Mahogany Energy Resources, L.L.C.
285 8th Street
Meeker, CO, 81641
970-878-9995

June 27, 2023

Colorado Division of Reclamation Mining & Safety,

P-2021-002

Shale Core 2020-01, 02

Closure Report

Prospecting Activity was completed on this site June 30, 2022.

Two PQ diameter (3.3") core holes were drilled in close proximity to each other on this 0.2 acre prospecting site. The coordinates to the two core holes are:

- CH1
  - LAT = 39°53'46.74" N
  - LONG = 108°36'46.01" W
  - ELEV. = 8650 feet above sea level
  - Total drilled depth = 1508.5 from reclaimed surface elevation
- CH2
  - LAT = 39°53'46.72" N
  - LONG = 108°36'46.20" W
  - ELEV. = 8560 feet above sea level
  - Total drilled depth – 1516.5 from reclaimed surface elevation

Please see Appendix A for the Section Map of the site location and detailed pad location for the site that is now under reclamation.

There was no artesian water flow at the surface for either of these core holes during the prospecting work.

Borehole 2020-01 was grouted from the bottom of hole to the top with sodium bentonite grout and capped with concrete prior to cutting the top of the surface casing off. An abandonment schematic is shown in Appendix B. Three different, non-treated bentonite grouts were used in the borehole to seal and fill it with low permeability material. The product data sheets are located in Appendix C.

The first material placed in the bottom of borehole 2020-01 was 17 each, 50-pound bags of Mi Swaco Super Plug. This was mixed with water from the White River at a ratio of 1 bag per 40 gallons of water. The second material placed in the borehole was 14 each, 50-pound bags of Baroid Holeplug. This was

dropped directly into the borehole. Next, 96 each, 50-pound bags of Baroid Quik-Grout were mixed with water and tremied into the borehole to fill it near the surface. Lastly, 3 each, 80-pound bags of concrete were mixed with water and added to the top 7 feet of the borehole. Once this was solidified, the top 2 feet of surface casing was cut off so that the back fill of soil and topsoil would bring the buried depth to 4 feet under surface.

Borehole 2020-02 was filled with sodium bentonite grout, a mixture of bentonite grout and cement, and then capped with concrete while holding a piezometer in the borehole to measure ground water pressure at a depth of 800 feet under surface. An abandonment schematic is shown in Appendix B. Three different, non-treated bentonite grouts were used in the borehole to seal and fill it with low permeability material. A mixture of water, cement, and bentonite grout were tremied in with pieces of 1" Schedule 80 PVC pipe coupled with 304 stainless steel threaded couplers to hold the piezometer in place. The mixture was a ratio of 30 gallons water to 1 bag of cement to ½ bag of Baroid Quik-Grout. The top 7 feet of the borehole was filled with 3 each, 80-pound bags of concrete. The surface casing was extended up 4 feet and a protective box constructed around the piezometer wiring and control computer.

The drill cuttings from boreholes 2020-01 and 2020-02 were buried in the water infiltration pit on the pad. The infiltration pit was then re-filled with the excavated soil. The entire pad was re-graded to closely match the original surface contour. The reserved topsoil was placed back on top of the affected area. Weed free mulch, fertilizer, and the pre-approved seed mixture were drilled and crimped into the topsoil. The area was fenced with BLM specification fencing to limit large animal and vehicular traffic during the early stages of growth.

Justin Bilyeu

Vice President; Mahogany Energy Resources, LLC

June 27, 2023

APPENDIX A

Maps of P-2021-002 Borehole Site

1) **Section Map w/ Borehole Locations**
2) **Contour Map**
3) **Pad Location Map w/ Added Fencing and Reclamation Boundaries**

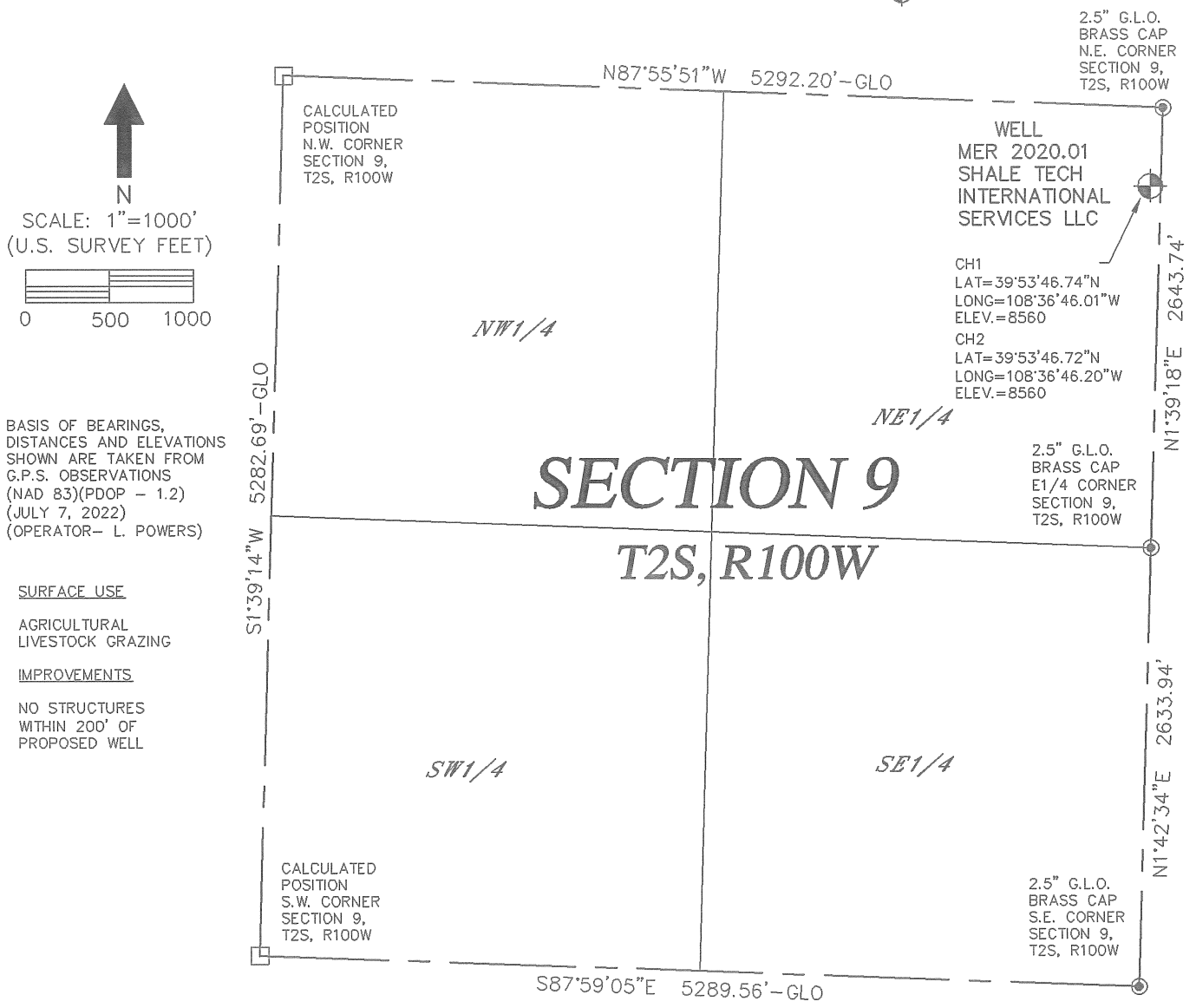
POWERS ENTERPRISES, INC.
Surveyors

1790 W. Victory Way – Craig, Colorado 81625
Telephone (970) 824-3435
FAX (970) 824-3102
EMAIL lpowers@springsips.com

LOCATED IN THE NE1/4NE1/4 OF SECTION 9, T2S, R100W OF THE 6TH P.M., RIO BLANCO COUNTY, COLORADO

WELL MER 2020.01 SHALE TECH INTERNATIONAL SERVICES LLC

LEGEND
- MONUMENT AS SHOWN
- NO MONUMENT FOUND
- WELL LOCATION



BASIS OF BEARINGS, DISTANCES AND ELEVATIONS SHOWN ARE TAKEN FROM G.P.S. OBSERVATIONS (NAD 83)(PDOP – 1.2) (JULY 7, 2022) (OPERATOR– L. POWERS)

SURFACE USE

AGRICULTURAL LIVESTOCK GRAZING

IMPROVEMENTS

NO STRUCTURES WITHIN 200' OF PROPOSED WELL

LAND SURVEYOR'S CERTIFICATE

I, Lloyd W. Powers being a duly registered Professional Land Surveyor do hereby certify that this survey was made by me or under my direct supervision and is based upon my professional knowledge, information and belief and conforms with the applicable standards of practice in the State of Colorado. This certificate does not constitute a guaranty or warranty, either expressed or implied.

Lloyd W. Powers, PLS
Colorado Reg. No. 13901

POWERS ENTERPRISES, INC.
Surveyors

1790 W. Victory Way – Craig, Colorado 81625
Telephone (970) 824-3435
FAX (970) 824-3102
EMAIL lpowers@springsips.com

LOCATED IN THE NE1/4NE1/4 OF SECTION 9, T2S, R100W OF THE 6TH P.M., RIO BLANCO COUNTY, COLORADO

WELL
MER 2020.01
SHALE TECH INTERNATIONAL SERVICES LLC

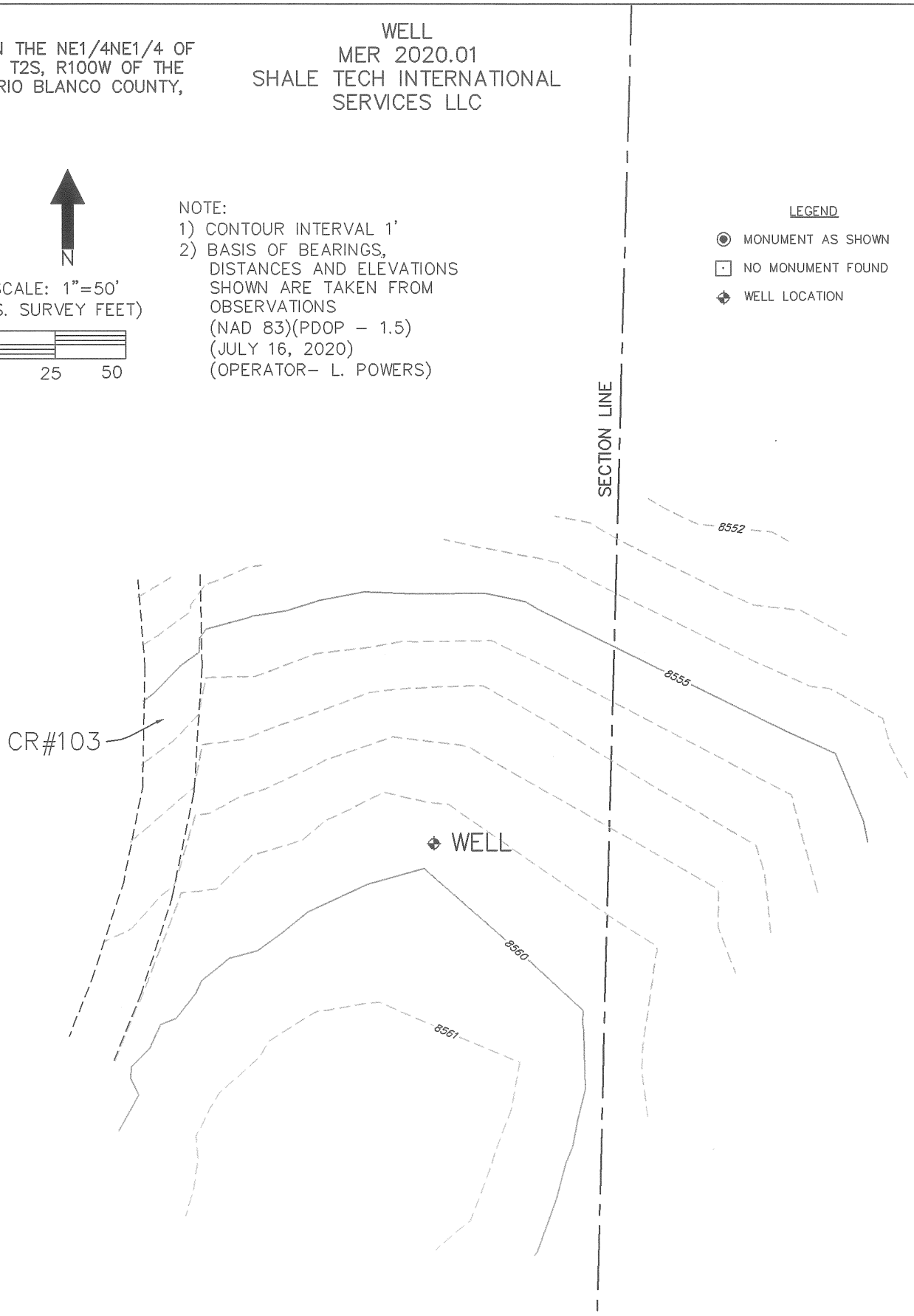
N

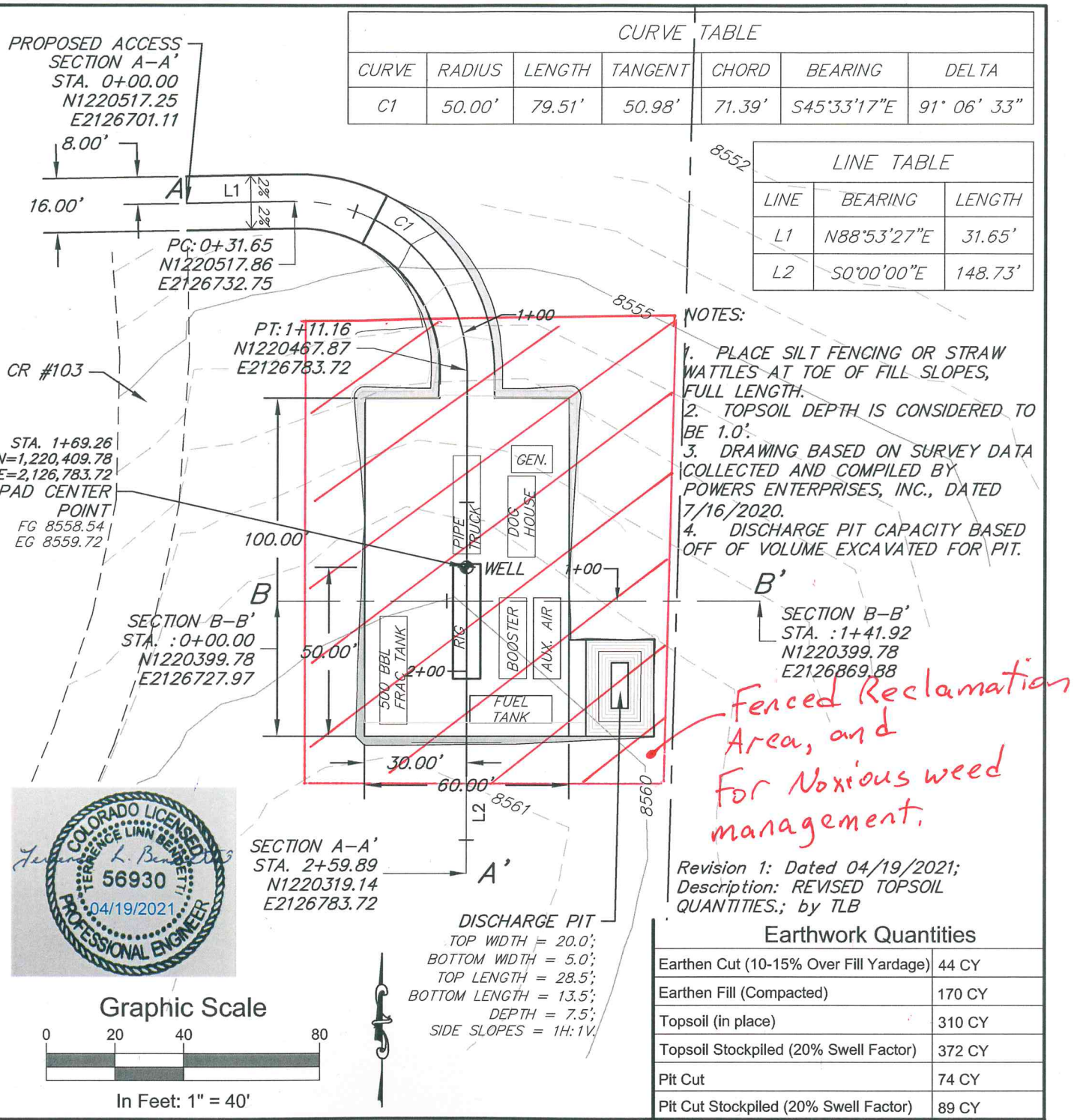
SCALE: 1"=50'
(U.S. SURVEY FEET)

0 25 50

NOTE:
1) CONTOUR INTERVAL 1'
2) BASIS OF BEARINGS, DISTANCES AND ELEVATIONS SHOWN ARE TAKEN FROM OBSERVATIONS (NAD 83)(PDOP – 1.5) (JULY 16, 2020) (OPERATOR– L. POWERS)

LEGEND
- MONUMENT AS SHOWN
- NO MONUMENT FOUND
- WELL LOCATION





CURVE TABLE						
CURVE	RADIUS	LENGTH	TANGENT	CHORD	BEARING	DELTA
C1	50.00'	79.51'	50.98'	71.39'	S45°33'17"E	91° 06' 33"

LINE TABLE		
LINE	BEARING	LENGTH
L1	N88°53'27"E	31.65'
L2	S0°00'00"E	148.73'

NOTES:

1. PLACE SILT FENCING OR STRAW WATTLES AT TOE OF FILL SLOPES, FULL LENGTH.
2. TOPSOIL DEPTH IS CONSIDERED TO BE 1.0'.
3. DRAWING BASED ON SURVEY DATA COLLECTED AND COMPILED BY POWERS ENTERPRISES, INC., DATED 7/16/2020.
4. DISCHARGE PIT CAPACITY BASED OFF OF VOLUME EXCAVATED FOR PIT.

Revision 1: Dated 04/19/2021; Description: REVISED TOPSOIL QUANTITIES.; by TLB

COLORADO LICENSED TERRENCE LINN BENNETT 56930 04/19/2021 PROFESSIONAL ENGINEER

Graphic Scale

0 20 40 80

In Feet: 1" = 40'

Earthwork Quantities

Earthen Cut (10-15% Over Fill Yardage)	44 CY
Earthen Fill (Compacted)	170 CY
Topsoil (in place)	310 CY
Topsoil Stockpiled (20% Swell Factor)	372 CY
Pit Cut	74 CY
Pit Cut Stockpiled (20% Swell Factor)	89 CY

County: Rio Blanco	
Township 2S	Range 100W
Section: 9	Quarter: NENE
P.M. 6th	
FG CENTER PAD: 8558.54	
Drawn By: TLB	PE: TLB
QC: Xx	Project: 2020-530.001
Sheet 01 of 06	Date: 11/17/2020

Legend

- CUT SLOPES
- FILL SLOPES
- WELL PAD CENTER POINT

Affected Area

Affected Area in Acres	0.195
Affected Area in SF	8,530

Containment Pit Quanities (Each Pit)

Pit Capacity	10,997 gal.
Freeboard Capacity (1 ft)	3,948 gal.
Pit Capacity w/Freeboard	14,945 gal.

SGM
118 West Sixth Street, Suite 200
Glenwood Springs, CO 81601
970.945.1004 www.sgm-inc.com

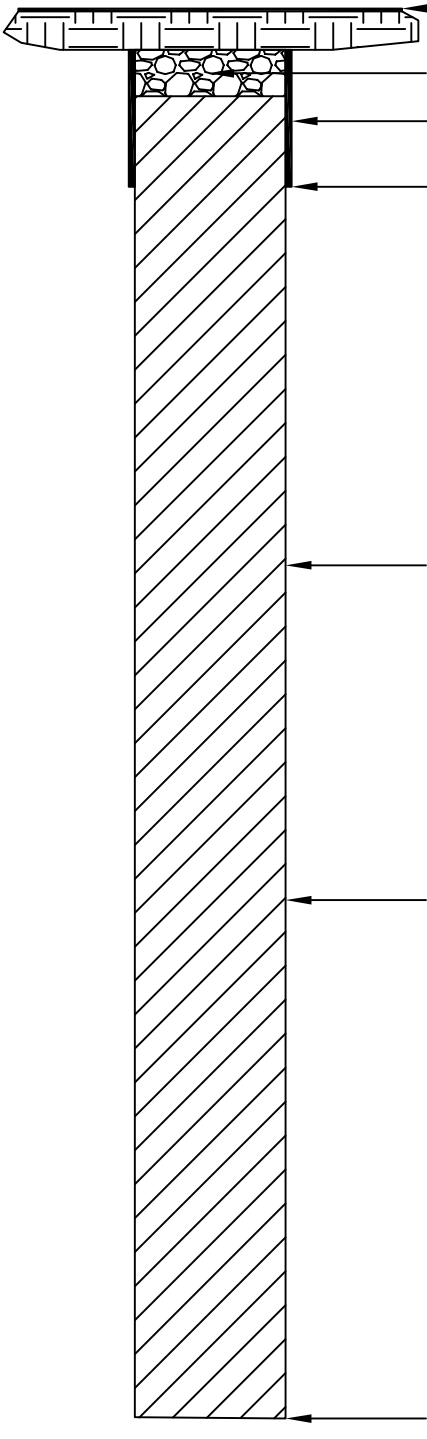
Shale Tech International Services LLC.
PROPOSED PAD FOR CORE HOLE MER 2020.01

APPENDIX B

Borehole Abandonment Schematics

1) **Shale Core 2020-01**
2) **Shale Core 2020-02**

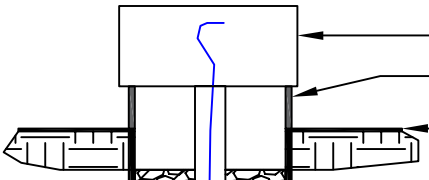
Borehole ID: 2020-01
Collar Elevation (ft AMSL): 8558
LAT: 39°53'46.74" N
LONG: 108°36'46.01"W
Grade Elevation (ft AMSL): 8560



Surface	0 to 4 feet
Concrete Fill	4 to 11 feet
8.75" Surface Hole	0 to 65 feet
Steel Starter Casing (6.625-inch OD, 6.056-inch ID) Cemented into Surface Hole	2 to 65 feet
5-inch Diameter PQ-size drill hole (rotary cored) - 3.3-inch core diameter	0 to 1508.5 feet
Bentonite Grout	11 to 1508.5 feet
Bottom of Borehole	1508.5 feet

Mahogany Energy Resources, LLC Rio Blanco County, Colorado	Shale Core 2020-01 File No. P-2021-002 Abandonment Schematic		
Core Hole Detail	DRAWN JB	DATE 05/18/23	JOB NO.
	.	SCALE Not to Scale	DRWG NO. ADD-MER-2020-01
	.	DATE	REVISION NO. 0

Borehole ID: 2020–02
Collar Elevation (ft AMSL): 8558
LAT: 39°53'46.72" N
LONG: 108°36'46.20"W
Surface Elevation (ft AMSL): 8560



Protective Metal Box	+4 to +2 feet
6.625" OD Casing Extension	+2 to 2 feet
Surface	
Concrete Fill	2 to 9 feet
8.75" Surface Hole	0 to 65 feet
Steel Starter Casing (6.625–inch OD, 6.056–inch ID) Cemented into Surface Hole	2 to 65 feet
5–inch Diameter PQ–size drill hole (rotary cored) – 3.3–inch core diameter	0 to 1516.5 feet
Bentonite Grout/Cement/Water $\frac{1}{2}$ bag /1 bag / 30 gal	9 to 800 feet
1 Piezometer; Geokon Model No. 4500S–2MPA unvented, with attached cable	800 feet
1–inch Schedule 80 PVC (1.315–inch OD) Open ended pipe for grout installation and guide for piezometer	+4 to 810 feet
Bentonite Grout	800 to 1516.5 feet
Bottom of Borehole	1516.5 feet

Mahogany Energy Resources, LLC Rio Blanco County, Colorado	Shale Core 2020–02 File No. P–2021–002 Abandonment Schematic		
Core Hole Detail	DRAWN JB	DATE 05/18/23	JOB NO.
	.	SCALE Not to Scale	DRWG NO. ADD–MER–2020–02
	.	DATE	REVISION NO. 0

APPENDIX C

Materials Used in Abandonment

1) MiSwaco Super Plug
2) Baroid Holeplug
3) Baroid Quik-Grout
4) Quikcrete Concrete Mix
5) Rapidset Cementall

MI SWACO
A Schlumberger Company

SUPER PLUG

All-natural bentonite plugging material

APPLICATIONS

- Plug and abandonment

ADVANTAGES

- Composed of all-natural bentonite
- Hydrates easily
- Sets efficiently

LIMITATIONS

- Limitations are the same as for most bentonite products. High chlorides and calcium decrease the yield of this product.

SUPER PLUG* all-natural bentonite plugging material is a 100% inorganic additive designed to minimize environmental impacts in hole-abandonment applications. The material is designed to offer superior sealing characteristics where low-permeability, flexible seals are required.

Method of addition

Mix one 50-lb [22.7-kg] bag of material with 33 to 43 galUS [125 to 163 L] fresh water. This mixture is pumpable with most available pumping equipment. Though progressive cavity or positive displacement pumps offer the best results, diaphragm or gear pumps can also be used.

Toxicity and handling

Bioassay information is available upon request. Handle as an industrial chemical, wearing protective equipment and observing the precautions described in the MSDS.

Packaging and storage

SUPER PLUG material is packaged in 50-lb [22.7-kg] multiwalled, moisture-resistant bags. It is also available in super sacks. Store in a well-ventilated area away from sources of heat or ignition.

Typical Physical Properties

Physical appearance	Light tan to gray powder
Specific gravity	2.45–2.55
pH	8.0–10.0 (5% aqueous suspension)
Solubility	Insoluble in water, forms colloidal suspension

Super Plug Slurry at Various Solids Content

Super Plug, lb (kg)	Water gas, lb/galUS [kg/L]	Density, lb/galUS [kg/L]	Fluid Loss, cm^3 [in^3]	Solids Content
50 (22.7)	33 (125)	9.2 (1.10)	8.9 (0.54)	15.4%
50 (22.7)	43 (163)	9 (1.08)	13 (0.8)	12.1%

HOLEPLUG®

Graded Sodium Bentonite

Description

HOLEPLUG® naturally occurring Wyoming sodium bentonite clay is a sized and graded chip material used to seal and plug earthen boreholes.

- HOLEPLUG® is available in graded 3/8" bentonite chips

Applications/Functions

The use of HOLEPLUG sodium bentonite assists or promotes the following:

- Grouting annulus in all types of wells, particularly environmental monitoring well applications
- Sealing above gravel packs
- Plugging decommissioned boreholes
- Stemming shotholes
- Sealing around conductor pipe
- Sealing lost circulation zones
- Shutting off artesian flow

Advantages

- Helps prevent entry of surface water into boreholes
- High swelling potential
- In situ swelling to provide a superior seal with excellent casing stabilization
- Easier to apply than pellets
- Cost effective
- Simple to apply, mixing not required
- Helps prevent vertical movement of fluids in the hole between porous zones
- Helps form a permanent, flexible downhole seal
- Helps allow hole re-entry
- Rehydratable
- NSF/ANSI Standard 60 certified

Typical Properties

Volume of 50-lb (22.7 kg) sack

HOLEPLUG	0.70 ft^3 or 0.026 yd^3 or 0.020 m^3
Permeability	1.5 x 10^{-9} cm/sec (in fresh water)
Appearance	Beige to tan chips

Rev. 07/28/2020

Recommended Treatment

Plugging and Stemming Drill Holes

Due to shipping and handling, a small amount of fine bentonite particles may be present. For optimum results, HOLEPLUG® should be poured over a mesh or screen with ¼" (6.4 mm) openings to "sift out" the smaller particles. The screen should be large enough (approx.1 yd^2 or $1m^2$) to be folded into a "V" shape to allow sifting while the product is being poured into the hole. Also, HOLEPLUG bentonite should be poured slowly. Allow approximately two minutes to pour a 50-lb (22.7 kg) bag.

1. Position the screen with the lower end placed over the borehole
2. Slowly pour HOLEPLUG bentonite down the "V" so that fine particles fall through the screen before the larger particles fall into the borehole
3. Fill hole as required (above static water level or to ground level)
4. Observe all regulatory specifications

Stopping loss of circulation and stabilizing unconsolidated formations

1. Pull drill pipe out of hole
2. Pour HOLEPLUG bentonite into hole to fill above problem zone
3. Drill ahead slowly with reduced pump pressure

Plugging flowing wells

Pour HOLEPLUG bentonite into hole until water flow subsides or hole is filled to surface.

Treatment Considerations

- Adequate annular space should be present to allow for the placement of HOLEPLUG bentonite into the area of concern without bridging. It is recommended that a minimum annular space of two inches on either side of the outside dimension of the casing be present. This will facilitate the placement of tremie lines and reduce the potential of the HOLEPLUG bentonite bridging during pouring operations. The use of this product should always correspond with applicable federal, state and local well construction guidelines.

- The subsurface environment that the respective bentonite sealing material or grout is to be placed into should always be taken into consideration when selecting the appropriate material to compose the well seal. If the formation water chemistry has a total hardness of greater than or equal to 500 parts per million and/or a chloride content of greater than or equal to 1500 parts per million the use of a bentonite material may not be appropriate for this environment. In the event that questions regarding subsurface environments arise it is always best to consult your local Baroid IDP representative to determine if the Baroid product of choice is appropriate for the given conditions.

Application Amounts

Amounts of HOLEPLUG®* Graded Sodium Bentonite Required for Plugging Applications				
Hole Diameter (inches)	Hole Volume (ft^3/ft)	Pounds HOLEPLUG bentonite Needed to Fill One Foot	Feet Filled by One Bag HOLEPLUG bentonite	Bags HOLEPLUG bentonite Needed to Fill 100 ft
2	0.022	1.6	32.6	3.2
2.5	0.034	2.4	20.5	5.0
3	0.049	3.5	14.3	7.0
3.5	0.067	4.8	10.4	9.6
4	0.087	6.3	7.9	12.6
4.5	0.110	7.9	6.3	15.8
5	0.136	9.8	5.1	19.6
5.5	0.165	11.9	4.2	23.8
6	0.196	14.1	3.5	28.2
6.5	0.230	16.6	3.0	33.2
7	0.267	19.2	2.6	38.4
7.5	0.307	22.1	2.3	44.2
8	0.349	25.1	2.0	50.2
8.5	0.394	28.4	1.8	56.8
9	0.442	31.8	1.6	63.6
9.5	0.492	35.4	1.4	70.8
10	0.545	39.2	1.3	78.4
11	0.660	47.5	1.1	95.0
12	0.785	56.5	0.89	113.0
15	1.227	88.3	0.57	176.6
18	1.767	127.2	0.39	254.4
20	2.182	157.1	0.32	314.2
25	3.409	245.4	0.20	490.8
30	4.909	353.4	0.14	706.8

**The above calculations and resultant volumes of material required assume a gauge bore hole and are based on the use of HOLEPLUG sodium bentonite where the average bulk density per bag is 0.7 ft^3/50-lb bag. In the event that questions arise or further information is needed, please contact your local Baroid IDP Representative for assistance*

Application Amounts (metric equivalents)

Amounts of HOLEPLUG®* Graded Sodium Bentonite Required for Plugging Applications

Hole Diameter (mm)	Hole Volume (m^3/m)	Kilograms HOLEPLUG bentonite Needed to Fill One Meter	Meters Filled by One Bag HOLEPLUG bentonite	Bags HOLEPLUG bentonite Needed to Fill 10 meters
51	0.002	2.3	9.87	1.0
64	0.003	3.6	6.31	1.6
76	0.005	5.2	4.38	2.3
89	0.006	7.0	3.22	3.1
102	0.008	9.2	2.47	4.1
114	0.010	11.6	1.95	5.1
127	0.013	14.4	1.58	6.3
140	0.015	17.4	1.30	7.7
152	0.018	20.7	1.10	9.1
165	0.021	24.3	0.93	10.7
178	0.025	28.2	0.81	12.4
191	0.029	32.4	0.70	14.3
203	0.032	36.8	0.62	16.2
216	0.037	41.6	0.55	18.2
229	0.041	46.6	0.49	20.5
241	0.046	51.9	0.44	22.9
254	0.051	57.5	0.39	25.3
279	0.061	69.6	0.33	30.7
305	0.073	82.8	0.27	36.5
381	0.114	129.4	0.18	57.0
457	0.164	186.4	0.12	82.1
508	0.203	230.1	0.10	101.4
635	0.317	359.5	0.06	158.4
762	0.456	517.7	0.04	228.1

**The above calculations and resultant volumes of material required assume a gauge bore hole and are based on the use of HOLEPLUG sodium bentonite where the average bulk density per bag is 0.020 m^3/22.7-kg bag. In the event that questions arise or further information is needed, please contact your local Baroid IDP Representative for assistance.*

Packaging

HOLEPLUG graded bentonite is packaged in 50-lb (22.7 kg) plastic bags.

Availability

HOLEPLUG graded sodium bentonite can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

QUIK-GROUT®

One-Sack Borehole Grouting and Plugging Material

Description

QUIK-GROUT® one-sack grouting and plugging material is a sodium bentonite-based grout designed for grouting water wells, monitoring wells, and for plugging boreholes. QUIK-GROUT grouting and plugging material does not contain any polymers.

Applications/Functions

- Can seal or grout plastic and steel casings
- Can seal downhole instrumentation in test and observation holes
- Can plug abandoned boreholes and earthen cavities
- Not recommended for use as a cement additive

Advantages

- Easy-to-use one sack grout
- Dust-free mixing
- Can be mixed and pumped using conventional rig equipment
- Rehydratable
- No heat of hydration
- Can develop a 20% active solids slurry weighing 9.4 lb/gal (1.13 g/cm^3) with hydrostatic gradient of 0.489 psi/ft (11.1 kPa/meter)
- Can create a low permeability seal to prevent entry of contaminants from the surface
- Can develop a permanent, flexible seal to prevent commingling between aquifers
- NSF/ANSI Standard 60 certified

Typical Properties

Appearance	Beige to tan granules
Specific gravity	2.6
pH (8% slurry)	8.2
Electrical Resistivity	0.98 ohm-meter
Yield Volume	26.3 gallons per 50-lb sack 99.5 liters per 23-kg sack
Permeability (in fresh water)	2.5 x 10^{-8} cm/sec

Recommended Treatment

For maximum results, pre-treat make-up water with Soda Ash to less than or equal to 100 mg/l total hardness and to a pH range of 8.5 – 9.5.

The recommended mixing rate is one 50-lb (23-kg) sack of QUIK-GROUT grouting and plugging material per 24 gallons (91 liters) of fresh water to create a 20% active solids by weight grout with a density of 9.4 lb/gal or 1.13 g/cm^3.

Rev. 3/3/2011 · IDP 023

Recommended Mixing Procedure

Do not over mix and do not use a centrifugal pump.

1. Using a mixing device, blend one sack of QUIK-GROUT® grouting and plugging material into 24 gallons (91 liters) of fresh water. Rate of addition should be about 20 to 30 seconds per 50-lb (23-kg) bag.

   Note: The resulting slurry should have an oatmeal consistency containing unyielded or partially yielded bentonite.

2. Pump slurry through tremie pipe into hole without delay. Grout slurry should be pumped through tremie pipe from bottom of interval to surface to ensure effective displacement. Maintain submergence of tremie pipe a minimum of 10-feet within grout column for uniform displacement.

Additional Information

- The grouting material and method selected will depend upon the specific subsurface environment including all prevailing geological and hydrological factors and any existing regulatory requirements. The grouting process may not be complete until the grout is static at the desired level.
- The use of bentonite may not be appropriate in environments where the formation water chemistry has a total hardness greater than 500 parts per million and/or a chloride content of greater than 1500 parts per million.
- If questions arise regarding subsurface environments it is always best to consult your local Baroid IDP representative to determine if the Baroid product of choice is appropriate for the given conditions.

Packaging

QUIK-GROUT grouting and plugging material is packaged in 50-lb (23-kg) multiwall paper bags, containing 0.7 ft^3 (0.02 m^3).

Availability

QUIK-GROUT grouting and plugging material can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

Baroid Industrial Drilling Products
Product Service Line, Halliburton
3000 N. Sam Houston Pkwy E.
Houston, TX 77032

Customer Service	(800) 735-6075 Toll Free	(281) 871-4612
Technical Service	(877) 379-7412 Toll Free	(281) 871-4613

QUIKRETE

CEMENT & CONCRETE PRODUCTS™

CONCRETE MIX

PRODUCT NO. 1101-40, -50, -60, -80, -90

DIVISION **3**

03 31 00 Structural Concrete

PRODUCT DESCRIPTION

QUIKRETE® Concrete Mix is a pre-blended mixture of cement and aggregates for general structural uses, requiring only the addition of water

PRODUCT USE

QUIKRETE® Concrete Mix is designed for pouring concrete 2 in (50 mm) thick or more and building or repairing anything out of concrete, including:

- Foundation walls and footings
- Sidewalks, curbs, steps, ramps and walkways
- Appliance and equipment platforms
- Pipe and post footings
- Floor slabs and patios
- Pools, fish ponds, stepping stones
- Splashblocks and bird baths
- Riprap & slope protection
- Driveway repairs

SIZES

QUIKRETE® Concrete Mix is available in the following bag sizes:

- 40 lb (18.1 kg)
- 50 lb (22.6 kg)
- 60 lb (27.2 kg)
- 80 lb (36.2 kg)
- 90 lb (40.8 kg) (*regional availability*)

YIELD

- A 40 lb (18.1 kg) bag yields approximately 0.30 ft^3 (8.5 L)
- A 50 lb (22.6 kg) bag yields approximately 0.375 ft^3 (10.6 L)
- A 60 lb (27.2 kg) bag yields approximately 0.45 ft^3 (12.7 L)
- An 80 lb (36.2 kg) bag yields approximately 0.60 ft^3 (17 L)
- A 90 lb (40.8 kg) bag yields approximately 0.675 ft^3 (19.1 L)

TECHNICAL DATA

APPLICABLE STANDARDS

- ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C138 Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
- ASTM C143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- ASTM C387 Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar

PHYSICAL/CHEMICAL

Typical results obtained for QUIKRETE® Concrete Mix, when tested in accordance with the referenced ASTM test methods, are shown in Table 1.

TABLE 1 TYPICAL PHYSICAL PROPERTIES

Slump, ASTM C143	
	2 in to 3 in (50 mm to 75 mm)
Unit Weight, ASTM C138	
	Approximately 140 lb/ft^3 (2242.5 kg/m^3)
Compressive Strength, ASTM C39	
Age	*PSI (MPa)*
7 days	2500 (17.2)
28 days	4000 (27.5)

INSTALLATION

SURFACE PREPARATION

Stake out the planned area and remove sod or soil to the desired depth. Nail and stake forms securely in place. Tamp and compact the sub-base until firm.

MIXING

QUIKRETE® Concrete Mix can be mechanically mixed in a barrel type concrete mixer or a mortar mixer. Choose the mixer size most appropriate for the size of the job to be done. Allow at least 1 ft^3 (28.3 L) of mixer capacity for each 80 lb (36.2 kg) bag of QUIKRETE® Concrete Mix to be mixed at one time. For each 80 lb (36.2 kg) bag of QUIKRETE® Concrete Mix to be mixed, add approximately 6 pt (2.8 L) of fresh water to the mixer. Turn on the mixer and begin adding the concrete to the mixer. If the material becomes too difficult to mix, add additional water until a workable mix is obtained. If a slump cone is available, adjust water to achieve a 2 in to 3 in (50 mm to 75 mm) slump.

QUIKRETE® Concrete Mix may also be mixed by hand. Empty concrete bags into a suitable mixing container. For each 80 lb (36.2 kg) bag of mix, add approximately 6 pt (2.8 L) of clean water. Work the mix with a shovel, rake or hoe and add water as needed until a stiff, moldable consistency is achieved. Be sure there are no dry pockets of material. Do not leave standing puddles of water.

Final water content should be approximately 6 pt to 9 pt (2.8 L to 4.3 L) of water per 80 lb (36.2 kg) bag of concrete. For other bag sizes, use Table 2 to determine water content.

TABLE 2 MIXING WATER FOR QUIKRETE® CONCRETE MIX

Package Size lb (kg)	Starting Water Content pt (L)	Maximum Expected Water Content pt (L)
40 (18.1)	3 (1.4)	4-1/2 (2.1)
50 (22.6)	3-1/2 (1.7)	5-1/2 (2.6)
60 (27.2)	4 (1.9)	7 (3.3)
80 (36.2)	6 (2.8)	9 (4.3)
90 (40.8)	7 (3.3)	10 (4.7)

APPLICATION

Method for Pouring a Slab

Start by dampening the sub-grade before concrete is placed. Do not leave standing puddles of water. Shovel or place concrete into the form; fill to the full depth of the form. Fill the repair area completely working continuously from one end to the other. Avoid partial depth fills which could lead to cold joints. After concrete has been compacted and spread to completely fill the forms without air pockets, strike off and float immediately. To strike off, use a straight board (screed), moving the edge back and forth with a saw-like motion to smooth the surface. Use a darby or bull float to float the surface; this will level any ridges and fills voids left by the straight edge. Cut the concrete away from the forms by running an edging tool or trowel along the forms to compact the slab edges. Cut 1 in (25 mm) deep control joints into the slab every 6 ft to 8 ft (1.8 m to 2.4 m) using a grooving tool. Allow concrete to stiffen slightly, waiting until all water has evaporated from the surface before troweling or applying a broom finish.
Note - For best results, do not overwork the material.

Method for Setting Fence Posts

Start by digging the post hole about 3 times the diameter of the post. Hole depth should be 1/3 the overall post height. Place 6 in (150 mm) of dry concrete mix in the bottom of the hole. Position the post, checking that it is level and plumb. Mix QUIKRETE® Concrete Mix with water prior to placement into the hole. When standing water has evaporated from the concrete, smooth the surface. Taper it away from the post so rain will flow in that direction. Wait 24 hours before post is subjected to any strain. For load-bearing applications, follow local building codes for proper footing specifications.

Finishing

Any standard concrete finishing technique is acceptable for use with QUIKRETE® Concrete Mix. Concrete can be hand troweled, power-troweled, broom finished or finished with other specialty finishes.

CURING

General

Curing is one of the most important steps in concrete construction. Proper curing increases the strength and durability of concrete, and a poor curing job can ruin an otherwise well-done project. Proper water content and temperature are essential for good curing. In near freezing temperatures the hydration process slows considerably. When the weather is too hot, dry, or windy, water is lost by evaporation from the concrete, which will hinder the hydration reaction, which may result in finishing difficulties and shrinkage cracking. The ideal circumstances for curing are ample moisture and moderate temperature and wind conditions. Curing should be started as soon as possible and should continue for a period of 5 days in warm weather at 70 ºF (21 ºC) or higher or 7 days in colder weather at 50 ºF to 70 ºF (10 ºC to 21 ºC).

Specific Curing Methods

QUIKRETE® Acrylic Concrete Cure & Seal – Satin Finish (No. 8730) provides the easiest and most convenient method of curing. Apply by spray, brush or roller soon after the final finishing operation when the surface is hard. The surface may be damp, but not wet, when applying curing compound. Complete coverage is essential. Other methods of providing proper curing include covering the surface with wet burlap, plastic sheeting, or waterproof paper to prevent moisture loss; keeping the surface wet with a lawn sprinkler is also acceptable. If burlap is used, it should be free of chemicals that could weaken or discolor the concrete. New burlap should be washed before use. Place it when the concrete is hard enough to withstand surface damage and sprinkle it periodically to keep the concrete surface continuously moist. Water curing with lawn sprinklers, nozzles or soaking hoses must be continuous to prevent interruption of the curing process. Curing with plastic sheets is convenient. They must be laid flat, thoroughly sealed at joints and anchored carefully along edges.

PRECAUTIONS

- Curing compounds should not be applied if rain or temperatures below 50 ˚F (10 ˚C) are expected within 24 hours
- Curing with plastic or burlap can cause patchy discoloration in colored concrete. For colored concrete, wet curing or the use of QUIKRETE® Acrylic Concrete Cure & Seal – Satin Finish (No. 8730) is recommended
- Do not use curing compounds during late fall on surfaces where de-icers will be used to melt ice and snow. Using curing compounds at that time may prevent proper air drying of the concrete, which is necessary to enhance its resistance to damage caused by de-icers
- Protect concrete from freezing during the first 48 hours. Plastic sheeting and insulation blankets should be used if temperatures are expected to fall below 32 ˚F (0 ˚C)

SAFETY

IMPORTANT: Read Safety Data Sheet carefully before using. **WEAR IMPERVIOUS GLOVES**, such as nitrile, mask, and eye protection.
DANGER: Causes severe skin burns and serious eye damage. Prolonged or repeated inhalation of dust may cause lung damage or cancer.
Keep out of reach of children

WARRANTY

NOTICE: Obtain the applicable **LIMITED WARRANTY** at www.quikrete.com/product-warranty or send a written request to The Quikrete Companies, LLC, Five Concourse Parkway, Atlanta, GA 30328, USA. Manufactured by or under the authority of The Quikrete Companies, LLC.

CEMENT ALL

Multi-Purpose Repair Material & Non-Shrink Grout

PRODUCT DATASHEET

DESCRIPTION: Rapid Set® CEMENT ALL® is a high-performance, fast-setting, multi-purpose concrete repair material and non-shrink grout. Durable in wet environments, CEMENT ALL is a blend of Rapid Set hydraulic cement and specially graded fine aggregates. CEMENT ALL is non-metallic and no chlorides are added. Mix CEMENT ALL with water to produce a workable, high quality material that is ideal where rapid strength gain and high durability are desired. CEMENT ALL sets in 15 minutes and achieves structural strength in 1 hour.*

USES: Use CEMENT ALL for general and structural concrete repair, doweling and anchoring, industrial grouting, formed work, vertical and horizontal trowel applications. CEMENT ALL is ideal for airport, highway, industrial and marine applications.

ENVIRONMENTAL ADVANTAGES: Use CEMENT ALL to reduce your carbon footprint and lower your environmental impact. Production of Rapid Set cement emits far less CO_2 than portland cement. Contact your representative for LEED values and environmental information.

APPLICATION: Apply CEMENT ALL in thicknesses from featheredge to 4" (10 cm). For heavy loads and vehicle traffic, minimum thickness will vary. For deeper sections, use Rapid Set® Mortar Mix or Rapid Set® Concrete Mix. Not intended for high heat applications above 300°F (149°C). For overlay applications, a minimum of one test section should be prepared to evaluate the suitability of the materials and procedures.

SURFACE PREPARATION: For repairs, application surface must be clean, sound and free from any materials that may inhibit bond, such as oil, asphalt, curing compound, acid, dirt and loose debris. Roughen surface and remove all unsound material. Apply CEMENT ALL to a surface that is thoroughly saturated with no standing water.

MIXING: The use of a power-driven mechanical mixer, such as a mortar mixer or a drill-mounted mixer, is recommended. Organize work so that all personnel and equipment are in place before mixing. Use clean potable water. **CEMENT ALL may be mixed using 3 to 3.75 quarts (2.8 L to 3.5 L) of water per 55-lb (25 kg) bag for Department of Transportation projects and other critical applications. For general purpose and high fluidity applications, a maximum of 5 quarts (4.7 L) may be used. Use less water to achieve higher strengths.** For increased fluidity and workability, use Rapid Set® FLOW Control® plasticizing admixture from the Rapid Set® Concrete Pharmacy®. Place the desired quantity of mix water into the mixing container. While the mixer is running, add CEMENT ALL. Mix for the minimum amount of time required to achieve a lump-free, uniform consistency (usually 1 to 3 minutes). Do not retemper.

PLACEMENT: CEMENT ALL may be placed using traditional construction methods. Organize work so that all personnel and equipment are ready before placement. Place, consolidate and screed quickly to allow for maximum finishing time. Use a method of consolidation that eliminates air voids. Do not wait for bleed water; apply final finish as soon as possible. CEMENT ALL may be troweled, floated or broom finished. On flat work, do not install in layers. Install full-depth sections and progress horizontally. Do not install on frozen surfaces. To extend working time, use Rapid Set® SET Control® retarding admixture from the Concrete Pharmacy or cold mix water. CEMENT ALL may be applied in temperatures ranging from 45°F to 90°F (7°C to 32°C).

OVERVIEW

Highlights:

- Fast: Sets in 15 minutes, structural strength in 1 hour*
- Durable: Formulated for long life in critical applications
- Excellent Bond: Superior adhesion to concrete, stone, brick, block, stucco and more
- Structural: For repair and new construction
- Multi-Purpose: Use for concrete repair, grouting, anchoring, casting, underlayment and more

Conforms to:

- ASTM: C1107, C928, C387 and CRD C621
- Army Corps of Engineers
- LA Research and Report 24654
- State and Local Approvals

MasterFormat® 2016

03 01 30	Maintenance of Cast-in-Place Concrete
03 01 40	Maintenance of Precast Concrete
03 01 60	Maintenance of Grouting
03 01 70	Maintenance of Mass Concrete
03 53 19	Concrete Overlayment
03 54 16	Hydraulic Cement Underlayment
03 60 00	Grouting
03 61 00	Cementitious Grouting
03 62 13	Non-Metallic Non-Shrink Grouting
04 01 00	Maintenance of Masonry

Manufacturer:

CTS Cement Manufacturing Corp.
12442 Knott St.
Garden Grove, CA 92841
Tel: 800-929-3030 | Fax: 714-379-8270
Web: www.CTScement.com
E-mail: info@CTScement.com

CEMENT ALL Multi-Purpose Repair Material & Non-Shrink Grout

CURING: Water cure all Rapid Set® CEMENT ALL® installations by keeping exposed surfaces wet for a minimum of 1 hour. Begin curing as soon as the surface starts to lose its moist sheen. When experiencing extended setting time due to cold temperature or the use of retarder, longer curing times may be required. The objective of water curing shall be to maintain a continuously wet surface until the product has achieved sufficient strength.

COLD WEATHER: Environmental and material temperatures below 70°F (21°C) may delay setting time and reduce the rate of strength gain. Lower temperatures will have a more pronounced effect. Thinner sections will be more significantly affected. To compensate for cold temperatures, keep material warm, use heated mix water, and follow ACI 306 Procedures for Cold Weather Concreting.

WARM WEATHER: Environmental and material temperatures above 70°F (21°C) may speed setting time and increase the rate of strength gain. Higher temperatures will have a more pronounced effect. To compensate for warm temperatures, keep material cool, use chilled mix water, and follow ACI 305 Procedures for Hot Weather Concreting. The use of Rapid Set® SET Control retarding admixture from the Rapid Set® Concrete Pharmacy will help offset the effects of high temperatures.

YIELD & PACKAGING: CEMENT ALL is available in 55-lb, 25-lb and 10-lb (25 kg, 11.3 kg and 4.5 kg) sizes. One 55-lb (25 kg) bag of CEMENT ALL will yield approximately 0.5 ft^3 (0.01 m^3).

SHELF LIFE: CEMENT ALL has a shelf life of 12 months when stored properly in a dry location, protected from moisture, out of direct sunlight, and in an undamaged package.

USER RESPONSIBILITY: Before using CTS products, read current technical data sheets, bulletins, product labels and safety data sheets at www.CTScement.com. It is the user's responsibility to review instructions and warnings for any CTS products prior to use.

WARNING: DO NOT BREATHE DUST. AVOID CONTACT WITH SKIN AND EYES. Use material in well-ventilated areas only. Exposure to cement dust may irritate eyes, nose, throat, and the upper respiratory system/lungs. Silica exposure by inhalation may result in the development of lung injuries and pulmonary diseases, including silicosis and lung cancer. Seek medical treatment if you experience difficulty breathing while using this product. The use of a NIOSH/MSHA-approved respirator (P-, N- or R-95) is recommended to minimize inhalation of cement dust. Eat and drink only in dust-free areas to avoid ingesting cement dust. Skin contact with dry material or wet mixtures may result in bodily injury ranging from moderate irritation and thickening/cracking of skin to severe skin damage from chemical burns. If irritation or burning occurs, seek medical treatment. Protect eyes with goggles or safety glasses with side shields. Cover skin with protective clothing. Use chemical resistant gloves and waterproof boots. In case of skin contact with cement dust, immediately wash off dust with soap and water to avoid skin damage. In case of skin contact with wet concrete, wash exposed skin areas with cold running water as soon as possible. In case of eye contact with cement dust, flush immediately and repeatedly with clean water, and consult a physician. If wet concrete splashes into eyes, rinse eyes with clean water for at least 15 minutes and go to the hospital for further treatment.

Please refer to the SDS and www.CTScement.com for additional safety information regarding this material.

LIMITED WARRANTY: CTS CEMENT MANUFACTURING CORP. (CTS) warrants its materials to be of good quality and, at its option, will replace or refund the purchase price of any material proven to be defective within one (1) year from date of purchase. The above remedies shall be the limit of CTS's responsibility. Except for the foregoing, all warranties expressed or implied, including merchantability and fitness for a particular purpose, are excluded. CTS shall not be liable for any consequential, incidental, or special damages arising directly or indirectly from the use of the materials.

⚠ **WARNING**
CANCER and REPRODUCTIVE HARM - www.P65Warnings.ca.gov

TYPICAL PHYSICAL DATA

Set Time, ASTM C191 Mod.	
Initial set	15 minutes
Final set	35 minutes

Compressive Strength, ASTM C109 Mod.	
1 hour*	3000 psi (20.7 MPa)
3 hours	5000 psi (34.5 MPa)
24 hours	6000 psi (41.4 MPa)
7 days	7000 psi (48.3 MPa)
28 days	9000 psi (62.1 MPa)

Slant Shear Bond, ASTM C882 per C928	
24 hours	1500 psi (10.3 MPa)
28 days	2500 psi (17.2 MPa)

Splitting Tensile, ASTM C496	
7 days	700 psi (4.82 MPa)
28 days	880 psi (6.06 MPa)

Flexural Strength, ASTM C78	
7 days	600 psi (4.14 MPa)
28 days	800 psi (5.51 MPa)

*After final set
Data obtained at flow consistency 102 by ASTM C1437
All Data obtained at 70°F (21°C).