hole down to 37'	0.5 days										
6	Run 26 Conductor Casing	0.25 days										
7	Install 4 Valve on 26 Casing	0.25 days										
8	RDMO conductor casing contractor	1 day										
9	MIRU Drilling Rig, Closed Loop, and Air Drilling Equip.	8 days										
10	Surface Casing	3.04 days										
11	Weld on 26 Riser, Rotating Head	4 hrs										
12	Install flowline and Shale-Gas Separator	4 hrs										
13	PU BHA-1	4 hrs										
14	Air Drill 24 hole down to 140' GL	14 hrs										
15	MIRU Wireline	2 hrs										
16	Run openhole logging suite	4 hrs										
17	RDMO Wireline	2 hrs										
18	Run 20 Casing down to 120' GL	1 hr										
19	ND flowline and hang off under substructure	4 hrs										
20	Cut off 26 Rotating Head	4 hrs										
21	Pull 26 Conductor Casing out of the well	6 hrs										
22	Rig up cementing contractors	2 hrs										
23	Cement 20 Surface Casing	2 hrs										
24	WOC	8 hrs										
25	Remove 20 cement head	2 hrs										
26	Cut and bevel 20 Casing	2 hrs										
27	MIRU Wireline, Run Bond Log, RDMO Wireline	6 hrs										
28	Weld on 20 Riser, Rotating Head	2 hrs										
29	Intermediate Casing	11.54 days										
30	PU BHA-2, TIH	2 hrs										
31	Air Drill 20 Surface Casing Float Track, Pressure Test	2 hrs										



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**Brine Well No. 20
Proposed Drilling & Completion Schedule
8/8/2018**

ID	Task Name	Duration	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
32	Air Drill 20 Surface Casing Shoe, Pressure Test	2 hrs										
33	Air Drill 17.5 hole down to 2220' GL	208 hrs										
34	MIRU Wireline	2 hrs										
35	Run openhole logging suite	6 hrs										
36	RDMO Wireline	2 hrs										
37	Run 13-3/8 Casing down to 2000' GL	10 hrs										
38	Rig up cementing contractors	2 hrs										
39	Cement 13-3/8 Intermediate Casing	4 hrs										
40	WOC	8 hrs										
41	Remove 13-3/8 cement head	2 hrs										
42	MIRU Wireline, Run Bond Log, RDMO Wireline	6 hrs										
43	ND flowline and hang off under substructure	4 hrs										
44	Cut off 20 Rotating Head and 20 Casing	2 hrs										
45	Cut 13-3/8 Casing and Bevel	2 hrs										
46	Weld on SOW Wellhead A Section	2 hrs										
47	Pressure Test	1 hr										
48	NU 13-5/8 5M BOP	6 hrs										
49	Test BOP	2 hrs										
50	NU 13-5/8 5M Rotating Head	2 hrs										
51	Long String Production Casing	22.54 days										
52	Switch to Salt Saturated Polymer Drilling Mud	4 hrs										
53	PU BHA-3, TIH	6 hrs										
54	Drill 13-3/8 Intermediate Casing Float Track, Pressure Test	2 hrs										
55	Drill 13-3/8 Intermediate Casing Shoe, Pressure Test	2 hrs										
56	Drill 12-1/4 hole down to 6,520' GL	430 hrs										
57	MIRU Wireline	2 hrs										
58	Run openhole logging suite	6 hrs										
59	RDMO Wireline	2 hrs										
60	Wiper Trip with BHA-3	22 hrs										
61	Run 8-5/8 Casing down to 6,500' GL	22 hrs										
62	Rig up cementing contractors	2 hrs										
63	Cement 8-5/8 Surface Casing	8 hrs										

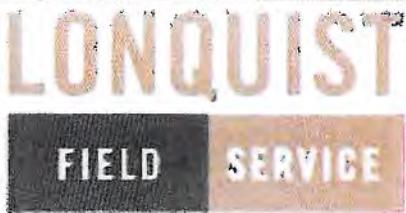
**Brine Well No. 20
Proposed Drilling & Completion Schedule
8/8/2018**

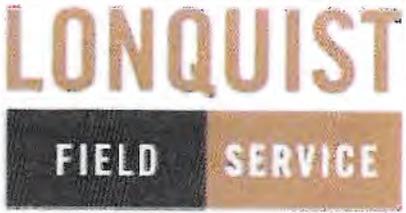
ID	Task Name	Duration	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10
64	WOC	8 hrs								WOC		
65	Remove 8-5/8 cement head	2 hrs								Bond Log		
66	MIRU Wireline, Run Bond Log, RDMO Wireline	8 hrs								Cut 8-5/8		
67	ND flowline and BOP and hang off under substructure	2 hrs								Install B Wellhead		
68	Cut 8-5/8 Casing and Bevel	2 hrs								NU BOP		
69	NU Wellhead B Section	2 hrs								Test BOP		
70	Pressure Test	1 hr								NU Rotating Head		
71	NU 13-5/8 5M BOP	4 hrs								Open Hole		
72	Test BOP	2 hrs								Test 8-5/8 Surface Casing		
73	NU 13-5/8 5M Rotating Head	2 hrs								Test 8-5/8 Surface Casing		
74	Open Hole Section	2.96 days								Drill 7-3/8 Hole to 6815'		
75	PU BHA-4, TIH	13 hrs								Run 5-1/2 liner		
76	Drill 8-5/8 Intermediate Casing Float Track, Pressure Test	4 hrs								Set Liner		
77	Drill 8-5/8 Intermediate Casing Shoe, Pressure Test	4 hrs								Set 8-5/8 packer		
78	Drill 7-3/8 hole down to TD (6,815' GL)	50 hrs								ND BOP		
79	Liner	1.92 days								Retrieve packer		
80	Run 5-1/2 liner from 6300' GL - 6790' GL on DP	16 hrs								RDMO Drilling Rig		
81	Set Liner and POOH	15 hrs										
82	Set 8-5/8 packer at 90' GL	4 hrs										
83	ND BOP, NU 8 ANSI 1500 Valve	6 hrs										
84	Retrieve packer and laydown	5 hrs										
85	RDMO Drilling Rig	3 days										

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Environmental Protection

		Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5			Project No: F1391	
					Date: April 2018	
					Page: 17 of 24	
Well No: 20	State: West Virginia	County: Marshall	Field: Marshall County			
District: Franklin	Location: TBD	Quadrangle: New Martinsville	Operator: Eagle Natrium, LLC			
API No: TBD	Estimated TD: 6215' TVD	Target Geology: Salina Formation	Status: Solution Mining			
AFE						
PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

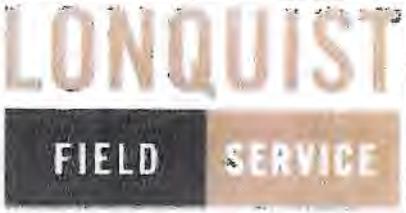
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API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining

CLIENT APPROVAL

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API No: TBD	Estimated TD: 6815' TVD	Target Geology: Salina Formation	Status: Solution Mining

June 4, 2018

Client: Westlake Chemical
Attn: Stephen Clark
16339 Energy Road, Proctor
West Virginia, 26055

Contractor: Lonquist Field Service, LLC
3345 Bee Cave Rd., Suite 201
Austin, TX 78746

By signing below, you acknowledge that the work described herein defines the expected scope of work required to complete the new Class III Solution Mining Well (Brine Well No. 20) and plug and abandon the existing Brine Well No. 9 at the Marshall County, West Virginia Natrium Facility as per Westlake Chemical for Westlake Project No. with effective date of TBD.

LONQUIST FIELD SERVICE, LLC

WESTLAKE CHEMICALS

DATE: _____

DATE: _____

SIGNATURE: _____

SIGNATURE: _____

TITLE: Senior Vice President

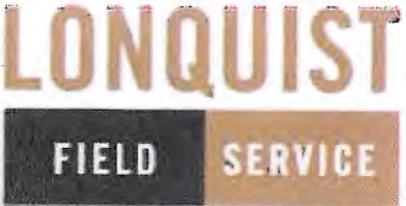
TITLE: Engineer Sr

DATE: _____

SIGNATURE: _____

TITLE: Vice President

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			

	<p align="center">Westlake Chemical Natrium Facility Brine Well No. 20 Drilling and Completion Procedure Rev. 5</p>		Project No: F1391
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			Page: 20 of 24

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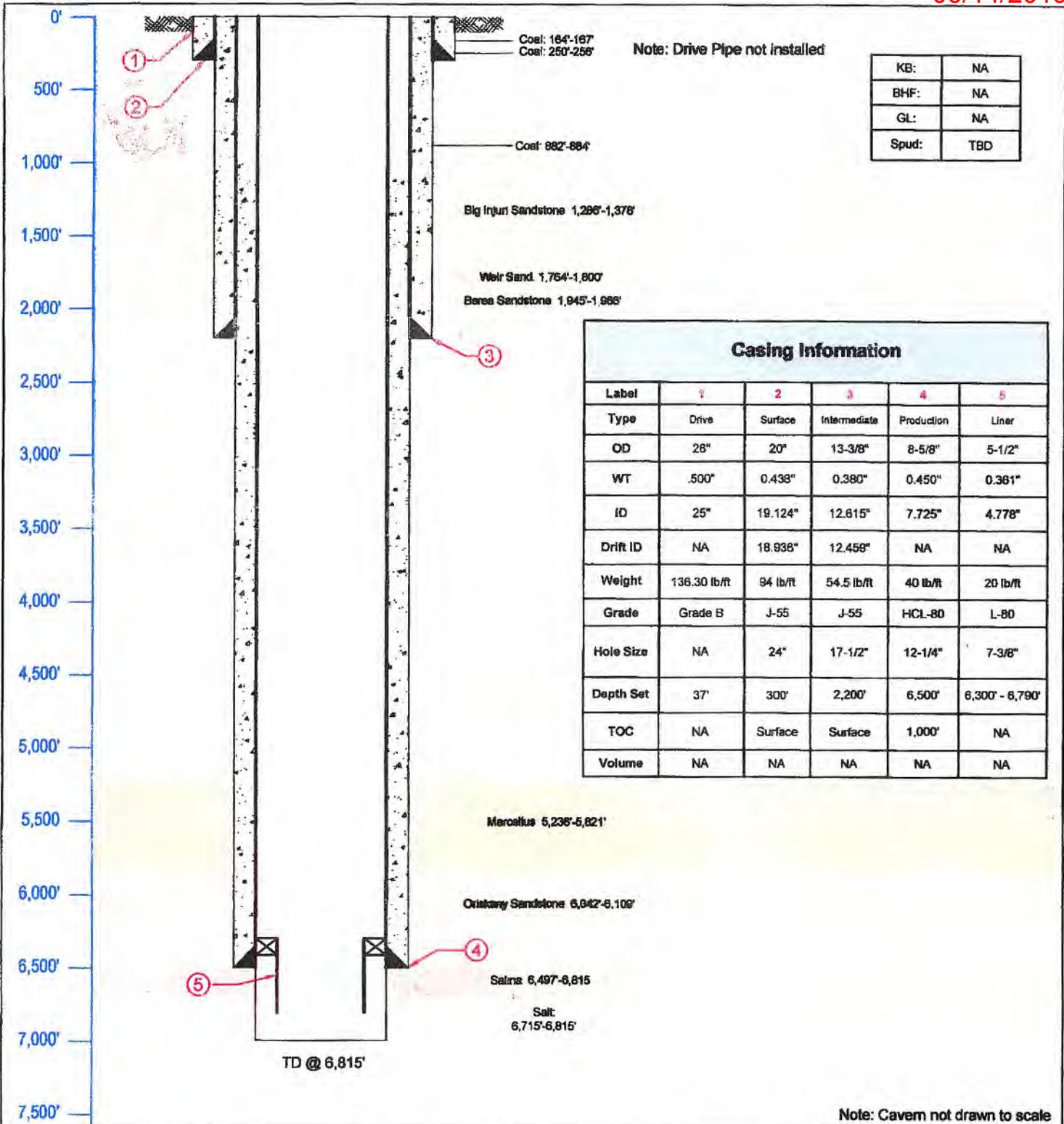
PROPOSED WELLBORE SCHEMATICS

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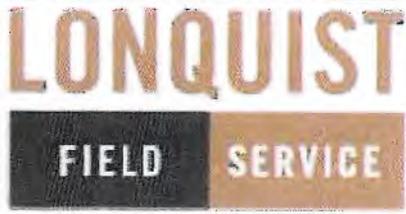
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Environmental Protection

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
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	Westlake Chemical		Brine Well No. 20 - Proposed Schematic	
	Country: USA	State/Province: West Virginia	County/Parish: Marshall	
	Location: NA	Site: Eagle Sodium Facility	Survey/STR: NA	
	API No: TBD	Field: Marshall County	Well Type/Status: Class III Solution Mining	
Texas License F-9147	Permit No: NA	Project No: F1391	Date: 04/22/2019	
1001 McKinney St, Suite 1650 Houston, Texas 77002 Tel: 713.559.9950 Fax: 713.559.9959	Drawn: C.JG	Reviewed: JRW	Approved: JRW	
	Rev No:	Notes:		



Westlake Chemical
 Natrium Facility
 Brine Well No. 20
 Drilling and Completion Procedure
 Rev. 5

Project No: F1391

Date: April 2018

Page: 21 of 24

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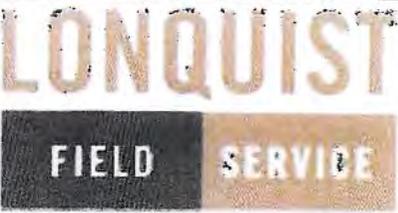
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SURVEY PLAT OF PROPOSED WELLBORE

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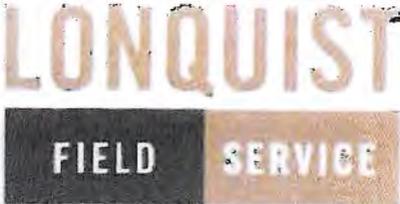
VENDOR PROPOSALS

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SAFETY PLAN

PREPARED BY	DATE	APPROVED BY	DATE	CLIENT APPROVAL	DATE	Client Signature
JRW	08/08/2018	ETB	08/08/2018			



4705102209

Marsh USA Inc.
11001 Lakeline Blvd., Bldg.1, Suite 200
Austin, TX 78717
www.marsh.com

06/14/2019

July 30, 2018

Westlake Chemical Corporation
PO Box 191
New Martinsville, WV 26115

Carrier: **Starr Indemnity & Liability Co. % Starr Companies**
Claims Administrator: **Gallagher Bassett Services, Inc.**
Claims Address: **6404 International Pkwy, Ste 2300, Plano, TX 75093**
Claims Reporting: **888-999-6813**
Policy Number: **1000001398**, Effective: **5/15/2018 to 5/15/2019**

Dear RJ Feldmeier,

Please find enclosed your new West Virginia Workers' Compensation Posting Notice(s).

The purpose of a workers' compensation posting notice is to comply with statutory regulations that require businesses to notify their employees of workers' compensation insurance coverage and their corresponding rights.

Please post in a common area (e.g. permanent/official bulletin board) where all employees will be able to view the notice.

Kind Regards,
Sharia Masso, WCPN Specialist
512-378-4319, allstates.wcpnrequest@marsh.com

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IMPORTANT: Workers' Compensation notices vary from state to state. Some notices will require specific information be added. Some notices will be issued directly from the state. PLEASE REVIEW the information below for state specific information. APR 25 2019

State	Requirement/Needed Data	State	Requirement/Needed Data
AK	The notice must be posted in 3 locations at each facility. A company rep (e.g. Mgr, HR, Safety) must sign each notice & the signature must be witnessed by 2 parties.	MA	Fill in the name & address of the closest hospital to your company has a designated workers' compensation officer, have them sign & date the notice before posting.
CA	a) If applicable, Medical Provider Network (MPN). Contact carrier for assistance. b) Add the address and/or ph.# of the nearest office of the California Division of Workers' Compensation. For office listings: 1-800-736-7401. Online: www.dir.ca.gov/dwc/dir2.htm	MI	Not Required Annually. If received, fill in the Employer Contact Person & ph.# of the rep. at your company who handles work related injuries/reporting.
CO	If applicable, add company information in allotted space.	MO	Fill in the name & ph.# of the company rep. who handles work related injuries/reporting.
CT	a) If applicable, add the Approved Medical Plan information. Contact carrier for assistance. b) Add the address & ph.# for the State of CT Workers' Compensation Commission Office for your area. For office listings: wcc.state.ct.us/wcc/dist-ct.htm c) Review section 'Public Act 17-141' & update accordingly.	MS	Fill in the name & title of the company rep. who handles work related injuries/reporting.
DC, ID, VA, WI, WV	Sign the notice before posting.	NV	If applicable, fill in the name, address, ph.# & contact person for your MCO/Health Care Provider. Contact carrier for assistance.
DE, HI, IA, ME, MI, NE, SD, VA, WI, WV	Not Required Annually: DE, HI, ME, MI, SD, VA Not State Required: IA, NE, WI, WV	OR	Workers' Compensation Posting Notices are issued directly from the state; carriers & brokers may not produce them. For OR information: www.cbs.state.or.us/wcd/operations/coverage/nocorder.html
GA	If applicable, fill in the doctors/clinics on the appropriate panel. Contact carrier for assistance.	TN	Fill in the name, title, ph# & address of the employer rep. to be notified of a work-related injury, as well as an alternative employer rep. to be notified of a work-related injury.
KY	If applicable, fill in the Managed Care Plan information. Contact carrier for assistance.	UT	If applicable, check the box regarding employer authorization by the Division of Industrial Accidents to self-insure and directly pay workers' compensation benefits.
LA	If your company has a designated Employer Representative, fill in the contact information.	ND, OH, WA, WY	Workers Compensation is provided by a monopolistic state fund & posting notices (if required) are provided directly by the state. For information: - ND: www.WorkforceSafety.com - OH: www.bwc.ohio.gov - WA: www.lni.wa.gov - WY: www.wyomingworkforce.org

WV Department of Environmental Protection

COPY

OP-8
Rev. 1/12

BOND NUMBER K09554737

This bond replaces Liberty Mutual Insurance Company Bond # 674020813 effective March 15, 2017.

Duplicate Original

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
BLANKET BOND FOR OIL OR GAS WELLS,
LIQUID INJECTION WELLS OR WASTE DISPOSAL WELLS

KNOWN ALL MEN BY THESE PRESENTS:

(1) That we, Eagle Natrium LLC

(2) State Route 2 North, PO Box 181, New Martinsville, WV 26155

As Principal, and (3) Westchester Fire Insurance Company

(4) 436 Walnut Street, Philadelphia, PA 19106

a firm and/or a corporation authorized to do business in the State of West Virginia, as Surety, are held and firmly bound unto the State of West Virginia in the just and full sum of (5) Fifty Thousand and no/100ths dollars (\$50,000.00) to the payment whereof well and truly to make, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above bound Principal in pursuance of the provisions of Chapter 22, Article 6 and/or 6A, of the Code of West Virginia, 1931, as amended, and the regulations promulgated thereunder, has made or intends to make application to the Chief of the Office of Oil and Gas, Department of Environmental Protection, the State of West Virginia for a permit to perform well work (as defined in Chapter 22, Article 6 and/or 6A), on oil or gas wells and/or liquid injection wells and/or waster disposal wells, or has acquired or purchased, or shall hereafter acquire or purchase such wells, or has been or shall be assigned operating responsibility for such wells located in West Virginia; and

WHEREAS, THE Obligee as a condition precedent to the issuance of such Permit or release of other obligation has required the Principal to furnish a SURETY BOND acceptable to the Obligee guaranteeing the performance of said provisions of Chapter 22, Article 6 or 6A, of the Code of West Virginia, 1931, as amended, and the regulations promulgated thereunder;

NOW THEREFORE, the condition of this obligation is such that if the Principal, its personal representatives, successors, heirs and assigns shall in performing well work (as defined in Chapter 22, Article 6 and/or 6A) or operating such wells shall furnish all reports, information and affidavits as may be required by the Department of Environmental Protection, Office of Oil and Gas, documenting that said wells have been plugged and abandoned in accordance with Chapter 22, Article 6, of the Code of West Virginia, 1931, as amended, and the regulations promulgated thereunder, then this obligation to be void; otherwise to remain in full force and effect.

This bond shall be effective from the (11) 15th day of March, 2017, until released by the Department of Environmental Protection.

IN WITNESS WHEREOF the said Principal has hereunder set his or its hand and affixed his or its seal, and the said surety has caused its corporate name to be signed hereto and its corporate seal to be hereunto affixed by its duly authorized officer or agent this instrument this (12) 17th day of March, 2017.

(15) Principal
Corporate Seal

(13) Eagle Natrium LLC Robert B. Byrnie (Seal)
(Principal) *BR*

(14) By: Sr. Vice President - Vinyls
(Title)
(Must be President or V. President)

(18) Surety
Corporate Seal

(16) Westchester Fire Insurance Company (Seal)
(Surety)

(17) By: NAV

19) Countersigned: n/a
(Resident West Virginia Agent)

(20) Address: 3280 Peachtree Road NE, Suite 200, Atlanta, GA 30305

(21) Telephone: 404-460-0754

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Office of Oil and Gas

APR 25 2019

WV Department of
Environmental Protection

(REVERSE)

ACKNOWLEDGMENTS

Acknowledgment by Principal if Individual or Partnership

- 1. STATE OF _____
- 2. County of _____ to-wit:
- 3. I, _____, a Notary Public in and for the
- 4. county and state aforesaid, do hereby certify that _____ whose name is signed to the foregoing writing, has this day acknowledged the same before me in my said county.
- 5. Given under my hand this _____ day of _____ 20____.
- 6. Notary Seal _____
- 7. _____
- (Notary Public)
- 8. My commission expires on the _____ day of _____ 20____.

Acknowledgment by Principal if Corporation or Limited Liability Company

- 9. STATE OF Texas
- 10. County of Harris to-wit:
- 11. I, Amanda Helton, a Notary Public in and for the
- 12. county and state aforesaid, do hereby certify that Robert F. Buesinger
- 13. who as, S. Vice President - Vinyls signed the foregoing writing for
- 14. Eagle Natrium LLC a corporation/LLC, has this day, in my said county, before me, acknowledged the said writing to be the act and deed of the said corp/LLC.
- 15. Given under my hand this 3 day of April 2017.
- 16. Notary Seal AMANDA HELTON Notary Public, State of Texas
My Commission Expires December 9, 2017
- 17. [Signature]
- 18. My commission expires on the 9 day of December 2017.

Acknowledgment by Surety

- 19. STATE OF Georgia
- 20. County of Dekalb to-wit:
- 21. I, N. Jenny Dowdy, a Notary Public in and for the
- 22. county and state aforesaid, do hereby certify that Stephen A. Vann
- 23. who as, Attorney-In-Fact signed the foregoing writing for
- 24. Westchester Fire Insurance Company a corporation has this day, in my said county, before me, acknowledged the said writing to be the act and deed of the said corporation.
- 25. Given under my hand this 17th day of March 2017.
- 26. Notary Seal N. JENNY DOWDY Notary Public, State of Georgia
My Commission Expires _____
- 27. [Signature]
- 28. My commission expires on the 21st day of November 2017.

Sufficiency in Form and Manner Of Execution Approved

Attorney General

This _____ day of _____ 20____

By _____ (Assistant Attorney General)

ACKNOWLEDGMENT PREPARATION INSTRUCTIONS

1. IF PRINCIPAL IS AN INDIVIDUAL OR PARTNERSHIP, HAVE NOTARY COMPLETE LINES (1) through (8).
2. IF PRINCIPAL IS A CORPORATION, HAVE NOTARY COMPLETE LINES (9) through (18).
3. SURETY MUST HAVE NOTARY COMPLETE LINES (19) through (28).
4. **Notaries must:**

ACKNOWLEDGMENT BY PRINCIPAL IF INDIVIDUAL OR PARTNERSHIP

1. Enter name of State.
2. Enter name of County.
3. Enter name of Notary Public witnessing transactions.
4. Enter name of Principal covered by bond if individual or partnership. (Must be Owner of Sole Proprietorship or General Partner of Partnership)
5. Notary enters date bond was witnessed. Must be the same as or later than signature date.
6. Affix Notary Seal.
7. Notary affixes his/her signature.
8. Notary enters commission expiration date.

ACKNOWLEDGMENT BY PRINCIPAL IF CORPORATION OR LIMITED LIABILITY COMPANY

9. Enter name of State.
10. Enter name of County.
11. Enter name of Notary Public witnessing transactions.
12. Enter name of Corporate or LLC Officer signing bond.
13. Enter Title of Officer signing bond. (Must be President or Vice President of Corporation; Manager or Managing Member of Limited Liability Company)
14. Enter name of Company or Corporation.
15. Notary enters date bond was witnessed. Must be the same as or later than signature date.
16. Affix Notary Seal.
17. Notary affixes his/her signature.
18. Notary enters commission expiration date.

ACKNOWLEDGMENT BY SURETY

19. Enter name of State.
20. Enter name of County.
21. Enter name of Notary Public witnessing transactions.
22. Enter name of person having power of attorney to bind Surety Company.
23. Enter Title of person binding Surety Company.
24. Enter name of Insurance Company (Surety).
25. Notary enters date bond was witnessed. Must be the same as or later than signature date.
26. Affix Notary Seal.
27. Notary affixes his/her signature.
28. Notary enters commission expiration date.

POWER OF ATTORNEY INSTRUCTIONS

Power of attorney for surety must be attached showing that it was in full force and effect on signature date indicated on the face of the bond. A raised corporate seal must also be affixed to the Power of Attorney form.

- a. Name of attorney in fact must be listed.
- b. Power of Attorney may not exceed imposed limitations.
- c. Certificate date, the signature date of bond must be entered.
- d. Signature of authorizing official must be affixed. (Signature may be facsimile).
- e. **Raised seal must be affixed.**

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Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That WESTCHESTER FIRE INSURANCE COMPANY, a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of power provided for in such person's written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as may be specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for, and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Stephen A Vann, all of the City of ATLANTA, Georgia, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Fifty million dollars & zero cents (\$50,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of this Company at its principal office.

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said WESTCHESTER FIRE INSURANCE COMPANY this 23 day of June 2016.

WESTCHESTER FIRE INSURANCE COMPANY



Stephen M. Haney
Stephen M. Haney, Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 23 day of June, AD. 2016 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney, Vice-President of the WESTCHESTER FIRE INSURANCE COMPANY to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation, and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
KAREN E. BRANDT, Notary Public
City of Philadelphia, Philadelphia County
My Commission Expires Sept. 28, 2018

Karen E. Brandt
Notary Public

I, the undersigned Assistant Secretary of the WESTCHESTER FIRE INSURANCE COMPANY, do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 17th day of March, 2017



William L. Kelly
William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER June 23, 2018.

GEOLOGIC DATA FOR COLUMBIA-SOUTHERN CHEMICAL CORPORATION'S
BRINE WELLS - No. 8 & No. 9
FRANKLIN DISTRICT, MARSHALL COUNTY, NATRIUM, WEST VIRGINIA



GRADE: 633'

<u>ERA</u>	<u>SYSTEM</u>	<u>SERIES OR GROUP</u>	<u>FORMATION OR MEMBER</u>	<u>ELEV. WELL NO. 8</u>	<u>ELEV. WELL NO. 9</u>
Genezoic	Quartnary	Recent	(Alluvium)	0- 79	0- 60
Paleozoic				79-T.D.	60-T.D.
	Pennsylvanian			79-1246	60-1250
		Mononghelia		79- 246	60- 256
			Swickley Coal	165- 167	164- 167
			Pittsburgh Coal	240- 246	250- 256
		Conemaugh		246- 780	256- 785
			Ames Lime	478- 481	469- 487
			Saltsburg Sd. (Gow Run)	502- 541	495- 528
			Mahoning Lime	742- 763	735- 753
		Allegheny		780-1051	785-1035
			Upper Freeport Coal	Absent	Absent
			Upper Freeport Lime	795- 806	797- 803
			Lower Freeport Coal	850- ?	845-(Horizon)
			Upper Kittanning Coal	Absent	882- 884
			Lower Kittanning Coal (Horizon)	1010	1023
		Pottsville		1051-1246	1035-1252
			Homewood Sand	1051-1074	1035-1050
			Connoquessing Sand	1107-1120	1109-1115
		Mississippian		1246-1966	1252-1960
		(These are affected by (Mauch Chunk (an (St. Genevie		1286-1391	1292-1387
		(unconformity in (Greenbrier Lime		1286-1327	1292-1321
		(Northern W.Va. & Western (Loyalhanna Lime & Sand		1327-1391	1321-1378
		(Penna.			

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<u>ERA</u>	<u>SYSTEM</u>	<u>SERIES OR GROUP</u>	<u>FORMATION OR MEMBER</u>	<u>ELEV. WELL NO. 8</u>	<u>ELEV. WELL NO. 9</u>
		Burlington		1391-1945	1378-1955
			Pocano Formation	1391-1966	1378-1960
			Weir Sand	1764-1800	1758-1768
			Berea Sand	1945-1966	1955-1960
	Devonian				
		Upper	(Venango-Catshill (Chemung (Portage	1966-2590 ? 2590 ? -	1960-2576 ? 2576 ? -
		Middle	(Genesee (Hamilton (Marcellus) (Tioga Bentonite (Onondaga Lime	-4435 ? ? 4435-5245 5245-5818 5815 5818-6042	-4430 ? 4430-5236 ? 5236-5818 5820 5821-6040
		Lower	(Oriskany Sand (Helderburg Lime	6042-6109 6109-6397	6040-6119 6119-6406
	Silurian				
		Cayuga		6397-T.D.	6406-T.D.
			Tonoloway Lime	6397-T.D.	6406-T.D.
			Salina Formation	6397-6497	6406-6507
			Salt	6497-T.D.	6507-T.D.
				6715-6762	6720-6746
				6771-6780	6753-6776
				6785-6814	6780-6810
				T.D.-6818	6816-6826
					6834-6837
					T.D.-6840

WW-2A
(Rev. 6-14)

1.) Date: 4/16/19
2.) Operator's Well Number No. 20 Brine Well
State County Permit
3.) API Well No.: 47- 051

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE AND APPLICATION FOR A WELL WORK PERMIT

4) Surface Owner(s) to be served: (a) Name Eagle Natrium, LLC Address P.O. Box 191 New Martinsville, WV 26155 (b) Name N/A Address (c) Name N/A Address
5) (a) Coal Operator Name N/A Address (b) Coal Owner(s) with Declaration Name N/A Address (c) Coal Lessee with Declaration Name N/A Address
6) Inspector James Nicholson Address P.O. Box 44 Moundsville, WV 26041 Telephone 304-552-3874

TO THE PERSONS NAMED ABOVE TAKE NOTICE THAT:

N/A Included is the lease or leases or other continuing contract or contracts by which I hold the right to extract oil and gas

OR

N/A Included is the information required by Chapter 22, Article 6, Section 8(d) of the Code of West Virginia (see page 2)

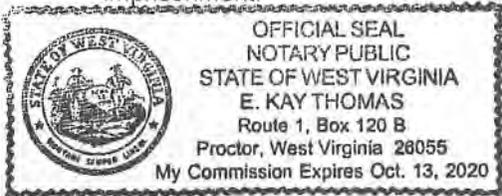
I certify that as required under Chapter 22-6 of the West Virginia Code I have served copies of this notice and application, a location plat, and accompanying documents pages 1 through ___ on the above named parties by:

- N/A Personal Service (Affidavit attached)
- N/A Certified Mail (Postmarked postal receipt attached)
- N/A Publication (Notice of Publication attached)

I have read and understand Chapter 22-6 and 35 CSR 4, and I agree to the terms and conditions of any permit issued under this application.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete.

I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.



Well Operator: Eagle Natrium, LLC
By: [Signature] Manager, Environmental Control
Address: P.O. Box 191 New Martinsville, WV 26155
Telephone: 304-451-3797
Email: ihoran@westlake.com

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APR 25 2019
WV Department of Environmental Protection

Subscribed and sworn before me this 16th day of April 2019, Eagle Natrium, LLC

[Signature] Notary Public
My Commission Expires Oct 13, 2020

Oil and Gas Privacy Notice

WW-2A Surface Waiver
(4/16)

SURFACE OWNER WAIVER

County 051

Operator
Operator well number

Eagle Natrium, LLC *IS SURFACE OWNER.*
No. 20 Brine Well

INSTRUCTIONS TO SURFACE OWNERS NAMED ON PAGE WW2-A

The well operator named on page WW2A is applying for a permit from the State to do oil or gas well work. (Note: If the surface tract is owned by more than three persons, then these materials were served on you because your name appeared on the Sheriff's tax ticket on the land or because you actually occupy the surface tract. In either case, you may be the only owner who will actually receive these materials.) See Chapter 22 of the West Virginia Code. Well work permits are valid for 24 months. If you do not own any interest in the surface tract, please forward these materials to the true owner immediately if you know who it is. Also, please notify the well operator and the Office of Oil and Gas.

NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.

WHERE TO FILE COMMENTS AND OBTAIN ADDITIONAL INFORMATION:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

Time Limits and methods for filing comments. The law requires these materials to be served on or before the date the operator files his Application. You have **FIFTEEN (15) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Comments must be in writing. Your comments must include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

The Chief has the power to deny or condition a well work permit based on comments on the following grounds:

- 1) The proposed well work will constitute a hazard to the safety of persons.
- 2) The soil erosion and sediment control plan is not adequate or effective;
- 3) Damage would occur to publicly owned lands or resources;
- 4) The proposed well work fails to protect fresh water sources or supplies;
- 5) The applicant has committed a substantial violation of a previous permit or a substantial violation of one or more of the rules promulgated under Chapter 22, and has failed to abate or seek review of the violation...".

If you want a copy of the permit as it is issued or a copy of the order denying the permit, you should request a copy from the Chief.

List of Water Testing Laboratories. The Office maintains a list of water testing laboratories which you can hire to test your water to establish water quality prior to and after drilling. Contact the Chief to obtain a copy.

VOLUNTARY STATEMENT OF NO OBJECTION

I hereby state that I have read the instructions to surface owners and that I have received copies of a Notice and Application for a Well Work Permit on Form WW2-A, and attachments consisting of pages 1 through ___ including a work order on Form WW2-B, a survey plat, WW-9, and a soil and erosion plan, all for proposed well work on my surface land as described therein.

I further state that I have no objection to the planned work described in these materials, and I have no objection to a permit being issued on those materials.

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APR 25 2019
WV Department of Environmental Protection

FOR EXECUTION BY A NATURAL PERSON

FOR EXECUTION BY A CORPORATION, ETC.

Signature

Date

N/A

Print Name

Company Name N/A

By _____
Its _____

Date

N/A

Signature

Date

WW-2A Coal Waiver

COAL OPERATOR, OWNER, OR LESSEE WAIVER

County 051
Operator Eagle Natrium, LLC

Operator's Well Number No. 20 Brine Well

INSTRUCTIONS TO COAL OPERATOR, OWNER, OR LESSEE

To the coal operator, owner, or lessee named on page WW2-A. You are hereby notified that any objection you wish to make or are required to make by WV Code 22-6-15, 16 or 17, must be filed with the Chief of the Office of Oil and Gas within fifteen (15) days after the receipt of this application by the Office. Mail objections to:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0499 extension 1654

WAIVER

The undersigned coal operator _____ / owner _____ / lessee _____ / of the coal under this well location has examined this proposed well location. If a mine map exists which covers the area of well location, the well location has been added to the mine map. The undersigned has no objection to the work proposed to be done at this location, provided, the well operator has complied with all applicable requirements of the West Virginia Code and the governing regulations.

FOR EXECUTION BY A NATURAL PERSON

FOR EXECUTION BY A CORPORATION, ETC.

Signature

Date

Company Name N/A (no active coal operations)
By _____
Its _____

Date

Signature

Date

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Environmental Protection

WW-9
(5/16)

API Number 47 - 051 -
Operator's Well No. 20 Brine Well

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Eagle Natrium, LLC OP Code 39600
Watershed (HUC 10) Ohio River Quadrangle New Martinsville

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes No

Will a pit be used? Yes No

If so, please describe anticipated pit waste: (No waste pit; a storm water run-off facility to be provided)

Will a synthetic liner be used in the pit? Yes No If so, what ml? N/A

Proposed Disposal Method For Treated Pit Wastes:

- Land Application (if selected provide a completed form WW-9-GPP)
- Underground Injection (UIC Permit Number _____)
- Reuse (at API Number _____)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain _____)

Will closed loop system be used? If so, describe: Yes; Dewatering system with centrifuge and weired tanks

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Vertical only: air and brine

-If oil based, what type? Synthetic, petroleum, etc. N/A

Additives to be used in drilling medium? Yes

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Solids: Landfill; Liquids: Solidified offsite and landfilled

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Solids: Short Creek Landfill, Approval #4383-13-3063; Liquids to be solidified: ETC, EPA ID #OHD987000783

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

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APR 25 2019

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on April 1, 2016, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature J. Thomas Horan
Company Official (Typed Name) J. Thomas Horan
Company Official Title Manager, Environmental Control

Subscribed and sworn before me this 16 day of April, 2019
E. Kay Thomas Notary Public

My commission expires Oct 13, 2020



Proposed Revegetation Treatment: Acres Disturbed 3.83 acres of stone to remain Preveg etation pH _____

Lime N/A Tons/acre or to correct to pH _____

Fertilizer type _____

Fertilizer amount N/A lbs/acre

Mulch N/A Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type lbs/acre

Seed Type lbs/acre

The disturbed soil will receive gravel
maintenance access purposes.

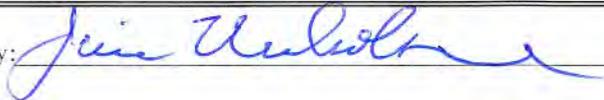
upon completion of well work for future

Attach:

Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, provide water volume, include dimensions (L, W, D) of the pit, and dimensions (L, W), and area in acres, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: _____



Comments: _____

The following documents are enclosed with this application:

Well Plat (mylar)

Proposed #20 Brine Well Configuration/ Schematic (Dwg. #70-2560)

#20 Brine Well Pad and Access Road (Dwg. #70-0370)

Adjacent #8 & 9 Brine Wells geologic data (circa 1959)

7.5' Topo Map of Site (Dwg. #49A-20BW); Reclamation Plan (9 drawings)

Title: _____

Oil & Gas Inspector

Date: _____

4/12/19

Field Reviewed? _____

() Yes

() No

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
GROUNDWATER PROTECTION PLAN

Operator Name: Eagle Natrium, LLC

Watershed (HUC 10): Ohio River Quad: New Martinsville, WV

Farm Name: Eagle Natrium, LLC

- 1. List the procedures used for the treatment and discharge of fluids. Include a list of all operations that could contaminate the groundwater.

N/A; A closed-loop dewatering system with containment will be utilized.

- 2. Describe procedures and equipment used to protect groundwater quality from the list of potential contaminant sources above.

A closed-loop dewatering system with containment will be utilized. A berm around the perimeter of the well pad will be installed. A liner will be installed on the well pad and perimeter berm.

- 3. List the closest water body, distance to closest water body, and distance from closest Well Head Protection Area to the discharge area.

The Ohio River is approximately 1/4 mile from the well pad.

- 4. Summarize all activities at your facility that are already regulated for groundwater protection.

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The Eagle Natrium Plant is a NPDES regulated facility for discharge into the Ohio River (Permit No. WV 0004359). The plant is also covered by the WV AST Rule (Registration No. WV 20140002939).

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Department of
Environmental Protection

- 5. Discuss any existing groundwater quality data for your facility or an adjacent property.

The groundwater at the Eagle Natrium Plant is contaminated due to historical operations. The plant is covered under Corrective Action Permit (No. WVD 004336343).

6. Provide a statement that no waste material will be used for deicing or fill material on the property.

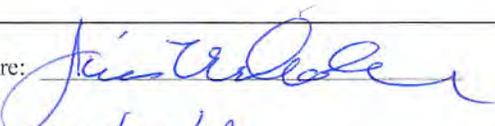
No waste material will be used for deicing or fill material on the property.

7. Describe the groundwater protection instruction and training to be provided to the employees. Job procedures shall provide direction on how to prevent groundwater contamination.

Drilling supervision will provide training to employees explaining the requirements to prevent groundwater contamination. The training will include the spill containment requirements for all oils, fluids, and chemicals.

8. Provide provisions and frequency for inspections of all GPP elements and equipment.

24/7 supervision will be provided for all drilling operations. On-going inspections will be performed to prevent groundwater contamination.

Signature: 

Date: 4/17/19

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EAGLE NATRIUM, LLC

11.69 AC. ±

WELL NO. BW 20

NAD '83 LATITUDE 39°45'00"

NAD '83 LONGITUDE 80°50'00"

WELL NO. BW 20
STATE PLANE COORDINATES
NORTH ZONE (NAD '83)

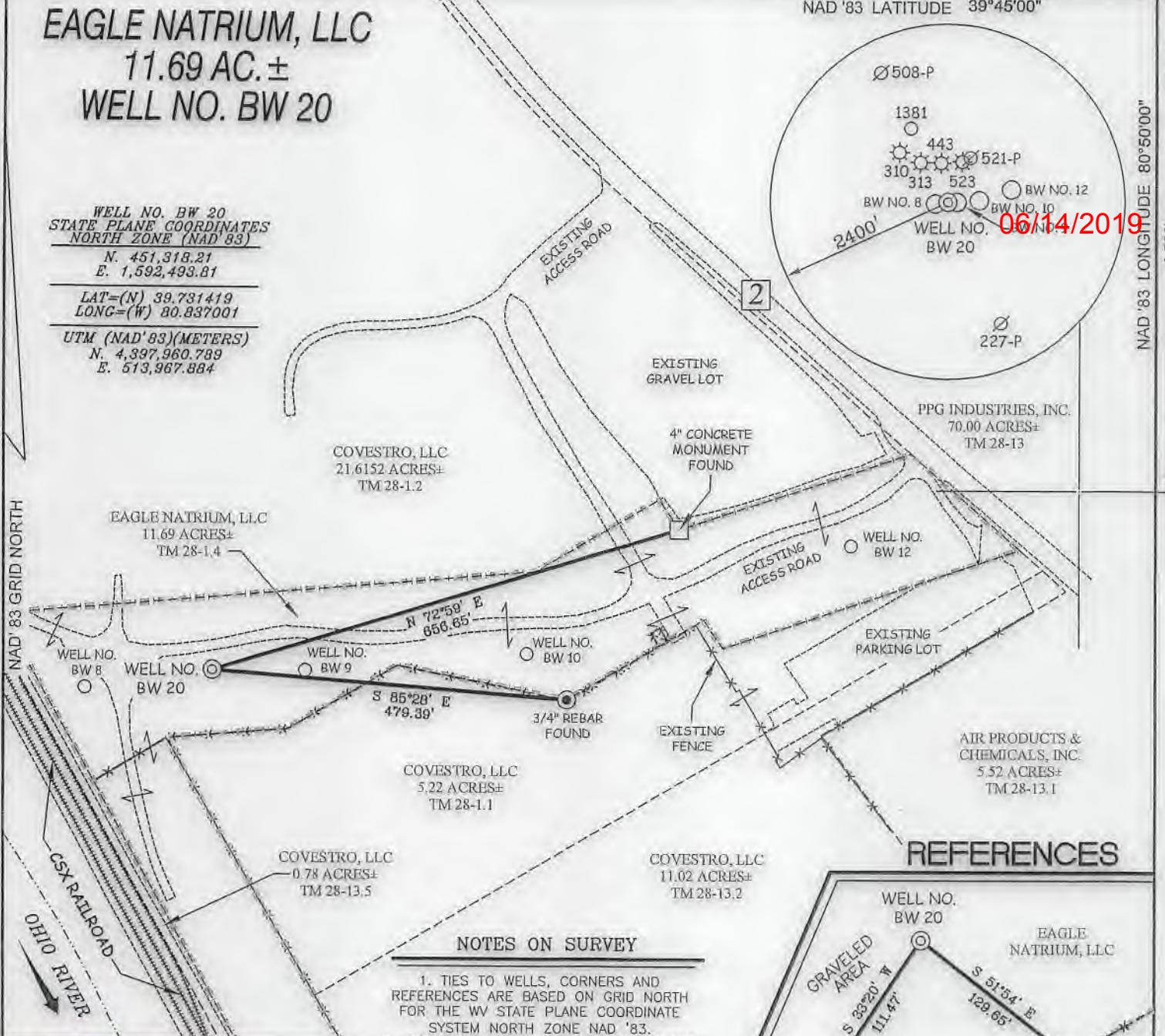
N. 451,318.21
E. 1,592,493.81

LAT=(N) 39.731419
LONG=(W) 80.837001

UTM (NAD '83)(METERS)

N. 4,397,960.789
E. 513,967.884

NAD '83 GRID NORTH

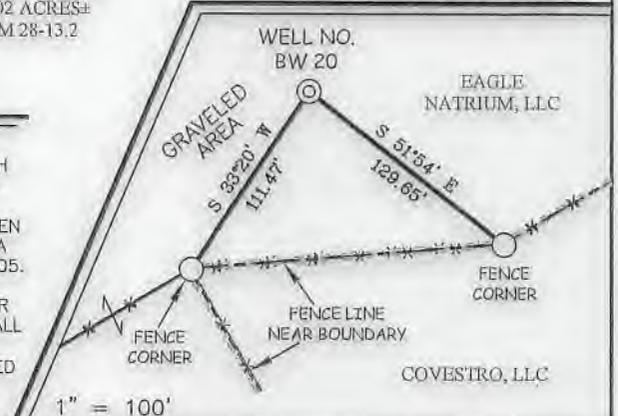


06/14/2019

NOTES ON SURVEY

1. TIES TO WELLS, CORNERS AND REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '83.
2. TRACT BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 799 PAGE 387 AND A PREVIOUS SURVEY BY SLS IN 2004 - 2005.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF MARSHALL COUNTY IN OCTOBER, 2018.
4. WELL LAT./LONG. (NAD'83) ESTABLISHED BY DGPS(SURVEY GRADE).

REFERENCES



SLS
Land & Energy Development
Solutions from the ground up.
P.O. Box 150 • 12 Vanhorn Drive • Glenville, WV 26031 • (304) 462-5634
www.slsurveyors.com

I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE NOVEMBER 5, 20 18
REVISED 11/16/18, 6/06/19
OPERATORS WELL NO. BW 20
API WELL NO. 47 - 051 - 02209
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 8874PBW20R2.dwg
HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 200'

STATE OF WEST VIRGINIA
DIVISION OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS



WELL TYPE: OIL GAS BRINE & LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION: GROUND ELEVATION 634' WATERSHED OHIO RIVER
DISTRICT FRANKLIN COUNTY MARSHALL QUADRANGLE NEW MARTINSVILLE 7.5'

SURFACE OWNER EAGLE NATRIUM, LLC ACREAGE 11.69 ±
ROYALTY OWNER EAGLE NATRIUM, LLC ACREAGE _____

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER _____

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION SALINA
ESTIMATED DEPTH 6,700' - 6,800'

WELL OPERATOR EAGLE NATRIUM, LLC DESIGNATED AGENT J. THOMAS HORAN
ADDRESS P.O. BOX 191 ADDRESS P.O. BOX 191
NEW MARTINSVILLE, WV 26155 NEW MARTINSVILLE, WV 26155

COUNTY NAME PERMIT

BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL

LIST OF DRAWINGS

- 1 - COVER SHEET
- 2 - ACCESS ROAD - PAD
- 3 - WELL PAD - STORM WATER DRAINAGE BASIN - STOCKPILE
- 4 - WELL PAD ELEVATIONS SHEET
- 5 - BASIN & STOCKPILE ELEVATION SHEET
- 6 - PROFILES SHEET
- 7 - DETAILS SHEET
- 8 - RECLAMATION PLAN
- 9 - RECLAMATION - E&S NOTES

PROJECT INFORMATION

PROJECT NAME: BRINE WELL NO. 20
 TAX PARCEL:
 FRANKLIN DISTRICT
 MAP 28-1.2
 MAP 28-1.4
 MAP 28-13.5

SURFACE OWNER:
 EAGLE NATRIUM, LLC/AXIALL CORPORATION
 FRANKLIN DISTRICT
 MARSHALL COUNTY, WV
 TOTAL PROPERTY AREA: 403.636 ± ACRES

ROYALTY OWNER:
 EAGLE NATRIUM, LLC/AXIALL CORPORATION
 FRANKLIN DISTRICT
 MARSHALL COUNTY, WV

SITE LOCATION:
 THE BRINE WELL NO. 20 SITE IS LOCATED ON THE WEST SIDE OF WV ST. RT. 2, APPROXIMATELY 1.88 MILES NORTH OF MARSHALL CO. RT. 89 AND WV RT 2 INTERSECTION.

ENTRANCE PERMIT

AS PER WESTLAKE CHEMICAL, ACCESS TO THE SITE IS MADE VIA AN EXISTING ACCESS POINT TO WV STATE ROUTE 2; THEREFOR AN ENCROACHMENT PERMIT IS NOT REQUIRED FROM WVDOH.

LOCATION COORDINATES

BRINE WELL NO. 20 WELL PAD CENTER
 LATITUDE: 39.731540 LONGITUDE: -80.836927 (NAD 83)
 NORTHING: 4397974.19 EASTING: 513974.22 (UTM NAD 83 METERS)

BRINE WELL NO. 20 WELL PAD ENTRANCE
 LATITUDE: 39.733237 LONGITUDE: -80.835103 (NAD 83)
 NORTHING: 4398162.82 EASTING: 514130.18 (UTM NAD 83 METERS)

SITE INCLUSION COMPUTATIONS

TOTAL SITE INCLUSION AREA = 3.83 ± ACRES

MISS UTILITY STATEMENT

MISS UTILITY OF WEST VIRGINIA WILL BE NOTIFIED BY THE SUBCONTRACTOR FOR THE LOCATING OF UTILITIES NOT LATER THAN 48 HOURS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ON THIS PROJECT.

FLOODPLAIN NOTE

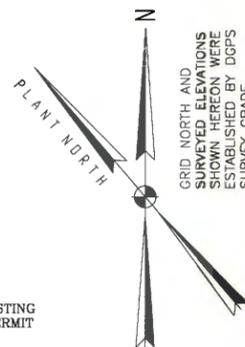
THE PROPOSED LIMITS OF DISTURBANCE FOR THIS PROJECT IS LOCATED IN PORTIONS OF FEMA FLOOD ZONE X AND ZONE AE, PER THE FLOOD INSURANCE RATE MAP (FIRM) NUMBER 54051C0205E, DATED SEPT. 25, 2009.

GEOTECHNICAL NOTE

A SUBSURFACE INVESTIGATION HAS NOT BEEN PERFORMED AT THIS TIME. THE ENGINEER AND SURVEYOR ARE NOT RESPONSIBLE FOR UNFORESEEN SUBSURFACE IRREGULARITIES CAUSING ADDITIONAL WORK OR ADDITIONAL CONSTRUCTION MEASURES REQUIRED BEYOND THOSE STANDARD PRACTICES SHOWN ON THIS PLAN AS A RESULT OF ANY OTHER GEOTECHNICAL COMPLICATIONS ENCOUNTERED DURING CONSTRUCTION.

ENVIRONMENTAL NOTE

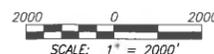
A WETLAND/STREAM DELINEATION WAS PERFORMED ON 10-03-2016 BY SLS TO REVIEW THE SITE FOR WATERS AND WETLANDS THAT ARE MOST LIKELY WITHIN THE REGULATORY PURVIEW OF THE U.S. ARMY CORPS OF ENGINEERS (USACE). THIS DELINEATION DOES NOT, IN ANY WAY, REPRESENT A JURISDICTIONAL DETERMINATION OF THE LANDWARD LIMITS OF WATERS AND WETLANDS WHICH MAY BE REGULATED BY THE USACE. IT IS STRONGLY RECOMMENDED THAT THE USACE BE CONSULTED IN AN EFFORT TO GAIN WRITTEN CONFIRMATION OF THE DELINEATION DESCRIBED BY THIS REPORT PRIOR TO ENGAGING IN CONSTRUCTION ON THE PROPERTY DESCRIBED HEREIN. THE DEVELOPER SHALL OBTAIN THE APPROPRIATE PERMITS FROM THE FEDERAL AND/OR STATE REGULATORY AGENCIES PRIOR TO ANY PROPOSED IMPACTS TO WASTER IN THE U.S. INCLUDING WETLAND FILLS AND STREAM CROSSINGS.



SITUATE ON THE WATERS THE OHIO RIVER IN
 FRANKLIN DISTRICT, MARSHALL COUNTY, WEST VIRGINIA.



NEW MARTINSVILLE QUAD



LEGEND			
EX. INDEX CONTOUR	700	PROP. INDEX CONTOUR	700
EX. INTERMEDIATE CONTOUR		PROP. INTERMEDIATE CONTOUR	
EX. BOUNDARY LINE		PROP. LIMITS OF DISTURBANCE	
EX. ROAD EDGE OF GRAVEL/DIRT		PROP. WELL PAD	
EX. ROAD EDGE OF PAVEMENT		PROP. BRINE WELL HEAD	
EX. ROAD CENTERLINE		PROP. RIG MATTING	
EX. DITCHLINE		PROP. SUMP DRAIN	
EX. CULVERT		PROP. CONTAINMENT BERM	
EX. GUARDRAIL		PROP. PIT/IMPOUNDMENT CL	
EX. FENCELINE		PROP. PERIMETER SAFETY FENCE	
EX. GATE		PROP. ACCESS GATE WITH EMERGENCY LIFELINE	
EX. OVERHEAD UTILITY		PROP. OVERHEAD UTILITY	
EX. OVERHEAD UTILITY R/W			
EX. POWER POLE			
EX. GUY WIRE			
EX. TELEPHONE LINE			
EX. GASLINE		PROP. ROCK CONSTRUCTION ENTRANCE	
EX. GASLINE R/W			
EX. WATERLINE			
EX. WATER WELL			
EX. BRINE WELL		PROP. 14" SHUTOFF VALVE	
EX. TREELINE		PROP. ROAD EDGE OF GRAVEL	
EX. REFERENCE TREE		PROP. ROAD CENTERLINE	
EX. DELINEATED STREAM		PROP. DITCH RELIEF	
EX. DELINEATED WETLAND		CULVERT (DRC)	
		PROP. MOUNTABLE BERM	
		12" COMPOST FILTER SOCK	
		PROP. GROUNDWATER DEWATERING TRENCH	
EX. BUILDING			
		SECTION LINE	
		X-SECTION GRID INDEX	
		X-SECTION GRID INTERMEDIATE	
		X-SECTION PROPOSED GRADE	
		X-SECTION EXISTING GRADE	
		X-SECTION WATER SURFACE	
		SPOT ELEVATION	x 1000'
		RECLAMATION CONTOUR INTER.	
		RECLAMATION CONTOUR INDEX	



Richard A. Triggs
 4-18-19

THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT FOR: WESTLAKE CHEMICAL

COVER SHEET
BRINE WELL # 20
FINAL SITE PLAN
 FRANKLIN DISTRICT
 MARSHALL COUNTY, WV

DATE: 04-01-2019
SCALE: N/A
DESIGNED BY: K.L.H.
FILE NO. 8874
SHEET 1 OF 9
REV:

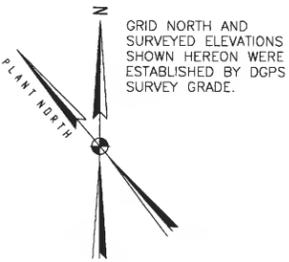
OPERATOR

WESTLAKE CHEMICAL
 WV STATE ROUTE 2
 P.O. BOX 191
 NEW MARTINSVILLE, WV 26155
 PHONE: (304) 455-2200

ENGINEERS/SURVEYOR

SLS LAND AND ENERGY DEVELOPMENT
 12 VAN HORN DRIVE
 P.O. BOX 150
 GLENVILLE, WV 26351
 PHONE: (304) 462-5634

MISS Utility of West Virginia
 1-800-245-4848
 West Virginia State Law
 (Section XIV: Chapter 24-C)
 Requires that you call two
 business days before you dig in
 the state of West Virginia.
IT'S THE LAW!!



BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL

470 5102 209

06/14/2019

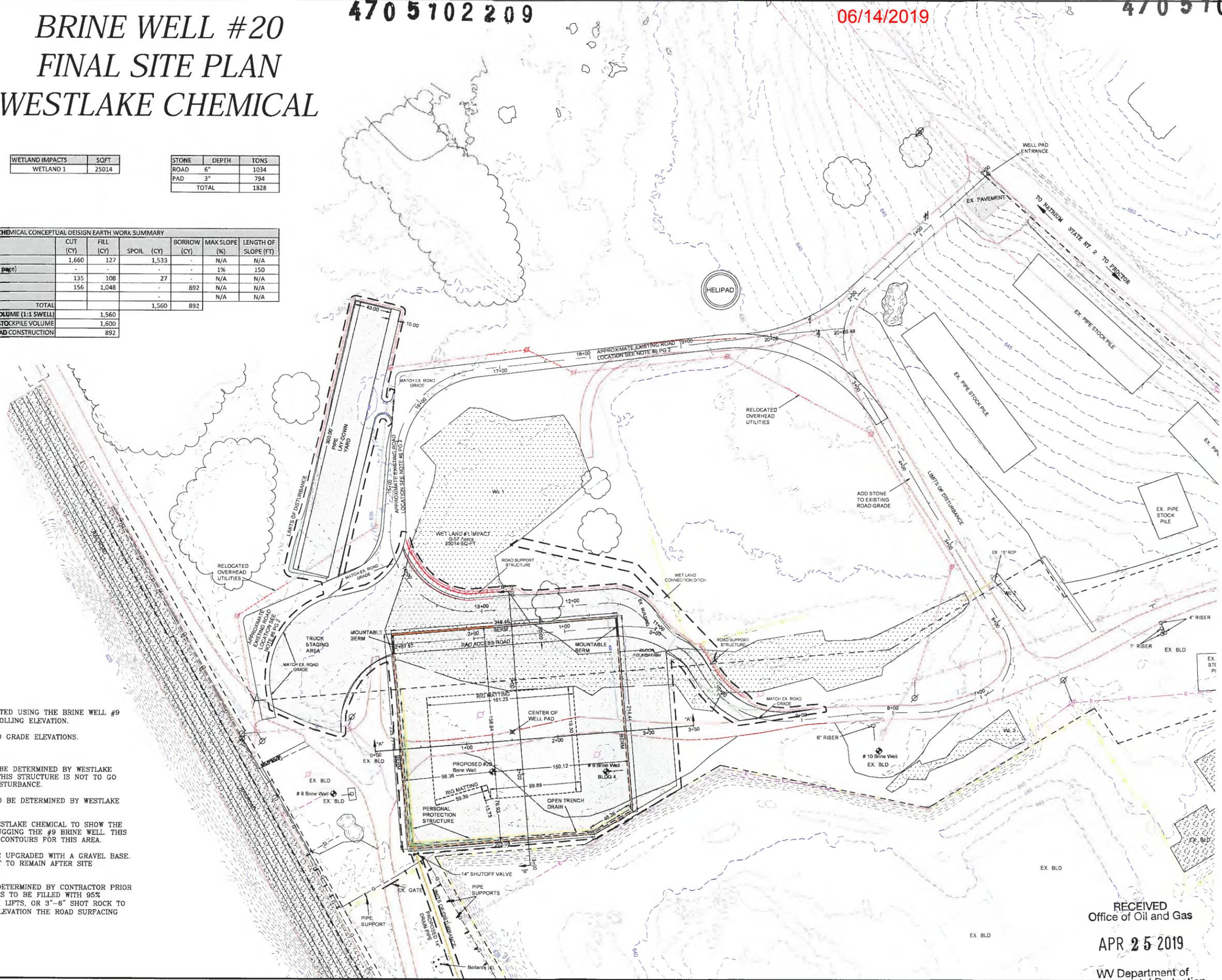
470 5102 209

LIMITS OF DISTURBANCE (ACRES)
3.83

WETLAND IMPACTS	SQFT
WETLAND 1	25014

STONE	DEPTH	TONS
ROAD	6"	1034
PAD	3"	794
TOTAL		1828

WESTLAKE CHEMICAL CONCEPTUAL DESIGN EARTH WORK SUMMARY						
DESCRIPTION	CUT (CY)	FILL (CY)	SPOIL (CY)	BORROW (CY)	MAX SLOPE (%)	LENGTH OF SLOPE (FT)
STORM WATER DRAINAGE BASIN	1,660	127	-	1,533	N/A	N/A
ROAD STA 9+48 TO 14+16 (See Note 8 page)	-	-	-	-	1%	150
PIPE LAY DOWN YARD	135	108	27	-	N/A	N/A
WELL PAD	156	1,048	-	892	N/A	N/A
TOTAL STRIPPED TOPSOIL (5")	-	-	-	-	-	-
TOTAL			1,560	892		
TOTAL REQUIRED EXCESS STOCKPILE VOLUME (1:1 SWELL)		1,560				
TOTAL AVAILABLE EXCESS STOCKPILE VOLUME		1,600				
OFF SITE BORROW MATERIAL FOR PAD AND ROAD CONSTRUCTION			892			



- NOTE:**
- 1) ALL ELEVATIONS SHOWN ARE CALCULATED USING THE BRINE WELL #9 ELEVATION OF 634.02' AS THE CONTROLLING ELEVATION.
 - 2) ALL ELEVATIONS SHOWN ARE FINISHED GRADE ELEVATIONS.
 - 3) PAD SLOPES ARE +/- 1%.
 - 4) ALL ROAD SUPPORT STRUCTURES TO BE DETERMINED BY WESTLAKE CHEMICAL PRIOR TO CONSTRUCTION. THIS STRUCTURE IS NOT TO GO BEYOND THE PROPOSED LIMITS OF DISTURBANCE.
 - 5) PERSONAL PROTECTION STRUCTURE TO BE DETERMINED BY WESTLAKE CHEMICAL PRIOR TO CONSTRUCTION.
 - 6) ROAD LOCATION WAS PROVIDED BY WESTLAKE CHEMICAL TO SHOW THE ACCESS ROAD AS PERMITTED FOR PLUGGING THE #9 BRINE WELL. THIS PLAN DOES NOT SHOW THE EXISTING CONTOURS FOR THIS AREA.
 - 7) THE EXISTING ACCESS ROAD IS TO BE UPGRADED WITH A GRAVEL BASE. ALL ACCESS ROAD GRAVEL PLACEMENT TO REMAIN AFTER SITE RECLAMATION.
 - 8) WETLAND EXCAVATION DEPTH TO BE DETERMINED BY CONTRACTOR PRIOR TO CONSTRUCTION. EXCAVATED AREA IS TO BE FILLED WITH 95% COMPACTED MATERIAL IN 12" MINIMUM LIFTS, OR 3"-6" SHOT ROCK TO AN ELEVATION OF 633'. FROM THIS ELEVATION THE ROAD SURFACING STONE SHALL BE PLACED.



REVISION	DATE	DESCRIPTION
1	4-18-19	ADD 14" SHUTOFF VALVE

Westlake Chemical

SLS Land & Energy Development
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Solutions from the ground up.

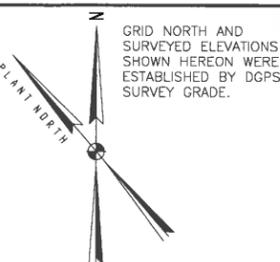
Richard A. Triggs
REGISTERED PROFESSIONAL ENGINEER
0713
4-18-19

THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT
FOR: WESTLAKE CHEMICAL

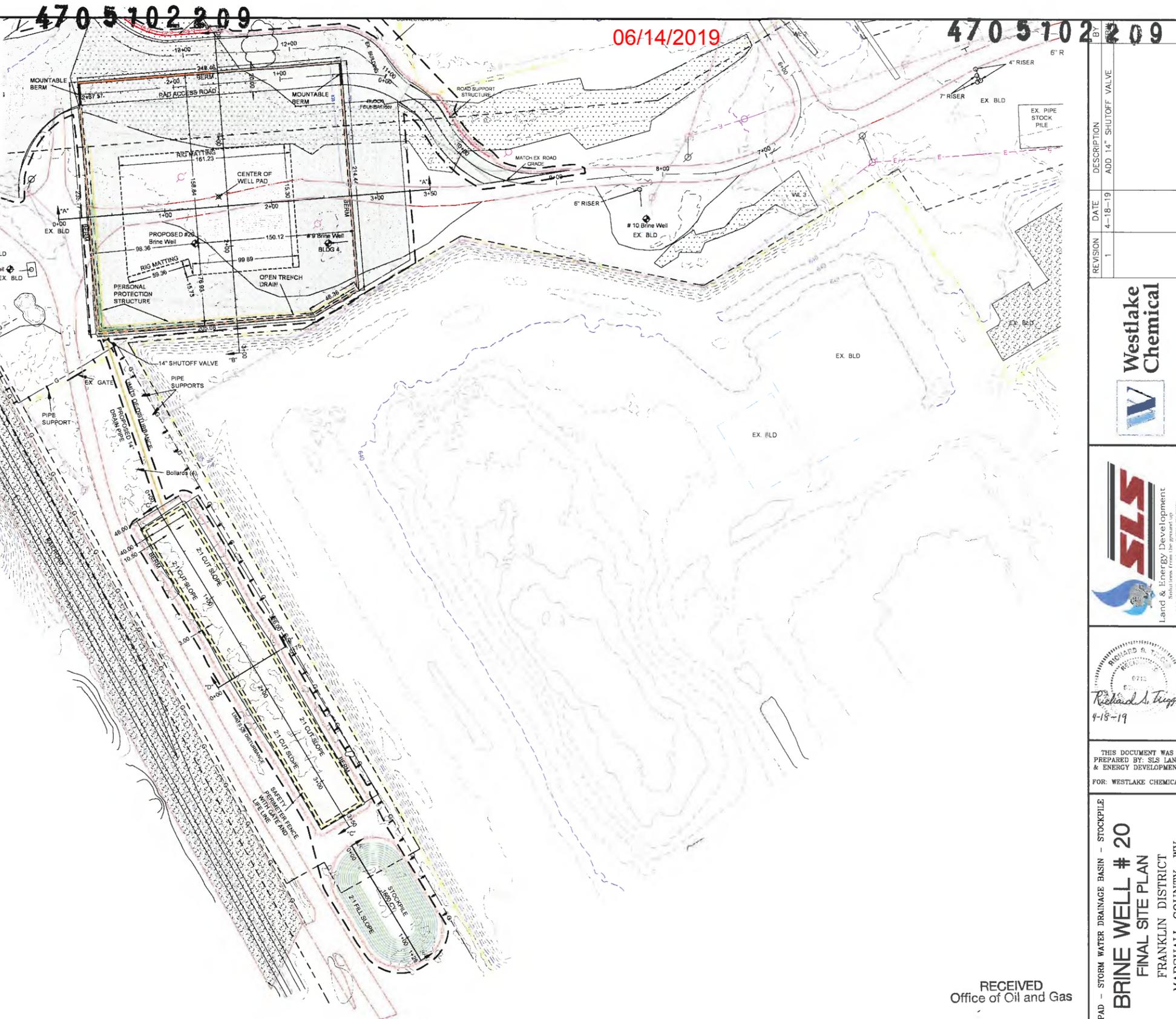
ACCESS ROAD - PAD
BRINE WELL # 20
FINAL SITE PLAN
FRANKLIN DISTRICT
MARSHALL COUNTY, WY

DATE: 04-01-2019
SCALE: 1" = 50'
DESIGNED BY: K.L.H.
FILE NO. 8874
SHEET 2 OF 9
REV.

RECEIVED
Office of Oil and Gas
APR 25 2019
WV Department of Environmental Protection

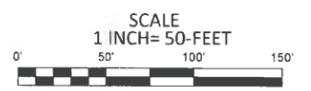


BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL



Storm Water Drainage Basin				
Top of Berm Elevation: 634.50				
Bottom of Basin Elevation: 627.25				
Elev	Storage(AcreFt)	(C.Y.)	(C.F.)	(Gallons)
627.25	0	0	0	0
627.75	0.04022	64.9	1752.2	13107.1
628.25	0.08747	141.1	3810.3	28503.3
628.75	0.14184	228.8	6178.5	46218.4
629.25	0.20341	328.2	8860.7	66282.4
629.75	0.27229	439.3	11860.8	88725.2
630.25	0.34855	562.3	15183	113576.7
630.75	0.4323	697.5	18831.2	140866.9
631.25	0.52363	844.8	22809.3	170625.7
631.75	0.62262	1004.5	27121.5	202882.9
632.25	0.72938	1176.7	31711.7	237668.6
632.75	0.84398	1361.6	36763.8	275012.6
633.25	0.96653	1559.3	42102	314944.8
633.75	1.09711	1770	47790.2	357495.3
634.25	1.23582	1993.8	53832.3	402893.8
634.5	1.30825	2110.6	56987.4	426295.5

- NOTE:**
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 - 2) ALL ELEVATIONS SHOWN ARE FINISHED GRADE ELEVATIONS.
 - 3) PAD SLOPES ARE +/- 1%.
 - 4) STORM WATER DRAINAGE BASIN TO BE LINED WITH 65 MIL POLYLINER.
 - 5) STOCKPILED MATERIAL IS TO BE USED IN THE BASIN RECLAMATION.



06/14/2019

4705102209

4705102209

REVISION	DATE	DESCRIPTION
1	4-18-19	ADD 14" SHUTOFF VALVE

Westlake Chemical

SLS
Land & Energy Development

Richard A. Tripp
4-18-19

THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT FOR: WESTLAKE CHEMICAL

WELL PAD - STORM WATER DRAINAGE BASIN - STOCKPILE
BRINE WELL # 20
FINAL SITE PLAN
FRANKLIN DISTRICT
MARSHALL COUNTY, WV

RECEIVED
Office of Oil and Gas
APR 25 2019
WV Department of Environmental Protection

DATE:	04-01-2019
SCALE:	1" = 50'
DESIGNED BY:	K.L.H.
FILE NO.	8874
SHEET	3 OF 9
REV:	

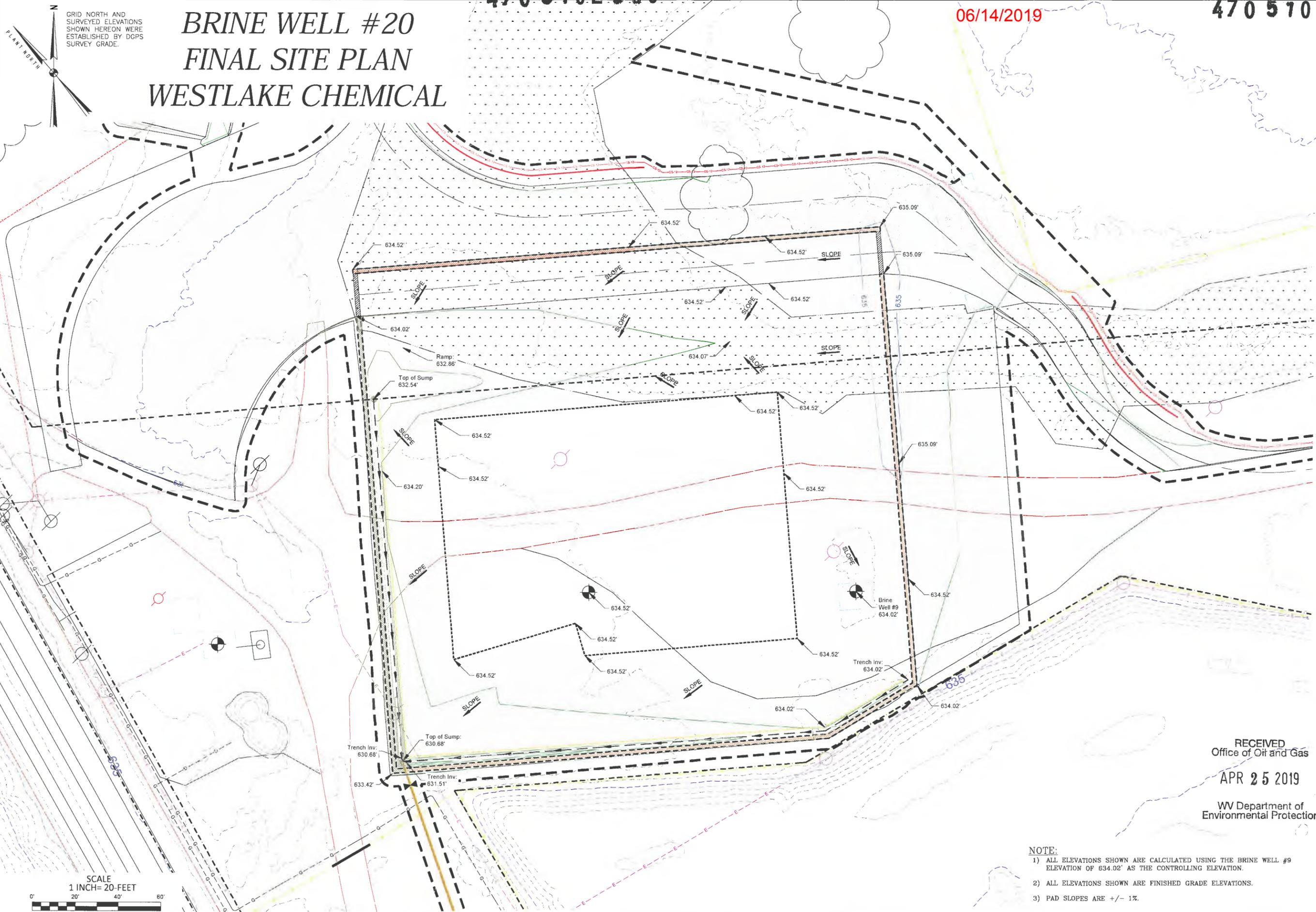
470 5102 209

06/14/2019

470 5102 209

BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL

GRID NORTH AND
SURVEYED ELEVATIONS
SHOWN HEREON WERE
ESTABLISHED BY DGPS
SURVEY GRADE.



SCALE
1 INCH = 20 FEET

- NOTE:**
- 1) ALL ELEVATIONS SHOWN ARE CALCULATED USING THE BRINE WELL #9 ELEVATION OF 634.02' AS THE CONTROLLING ELEVATION.
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 - 3) PAD SLOPES ARE +/- 1%.

RECEIVED
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APR 25 2019
WV Department of
Environmental Protection

REVISION	DATE	DESCRIPTION
1	4-18-19	ADD 14" SHUTOFF VALVE

Westlake Chemical

SLS
Land & Energy Development
Solutions from the ground up.

Richard A. Triggs
4-18-19

THIS DOCUMENT WAS PREPARED BY SLS LAND & ENERGY DEVELOPMENT FOR WESTLAKE CHEMICAL

WELL PAD ELEVATION SHEET
BRINE WELL # 20
FINAL SITE PLAN
FRANKLIN DISTRICT
MARSHALL COUNTY, WV

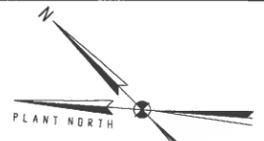
DATE: 04-01-2019
SCALE: 1" = 20'
DESIGNED BY: K.L.H.
FILE NO. 6874
SHEET 4 OF 9
REV:

470 5102 209

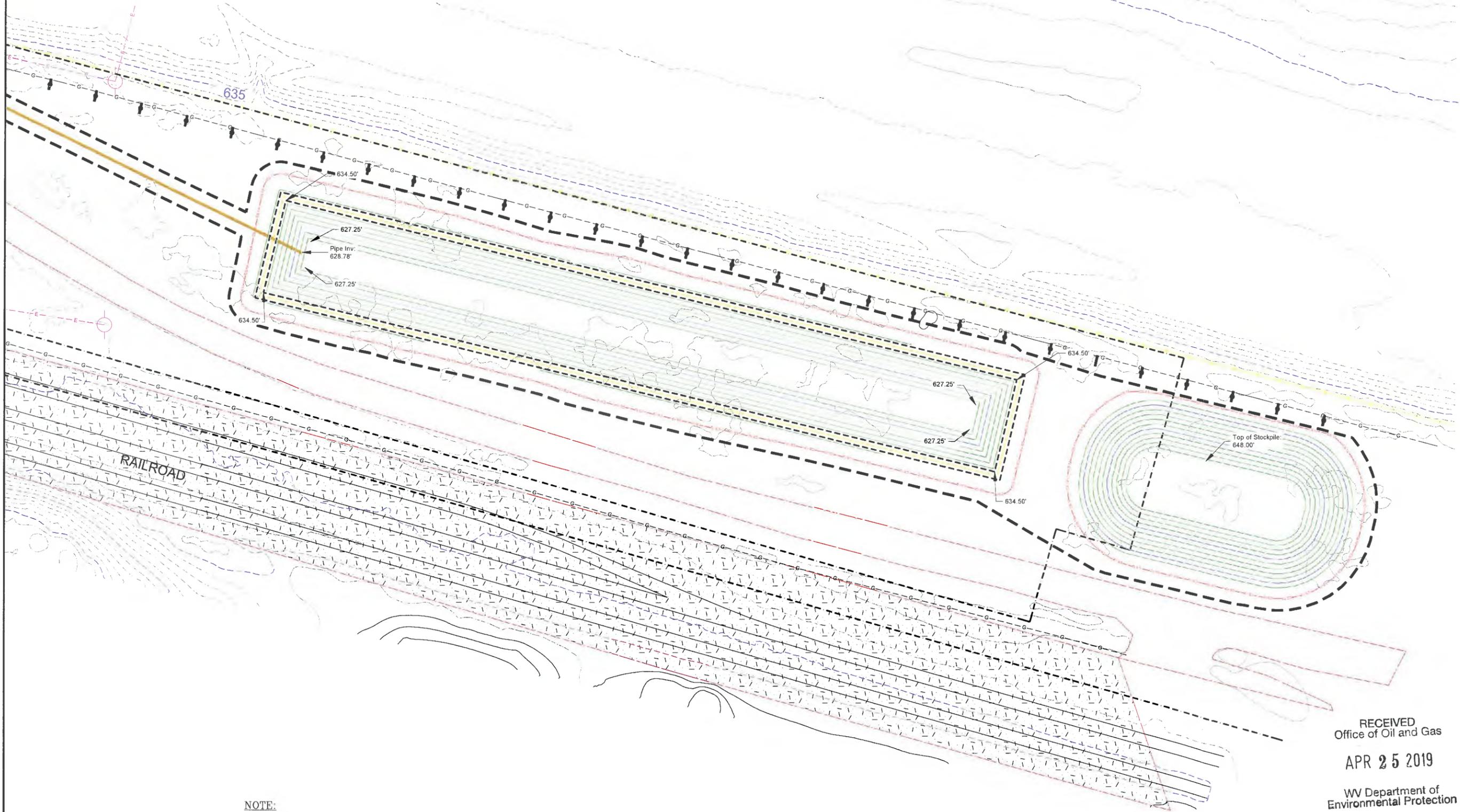
06/14/2019

470 5102 209

BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL



GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



REVISION	DATE	DESCRIPTION	BY
1	4-18-19	ADD 14" SHUTOFF VALVE	AW



Richard A. Trigger
4-18-19

THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT
FOR: WESTLAKE CHEMICAL

BASIN & STOCKPILE ELEVATION SHEET
BRINE WELL # 20
FINAL SITE PLAN
FRANKLIN DISTRICT
MARSHALL COUNTY, WV

RECEIVED
Office of Oil and Gas

APR 25 2019

WV Department of
Environmental Protection

- NOTE:**
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 - 2) ALL ELEVATIONS SHOWN ARE FINISHED GRADE ELEVATIONS.



DATE	04-01-2019
SCALE	1" = 20'
DESIGNED BY:	K.L.H.
FILE NO.	8874
SHEET	5 OF 9
REV.	

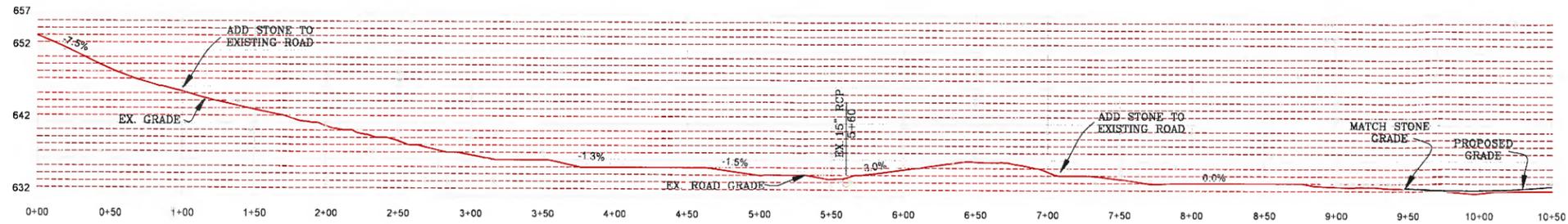
BRINE WELL #20 FINAL SITE PLAN WEST LAKE CHEMICAL

470 5102 209

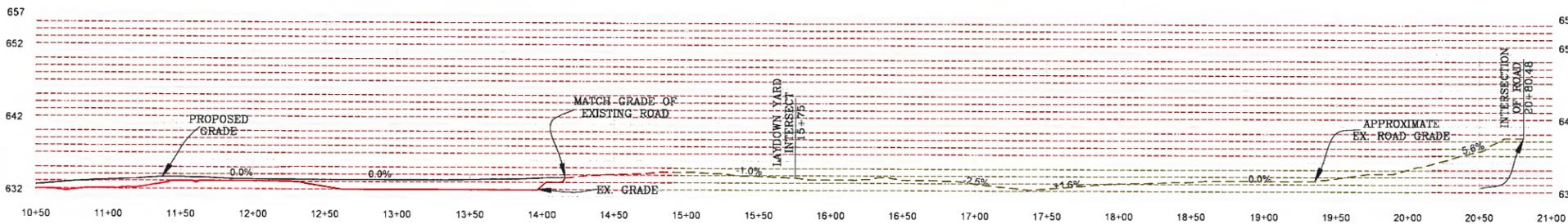
06/14/2019

470 5102 209

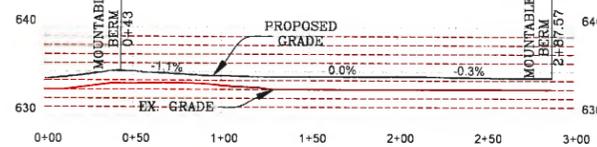
BRINE WELL #20 ACCESS ROAD PROFILE "0+00-10+50"
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



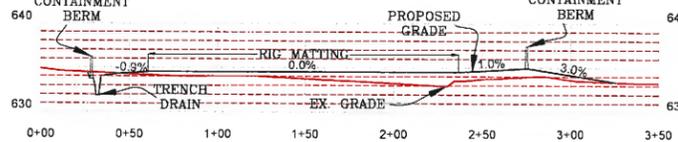
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SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



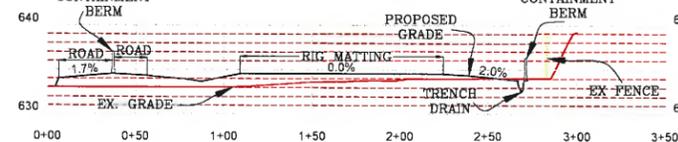
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SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



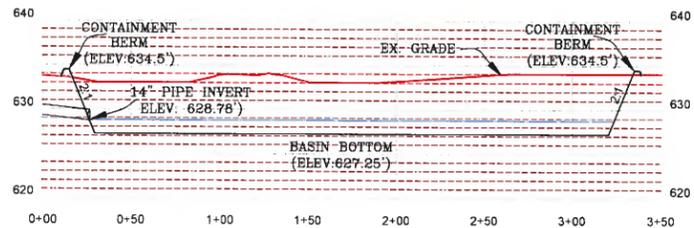
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SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



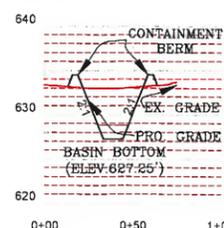
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SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



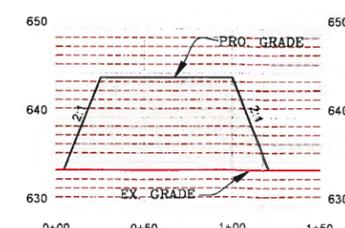
BRINE WELL #20 BASIN PROFILE C-C "0+00-3+50"
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



BRINE WELL #20 BASIN PROFILE D-D "0+00-0+75"
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'

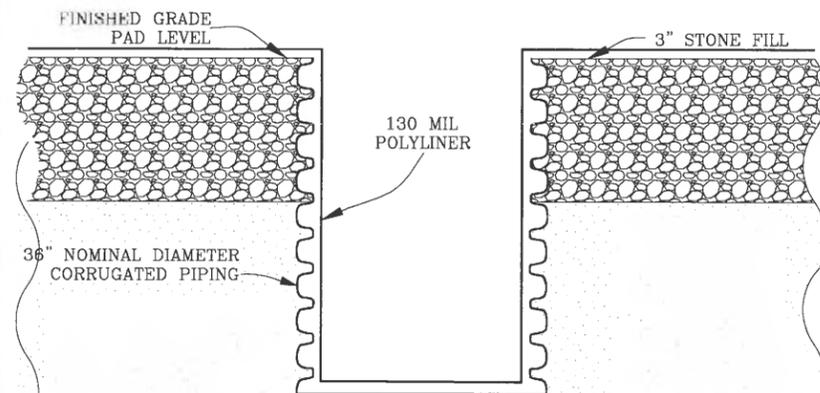


BRINE WELL #20 STOCKPILE PROFILE D-D "0+00-0+75"
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



REVISION	1	DESCRIPTION	ADD 14" SHUTOFF VALVE
DATE	4-18-19		
THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT FOR: WESTLAKE CHEMICAL			
PROFILES SHEET BRINE WELL # 20 FINAL SITE PLAN FRANKLIN DISTRICT MARSHALL COUNTY, WV			
RECEIVED Office of Oil and Gas APR 25 2019 WV Department of Environmental Protection			
DATE:	04-01-2019		
SCALE:	1" = 50'		
DESIGNED BY:	K.L.H.		
FILE NO.	8874		
SHEET	6 OF 9		
REV:			

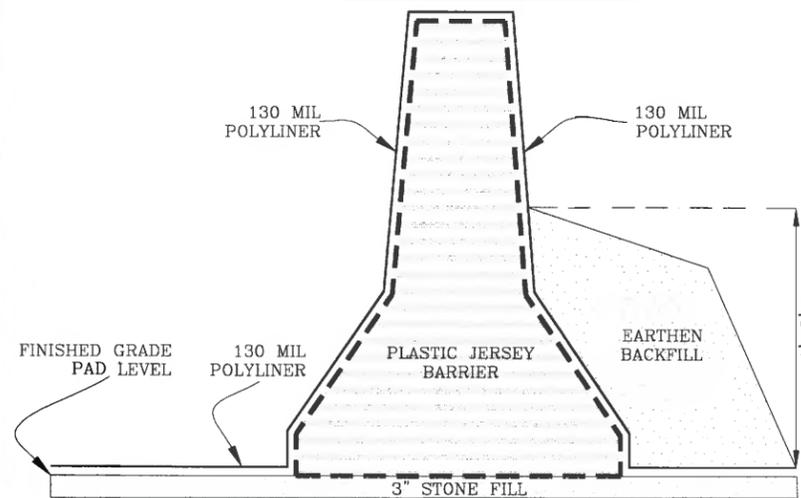
SUMP TYPICAL



1. CONTAINMENT SUMPS SHALL BE INSPECTED DAILY TO PREVENT OVERFLOWING.
2. SUMP AREAS SHALL BE LINED AS NECESSARY TO PREVENT FILTRATION THROUGH THE CONTAINMENT BERM.

NOT TO SCALE

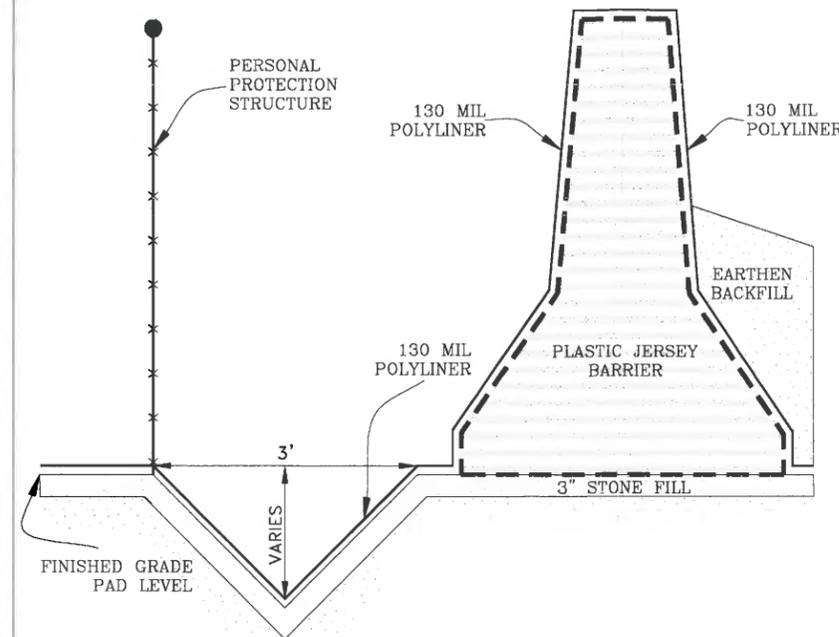
JERSEY BARRIER BERM TYPICAL



1. 130MIL POLYLINER TO BE LAID OVER PLASTIC JERSEY BARRIER CONTAINMENT BERM ALONG THE FULL LENGTH OF THE PAD PERIMETER. (MOUNTABLE BERM IS EXCLUDED IN THIS DETAIL.)
2. THE 130MIL POLYLINER IS TO OVERLAP THE JERSEY BARRIERS AND EXTEND PAST THE BERM PER MANUFACTURERS RECOMMENDATION, AND EARTHEN MATERIAL TO BE PLACED OVER TOP OF LINER TO ACT AS ANCHORING.

NOT TO SCALE

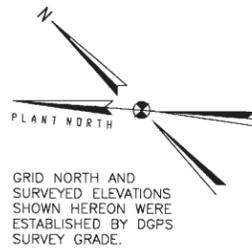
OPEN TRENCH DRAIN TYPICAL



1. OPEN 3' WIDE TRENCH DRAIN AT MINIMUM 1% SLOPE. 130MIL POLYLINER TO BE LAID OVER STONE IN TRENCH FOR THE FULL LENGTH OF THE TRENCHES.
2. TRENCHES TO DRAIN TOWARDS SEDIMENT COLLECTION SUMP AT SOUTHWEST CORNER OF PAD BEFORE EXITING THE PAD VIA 14" DRAIN PIPE TO TEMPORARY BASIN.
3. PERSONAL PROTECTION STRUCTURE TO BE INSTALLED ALONG INSIDE EDGE OF TRENCH. THIS STRUCTURE WILL BE DETERMINED BY WESTLAKE CHEMICAL PRIOR TO CONSTRUCTION.

DESCRIPTION	ADD 14" SHUTOFF VALVE
DATE	4-18-19
REVISION	1
THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT FOR: WESTLAKE CHEMICAL	
RECEIVED Office of Oil and Gas APR 25 2019 WV Department of Environmental Protection	
DETAIL SHEET	BRINE WELL # 20
	FINAL SITE PLAN
	FRANKLIN DISTRICT
	MARSHALL COUNTY, WV
DATE:	04-01-2019
SCALE:	N/A
DESIGNED BY:	K.L.H.
FILE NO.	8874
SHEET	7 OF 9
REV.	

BRINE WELL #20 FINAL SITE PLAN WESTLAKE CHEMICAL



06/14/2019



RECLAMATION NOTE.

- 1) SITE IS TO BE REGRADED TO PRE-CONSTRUCTION SITE CONDITIONS.
- 2) ALL GRAVEL PLACED ON ACCESS ROADS TO REMAIN IN PLACE.
- 3) ROAD LOCATION WAS PROVIDED BY WESTLAKE CHEMICAL TO SHOW PERMITTED #9 BRINE WELL PLUGGER ACCESS ROAD. THIS PLAN DOES NOT SHOWN THE EXISTING CONTOURS FOR THIS AREA.
- 4) THE EXISTING ACCESS ROAD IS TO BE UPGRADED WITH A GRAVEL BASE. ALL ACCESS ROAD GRAVEL PLACEMENT TO REMAIN AFTER SITE RECLAMATION.
- 5) AREAS WHERE EXISTING CONDITIONS WERE GRAVEL COVERED ARE TO BE RESTORED WITH GRAVEL SURFACE.
- 6) ALL AREAS THAT WERE VEGETATED SHALL BE RETURNED TO THEIR PRE-CONSTRUCTION CONDITIONS UTILIZING SEEDING AND MULCHING RECOMMENDATIONS AND INFORMATION ON PAGE 9. (NW-9)

RECEIVED
Office of Oil and Gas
APR 25 2019

WV Department of
Environmental Protection
SCALE
1 INCH= 50- FEET

REVISION	DATE	DESCRIPTION	BY
1	4-18-19	ADD 14" SHUTOFF VALVE	TBW

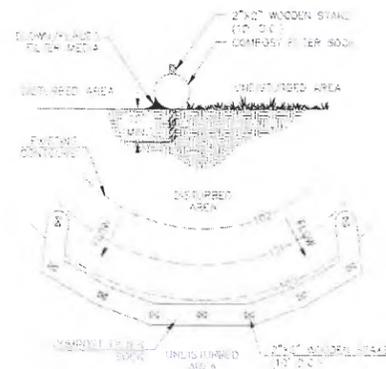


Richard A. Tuggs
4-18-19

THIS DOCUMENT WAS PREPARED BY: SLS LAND & ENERGY DEVELOPMENT FOR: WESTLAKE CHEMICAL

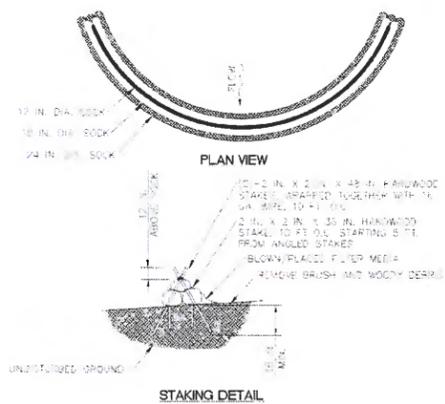
RECLAMATION PLAN SHEET
BRINE WELL # 20
FINAL SITE PLAN
FRANKLIN DISTRICT
MARSHALL COUNTY, WV

DATE:	04-01-2019
SCALE:	1" = 50'
DESIGNED BY:	K.L.H.
FILE NO.	8874
SHEET	6 OF 9
REV:	



NOTE: SOCK FABRIC SHALL MEET STANDARDS OF TABLE 4.1. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2.

COMPOST FILTER SOCK
SCALE: NOT TO SCALE



- COMPOST FILTER SOCK NOTES:**
- COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL (GRADE). BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 6 FEET UP SLOPE AT 4% (REFER TO THE MAIN SOCK DRAWING).
 - TRUCKING SHALL NOT BE PERMITTED TO CROSS FILTER SOCKS.
 - ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES THE ABOVE-GROUND HEIGHT OF THE SOCK AND DISPOSED IN AN APPROVED MANNER.
 - SOCKS SHALL BE INSPECTED WEEKLY (AND AFTER EACH RAINFALL EVENT). DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
 - BIOLOGICALLY DEGRADABLE FILTER SOCK SHALL BE REPLACED AFTER 6 MONTHS. PHOTODEGRADABLE SOCKS AFTER 1 YEAR. PHOTODEGRADABLE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
 - UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND RECOVERED OR REMOVED. IN THE LATTER CASE, THE SOCK SHALL BE PUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

MATERIAL TYPE	4 IN. HOLES		3 IN. HOLES		2 IN. HOLES	
	MINIMUM TENSILE STRENGTH (LBS)					
NON-DEGRADABLE	100	150	100	150	100	150
BIOLOGICALLY DEGRADABLE	100	150	100	150	100	150
PHOTODEGRADABLE	100	150	100	150	100	150

PARAMETER	STANDARD
ORGANIC MATTER DEGRADATION	20-100% (BY WEIGHT BASIS)
ODORANT REDUCTION	100% (BY WEIGHT BASIS)
MOISTURE CONTENT	50-60%
PARTICLE SIZE	NO MORE THAN 1/8" SIEVE
SOLUBLE SALT CONCENTRATION	NO MORE THAN 1000 PPM

- COMPOST SOCK SEDIMENT TRAP NOTES:**
- COMPOST SOCK SEDIMENT TRAP SHALL BE SIZED TO PROVIDE 1000 CUBIC FEET OF STORAGE CAPACITY PER EACH ACRE TRIBUTARY TO THE TRAP.
 - MINIMUM BASE WIDTH IS EQUAL TO THE HEIGHT.
 - SEDIMENT ACCUMULATION SHALL NOT EXCEED 1/3 THE TOTAL HEIGHT OF THE TRAP.
 - SOCKS SHALL BE OF LARGER DIAMETER AT THE BASE OF THE TRAP AND DECREASE IN DIAMETER FEET SUCCESSIVE LAYERS AS SHOWN ON THE PLAN VIEW.
 - ENDS OF THE TRAP SHALL BE A MINIMUM OF 1 FOOT HIGHER IN ELEVATION THAN THE MID-SECTION, WHICH SHALL BE LOCATED AT THE POINT OF DISCHARGE.

- COMPOST SOCK SEDIMENT TRAP NOTES:**
- COMPOST SOCK SEDIMENT TRAP SHALL MEET THE STANDARDS OF TABLE 4.1 ABOVE. COMPOST SHALL MEET THE STANDARDS OF TABLE 4.2 ABOVE.
 - COMPOST SOCK SEDIMENT TRAPS SHALL NOT EXCEED THREE FEET IN HEIGHT AND SHALL BE STAKED IN TRIANGULAR FORM BY BRUSH AND WOODY DEBRIS. 1/2" DIA. 24" DIA. 24" DIA. SOCKS. SEDIMENT TRAPS MAY BE PROVIDED BY MEANS OF AN EQUIVALENT SIZED USER EXTENDING 1 TO 3 FEET BENEATH OF THE SOCKS ALONG THE LOWER END OF THE TRAP.
 - COMPOST SOCK SEDIMENT TRAPS SHALL PROVIDE 1000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEDRAME FOR EACH TRAP AND DRAINAGE TUBES. SEE MANUFACTURER FOR MATERIALS SPECIFICATIONS.
 - THE MAXIMUM TRIBUTARY DRAINAGE AREA FOR EACH TRAP SHALL BE 10 ACRES. TRAP SOCKS ARE "FLOW THROUGH" NO SWILLYWAY IS REQUIRED.
 - COMPOST SOCK SEDIMENT TRAPS SHALL BE INSPECTED WEEKLY AND AFTER EACH RAINFALL EVENT. SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/3 THE HEIGHT OF THE SOCKS.
 - PHOTODEGRADABLE AND BIOLOGICALLY DEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 YEAR.

MATERIAL TYPE	4 IN. HOLES		3 IN. HOLES		2 IN. HOLES	
	MINIMUM TENSILE STRENGTH (LBS)					
NON-DEGRADABLE	100	150	100	150	100	150
BIOLOGICALLY DEGRADABLE	100	150	100	150	100	150
PHOTODEGRADABLE	100	150	100	150	100	150

PARAMETER	STANDARD
ORGANIC MATTER DEGRADATION	20-100% (BY WEIGHT BASIS)
ODORANT REDUCTION	100% (BY WEIGHT BASIS)
MOISTURE CONTENT	50-60%
PARTICLE SIZE	NO MORE THAN 1/8" SIEVE
SOLUBLE SALT CONCENTRATION	NO MORE THAN 1000 PPM

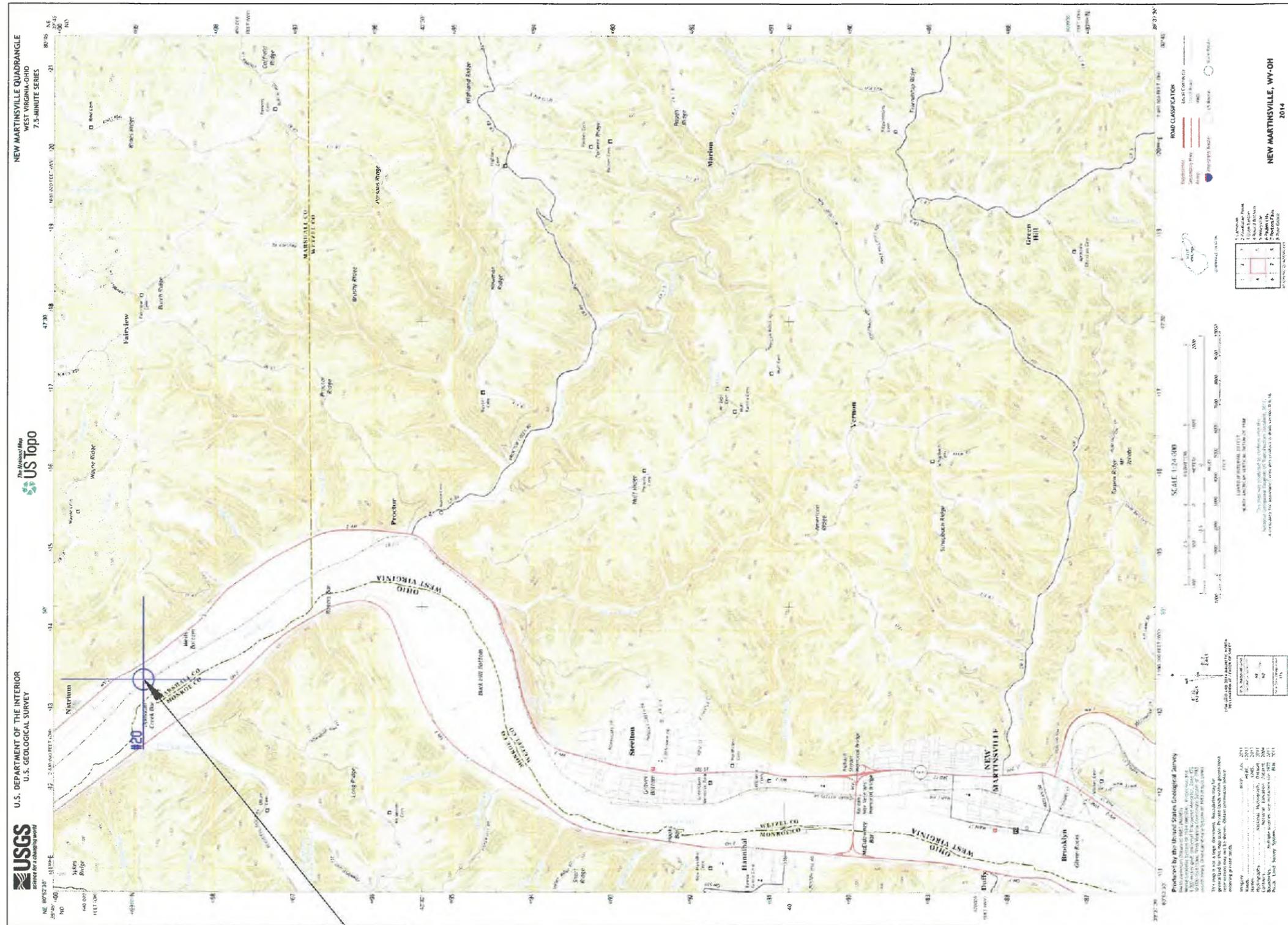
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 - PHOTODEGRADABLE AND BIOLOGICALLY DEGRADABLE SOCKS SHALL NOT BE USED FOR MORE THAN 1 YEAR.

RECLAMATION - E&S NOTES
BRINE WELL # 20
 FINAL SITE PLAN
 FRANKLIN DISTRICT
 MARSHALL COUNTY, WV

DATE: 04-01-2019
 SCALE: N/A
 DESIGNED BY: K.L.H.
 FILE NO. 8874
 SHEET 9 OF 9
 REV.

RECEIVED
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 APR 25 2019
 WV Department of
 Environmental Protection

Westlake Chemical
 SLS Land & Energy Development
 Richard A. Trapp
 4-18-19
 THIS DOCUMENT WAS PREPARED BY SLS LAND & ENERGY DEVELOPMENT FOR WESTLAKE CHEMICAL



#20 BRINE WELL

STATE PLANE COORDINATES

NORTH ZONE (NAD 83)

N 451,318.21

E 1,592,493.81

LAT. = (N) ~~39.798177~~ 39.731419

LONG. = (W) ~~80.948775~~ 80.837001

UTM (NAD 83) (METERS)

N 4,397,811.190 4,397,960.789

E ~~806,889.752~~ 513,967.894



#20 BRINE WELL

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Office of Oil and Gas
APR 25 2019
WV Department of
Environmental Protection

REV. BY	DATE	DESCRIPTION

DEPT: 49 - GENERAL	
TITLE: 20 BRINE WELL CONTOURS	
DRAWING TYPE: GENERAL AREA PLAN (GAP)	
EQUIPMENT No:	
<p>NATRIUM</p>	DRAWN DWS DATE: 01/10/19
	CHECKED SMC DATE: 01/10/19
	APP'VD SMC DATE: 01/10/19
	SCALE: AS SHOWN ACAD: YES
	JOB No: DWG: 49A-20BW
	REV: 0

47-051-02209

06/14/2019



P.O. Box 191
New Martinsville, WV 26155
Tel 304-451-3797 • Fax 304-455-2422
Tom.Horan@Westlake.com

April 24, 2019

Via Overnight Mail

James Martin, Chief
WV Department of Environmental Protection
Office of Oil & Gas
601 57th Street
Charleston, WV 25304

Dear Mr. Martin:

**Subject: Permit Application for #20 Brine Well
UIC Permit No. UIC3S05101 AP**

Please find enclosed, completed forms required to obtain permission to drill and operate a new Brine Well #20 at the Eagle Natrium LLC, Westlake Chemical, Natrium Plant to produce sodium chloride brine using solution mining techniques for the manufacture of chlorine and caustic soda.

The WVDEP required forms will be submitted after completion and prior to operations as required by regulations. A check in the amount of \$900.00 is enclosed for the required filing fees.

If you should have any questions, please call Mr. Stephen Clark, P.E., Principal Project Engineer at (304) 451-3881.

Sincerely,

A handwritten signature in blue ink that reads 'J. Thomas Horan'.

J. Thomas Horan
Environmental Manager

RECEIVED
Office of Oil and Gas
APR 25 2019
WV Department of
Environmental Protection

Attachments:

Cc: Mr. James Nicholson, Inspector
WV DEP, Office of Oil & Gas
P.O. Box 44
Moundsville, WV 26041

CHK# 110334755
Amt \$ 900
Date 1/10/19