OURAY SILVER MINES

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Revenue Virginius Mine
EPF Certification Plan for Previously Approved Building Modifications

Technical Revision No. 14
CDRMS Permit No. M-2012032
April 16, 2021

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1 Introduction

This Technical Revision (TR) requests the following revisions to the Revenue-Virginius Mine (Mine) Division of Reclamation, Mining, and Safety (DRMS) Permit No. M-210-032 (Permit).

1) Environmental Protection Facility (EPF) certification plan for the Reagent Room portion of the previously approved mill filter building extension, permitted under TR-09.

This TR request describes the reasoning, characteristics, construction, operation, and reclamation measures associated with the Reagent Room EPF at the Revenue Mine. Supporting information is presented under the following sections, background information (Section 2), project rationale (Section 3), construction (Section 4), operation (Section 5), and reclamation (Section 6).

2 Background Information

The Mine, owned and operated by Ouray Silver Mines Inc. (OSMI), is an active silver mine located approximately 6 miles south west of Ouray Colorado along County Road 26. The Sneffels District has a rich mining history that began with the staking of the Virginius in 1876 in Governor Basin. The Revenue Tunnel was built as a lower access point to the Virginius in 1893. The bulk of mining activity occurred from 1878 through 1912, with intermittent mining since. The Mine is currently permitted to operate under Amendment 1 to DRMS designated mining operations permit (Section 112-d) M-2012-032. There are two active permitted disturbance areas – one at the Revenue Tunnel and another in Governor Basin. The Mine is in a state of construction and development, moving towards ore production.

Several Technical Revisions (TRs) to Amendment 1 of M2012-032 have been filed over the recent years. These revisions, summarized below, have focused on improved mill functioning, waste reduction, and improved environmental protocols. Recent TRs are summarized below.

TR-13 – Officially withdrawn. Building modifications and bond update that were proposed under this TR will be addressed by Amendment 2.

TR-12– In progress. Characterization and monitoring of historic hydrocarbons found in GW-4 with the desire to abandon GW-4.

TR-11– Updated the water monitoring program. Allowed placement of Pilot Passive Water Treatment Materials withing permit boundary. Updated reclamation plan to incorporate Waste Storage Pad and address minor modifications to topsoil placement.

TR-10–Allowed the construction of the five-stage passive treatment system with discharge to surface water as permitted through CDPHE (CO-0000003 Modification 5)

TR-09 – Updated groundwater standards, allowed the sale of mixed tailings and waste rock as road base. Allowed for the relocation of buildings and construction of additional storage areas.

TR-08 – Allowed for infiltration of mine discharge to groundwater following passive treatment in a sulfate reducing bioreactor.

3 Project Rationale

The reagent room was permitted in 2016 as part of the Mill Filter Building expansion in TR-09. The expansion is being built on the east side of the Mill Building (Map 1). Mill reagents will be stored in the additional space - retaining and footing walls will be built to contain all reagents along with sump pumps to remove any spilled material back into process. Of the permitted 6,004 square feet that were approved for Mill Filter Building expansion under TR-09, approximately 3,000 square feet are the Reagent Room. The other portion of the expansion is a building separated by a firewall to house compressors. Since the reagent room will house designated chemicals, it needs to be certified as an EPF per Rule 7.3 of DRMS Hardrock Mining Rules. Exhibit D (Mine Plan) and Exhibit U (Environmental Protection Plan – previously Exhibit T of Amendment 1) will be updated as part Amendment 2 which is currently being drafted. Exhibit E (Reclamation Plan) and Exhibit L (Reclamation Costs) were updated in TR-11 and included these facilities.

4 Construction

Final design work was performed by Barr Engineering. A complete set of engineering drawings issued for construction can be found in Appendix 1. Secondary containment and sumps are shown on the attached engineering drawings. All designated chemical piping is double walled. There are no under drains or liners. The reagent room will contain, at a maximum, 12,730 gallons of reagents. The secondary containment volume is 28,019 gallons including the sump volume of 268 gallons.

Table 1.- Volume of Reagents

Reagent	Day Tank (gal)	Mixing /storage tanks (gal)	Comment
Zinc Sulfate	70	240	the mixing tank is existing and approx. 240gal
Sodium Metabisulfite	70	280	140gal mixing tank feeding 140gal solution tank
Aerophine 3418A	70	300	only storage tank in reagent area
Aero 242	70	300	only storage tank in reagent area
OrePrep 549	70	300	only storage tank in reagent area
Lime	9200	1320	both in reagent area
Copper Sulfate	70	240	the mixing tank is existing and approx. 240gal
Sodium Isopropyl Xanthate	70	240	the mixing tank is existing and approx. 240gal
Floc AF-309		310	70gal mixing tank feeding 240gal solution tank

*All day tanks will be located in the mill building except for the lime day tank.

Based on approval in TR09 and before DRMS notification of Reagent Room EPF certification requirement the Mill Filter Building Expansion area was excavated, and topsoil (approximately

2,800 cubic feet) was moved to the topsoil storage area. Aside from the excavation, the only work completed on the Reagent Room portion of the Mill Filter Building Expansion is the construction of the compressor room firewall and flow fill underneath footer locations. QA/QC documentation for the firewall can be found in Appendix 4. The report from December 8th 2020 is for the flow fill underneath footers and stem walls of the compressor area. The February 1st 2021 report is firewall QA/QC. Work on the Reagent Room was stopped in February as OSMI due with Winter conditions and Reagent Room construction will not commence again until after DRMS approves the EPF certification plan. No designated chemicals have been or will be placed in the Reagent Room until it is certified.

Once the EPF certification plan and schedule are approved by the DRMS, work will proceed. The mine will send QA/QC documentation (reinforced steel, slump tests, & 28-day compressive tests) to the DRMS monthly until certification of the EPF is complete. The mine anticipates that it will take 11 weeks to complete construction once the DRMS allows construction to proceed. An abbreviated construction schedule along with a recommended inspection schedule is found in Tables 2 and 3 below. A complete construction schedule is found in Appendix 3. The following EPF certification plan and schedule are requested based on the Rule 7.4.2 of DRMS Hardrock Mining Rules and Reagent Room design.

Table 2. - Condensed Construction Schedule

Task Name	Duration
700-Reagent Bld Foundation	20 days
700-Reagent Bld Structure	15 days
700-Reagent Bld Steel	20 days
700-Lime Mixing Area	8 days
700-Flocculant Mixing Area	8 days
700-Xanthate Mixing Area	8 days
700-MIBC Mixing (OrePrep 549) Area	8 days
700-Aerophine 3418A Mixing Area	8 days
700-Aero 242, and dry chemical mixing Area	8 days

Table 3. - Recommended Inspection Schedule

Date	Inspection
April 30, 2021	Foundation preparation inspection of current excavation
April 30, 2021	Earthen construction inspection of current excavation
April 30, 2021	Seep Inspection
April 30, 2021	Structural instability inspection
July 16, 2021	Fluid collection system inspection

OSMI understands that DRMS will prioritize these certification inspections above other inspections, performing them as soon as possible (Rule 7.4.2(1)). If DRMS is not able to make inspections, OSMI can contract an independent reviewer.

5 Operation

Mill reagent chemicals will be mixed and stored in the Reagent Room. Totes or bags (in the case of lime) of chemicals will be added to the mixing tanks located inside the Reagent Room. The mine's Spill Prevention Control and Countermeasures (SPCC) Plan is being updated to account for the hazards of the designated chemicals in the Reagent Room. The empty totes will be disposed of in accordance with regulations or returned to the manufacturer.

From the Reagent Room mixing tanks, reagents are pumped to storage tanks in the Reagent Room, then to smaller day tanks in the mill. Piping outside of areas with secondary containment will have double walled containment. The double walled containment on the pipes going into the Mill Building will be field fit by the contractor. Regents will be used in the process described below:

Ore will be received in the coarse ore bin and subsequently crushed, reducing the size down to roughly ¾ inch diameter. The crushed ore will be received by the rod mill where the ore will be ground into a ⅜" minus slurry in preparation for sizing by screening. Following screening, oversize (>120 micron) will be pumped into the ball mill circuit and undersize will be laundered to the lead flotation circuit. The ball mill circuit will grind this oversize to a p80 of 120 micron which will be pumped back to the screens to remove any remaining oversize.

The lead rougher flotation circuit will produce a lead concentrate which will be pumped to a lead cleaner circuit increasing the grade of the final concentrate product. Tails from the lead rougher circuit will report to the zinc rougher flotation circuit.

The zinc circuit will also have rougher and cleaner circuits. Final concentrates produced from both the lead and zinc circuit will report to concentrate thickeners, one for lead concentrate and one for zinc concentrate. The thickeners will remove water from the slurry prior to filter pressing. The filter press units will extract the remaining water, resulting in a semi-dry filter cake containing very low moisture content - targeting 20% or less. The concentrate will then be bagged in super-sacks and marketed for sale. The water removed from the concentrate will be recycled back through each of the concentrate thickeners. The water removed from tailing thickener will report back to the process. There will be no discharge from the milling process to be treated.

Final tailings from the zinc circuit will report to a tailings thickener for water recovery prior to reporting to the filter press units. The slurry from the filter press units will be converted to semi dry filter cakes containing very low moisture content – targeting 20% or less. The filter cakes will then be placed in the dry stack tails impoundment. Water from the filter press units will be routed back to the tails thickener and recovered back to the process water tank for continued use in the process.

Chemicals are ordered under min/max and only a two-month supply will be available for use. Due to the short shelf life, chemicals will be removed from the mine site under temporary cessation. The chemicals will either be return to the manufacturer, will be disposed of per manufacturer specification and using a hazardous waste disposal company, or will be consumed in process.

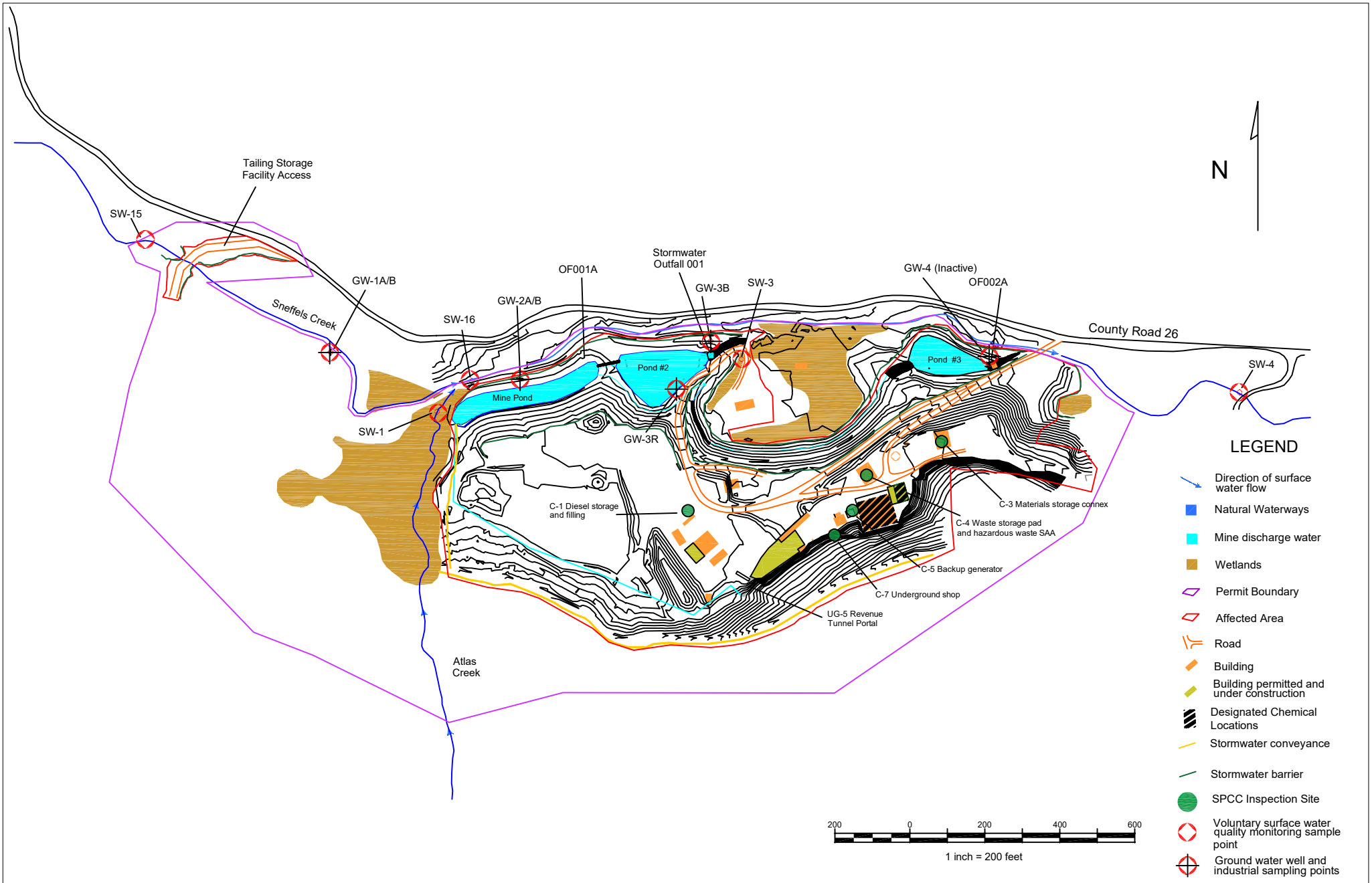
6 Reclamation

6.1 Expanded Reagent Room

Equipment will be removed and repurposed or sold upon final reclamation. Reagents will be removed from site; either sent back to the vendors or disposed of appropriately under hazardous waste regulations. Exhibit E of the permit was updated in TR-11 and included the Reagent Room.

6.2 Bond Adjustment

The current $476,269 reclamation bond in place for the Revenue-Virginius mine is higher than the required bond amount of $433,288.80 put forth by TR-11. Because the construction and bonding of the Reagent Room was previously addressed, the designation of the expanded reagent room as an EPF does not change total reclamation costs calculated for the Revenue-Virginius mine in Exhibit L of the permit.



REVENUE - VIRGINIUS MINE

Environmental Protection Map

April 2021

PO Box 564
Ouray CO 81427

Appendix 1

Engineered for Construction Drawings

NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)
2. REFER TO 100-SS-103 FOR COLUMN BASE PLATE AND ANCHOR SCHEDULE PATTERN.

ELECTRICAL CONDUIT EMBEDDED INTO SLAB AT SUMPS – SEE ELECTRICAL DRAWINGS

CONTRACTOR TO PROVIDE STEEL STUD ENCLOSURES IN XANTHATE AND MIBC AREAS – REFER TO: 9/700-SS-104 FOR REQUIREMENTS

FOR WALL NOTCH SEE SECTION 2 ON DWG. 700-SS-105

FIELD LOCATE SEPTIC TANK PRIOR TO EXCAVATION

AS REQD BY OWNER AND CIVIL GRADING, PROVIDE CONCRETE STAIR PAD

DOOR OPENING – EL 100'-8" TO EL 107'-10"

4'-0" WIDE x 2'-0" TALL OPENING BETWEEN EL 115'-0" AND 117'-0" – FOLLOWING PENETRATION INSTALL, OPENING IS TO BE ENCLOSED WITH ROCKWOOL FIREPRO FIRESTOP COMPOUND FOR A 3 HR MIN BARRIER

ELECTRICAL CONDUIT EMBEDDED INTO SLAB AT SUMPS – SEE ELECTRICAL DRAWINGS

COMPRESSOR PAD

TOC FIREWALL EL 129'-3"

6" CONCRETE SLAB AT TOC EL 100'-0" UNO

RAMP FROM 100'-0" DOWN TO 99'-10"±

APPROXIMATE LOCATION OF UNDERGROUND BURIED UTILITIES – LOCATE PRIOR TO EXCAVATING

SLOPE FROM 100'-0" TO 99'-10"±

PIER REINF PER 7/700-FF-103 SIM, PROVIDE ONE WALL TIE PER 3/FF-103 SIM

1 FOUNDATION PLAN:
1/4"=1'-0"

EL 100'-0" = EL 10677'-0"± WHICH SHOULD EQUAL FILTER BLDG TOC FLOOR ELEVATION WEST OF GL 2

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	SWO	JGT	JGT	10/23/20	IFC – MOVE 15' NORTH, REVISE COMPRESSOR AREA, ADJUST BEDROCK BEARING
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/23/20; BID 4/28/17 10/23/20; CONSTRUCTION 4/28/17 10/23/20

DATE RELEASED: A B C 0 1 2 3

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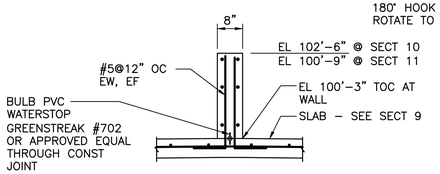
Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

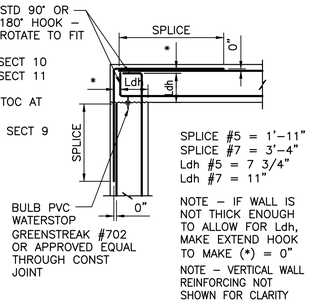
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

CONCRETE AND FOUNDATION
REAGENT & COMPRESSOR AREA FLOOR PLAN

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-FF-100
REV. No. 1

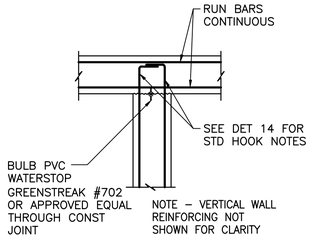


10 SECTION: 700–FF–100 1/2"=1'–0"

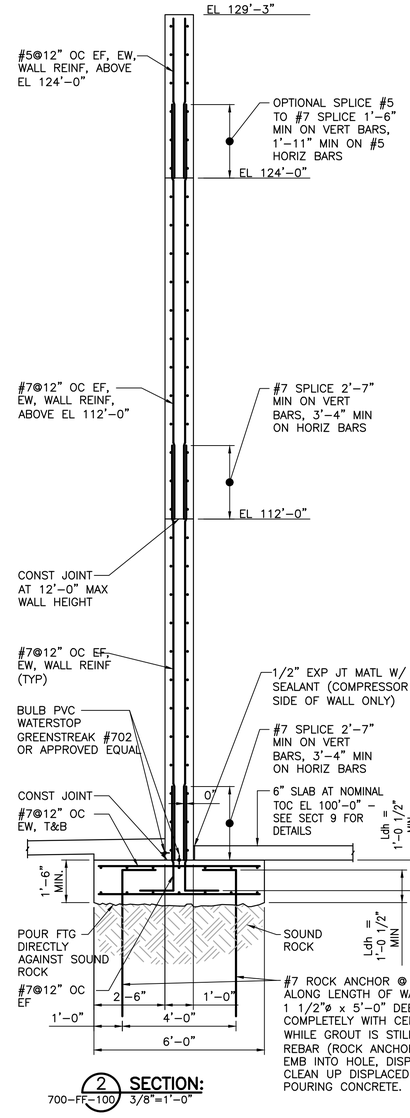


11 SECTION: 700–FF–100 1/2"=1'–0"

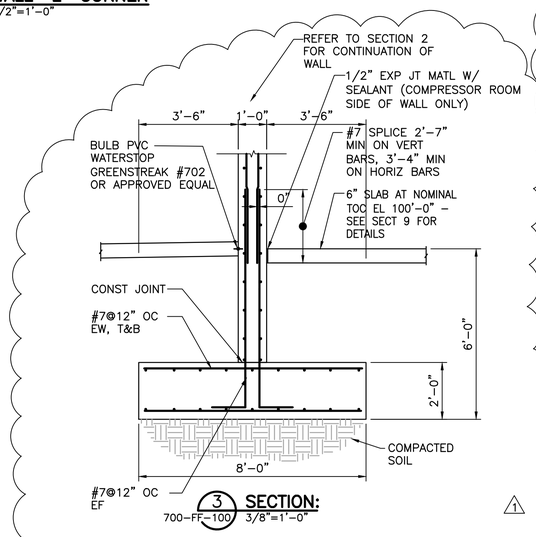
14 TYPICAL DETAIL: WALL "L" CORNER 1/2"=1'–0"



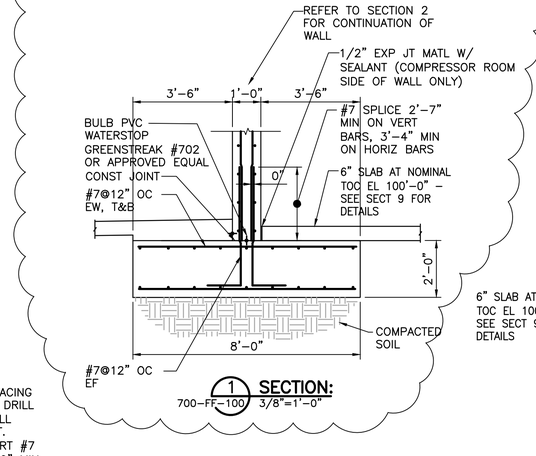
15 TYPICAL DETAIL: WALL "T" CORNER 1/2"=1'–0"



2 SECTION: 700–FF–100 3/8"=1'–0"



3 SECTION: 700–FF–100 3/8"=1'–0"



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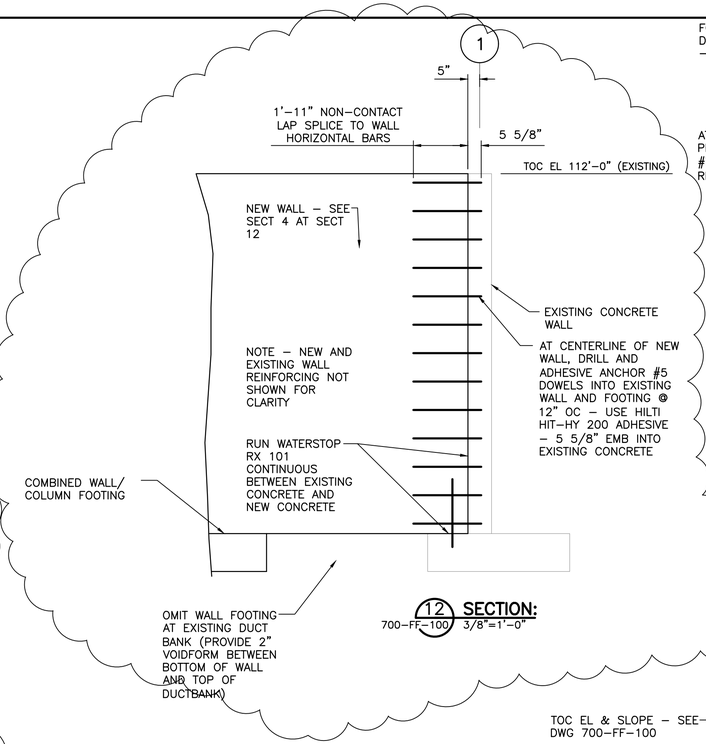
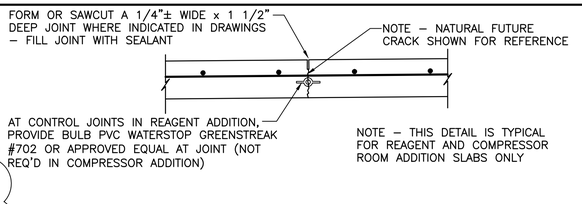
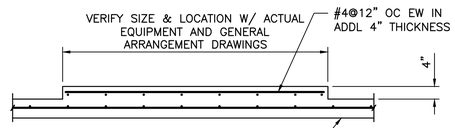


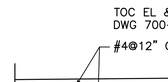
12 SECTION: 700–FF–100 3/8"=1'–0"

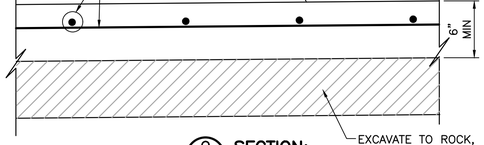


17 TYPICAL DETAIL: SLAB CONTROL JOINT (CJ OR C.J.) 1/2"=1'–0"

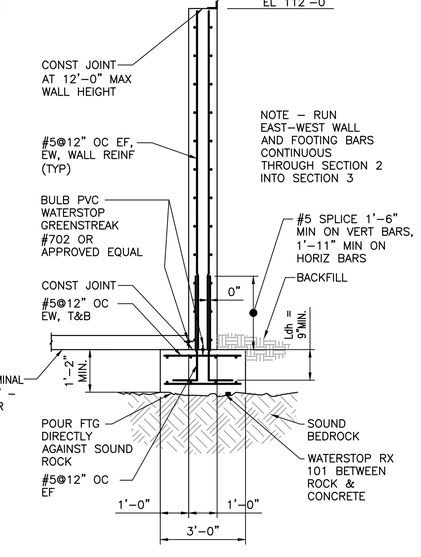


18 SECTION – COMPRESSOR PADS: 700–FF–100 1/2"=1'–0"





9 SECTION: 700–FF–100 1 1/2"=1'–0" 700–FF–102



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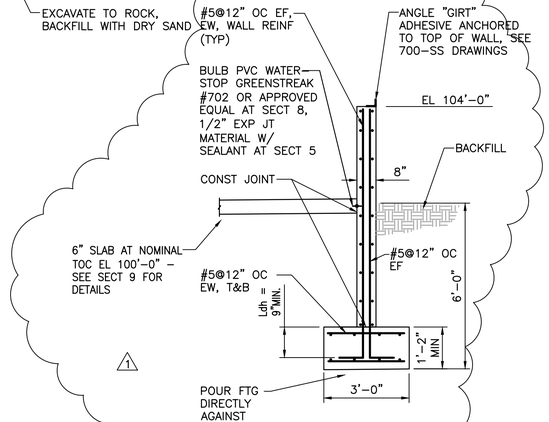

5 SECTION: 700–FF–100 3/8"=1'–0"

8 SECTION: 700–FF–100 3/8"=1'–0"

NOTES:
1. REFER TO 100–SS–100 AND 700–FF–102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	SWO	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION–ADD SECT 1&3, MODIFY SECT 5,8,12, DELETE SECT 19
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/23/20; BID 4/28/17 10/23/20; CONSTRUCTION 4/28/17 10/23/20

DATE RELEASED: A B C 0 1 2 3

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Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

CONCRETE AND FOUNDATION
REAGENT BUILDING CONCRETE WALL SECTIONS

BARR PROJECT No. 06/46–1001.04
CLIENT PROJECT No.
DWG. No. 700–FF–101
REV. No. 1

REAGENT AND COMPRESSOR BUILDING NOTES & SPECIFICATIONS:

1. ACCORDING TO PRELIMINARY NIXON MOORE ASSOCIATES DRAWINGS, THE EXISTING FILTER BUILDING WAS DESIGNED AS OCCUPANCY F2/B, TYPE V / NON-SPRINKLED. THE REAGENT AND COMPRESSOR ADDITIONS WILL BE TYPE I/II / NON-SPRINKLED.

A. THE COMPRESSOR PORTION OF THE ADDITION IS BEING CLASSIFIED AS F-2 AND WILL BE LOCATED DIRECTLY BETWEEN THE REAGENT ADDITION AND THE EXISTING FILTER BUILDING. THE REAGENT BUILDING WILL BE CLASSIFIED AS HAZARDOUS AS DESCRIBED IN 1B. THE EAST SIDE OF THE EXISTING FILTER BUILDING IS GENERALLY OCCUPANCY F-2 TO MATCH PART OF THE FILTER BUILDING. HOWEVER, THE SECOND FLOOR OF THE FILTER BUILDING IN THE SOUTHEAST CORNER CONTAINS AN OUT-OF-USE OFFICE OR CONFERENCE ROOM AREA. THIS ROOM IS VERY MOLD INFESTED AND CANNOT CURRENTLY BE USED AS AN OFFICE OR CONFERENCE ROOM. THE EAST EXTERIOR WALL OF THIS ROOM IS COVERED WITH MOLDED GYP BOARD. IF THIS AREA WERE IN USE, IT WOULD LIKELY BE CLASSIFIED AS B PER THE ORIGINAL NIXON MOORE CLASSIFICATION. SINCE IT IS NOT BEING USED FOR IT'S ORIGINAL PURPOSE, THIS ROOM IS BEING DECLARED AS THE SAME F-2 OCCUPANCY AS THE SURROUNDING FILTER BUILDING SPACE AS WELL AS THE NEW COMPRESSOR ROOM SPACE. IF THE OWNER WISHES TO EVENTUALLY REPAIR THIS ROOM AND BRING IT BACK TO B CLASSIFICATION, THEY WILL NEED TO MEET THE IBC SEPARATION REQUIREMENTS WHICH PER 2006 IBC WOULD INVOLVE ENSURING THAT THE FLOOR AND THE EAST, WEST, AND SOUTH WALLS ALL HAVE A 2-HOUR FIRE SEPARATION.

B. CLASSIFICATION OF THE REAGENT PORTION INCLUDES STORAGE OF NINE REAGENT CHEMICALS:

FLOCCULANT	NON-HAZARDOUS
AEROPHINE 3418A (DIALKYL DITHIOPHOSPATE)	HAZARDOUS (H-4)
AERO 242 PROMOTER (DIARYL DITHIOPHOSPHATE)	HAZARDOUS (H-4)
MIBC (METHYL ISOBUTYL CARBINOL)	HAZARDOUS (H-3 DUE TO FLAMMABILITY)
COPPER SULFATE	HAZARDOUS (H-4)
ZINC SULFATE	HAZARDOUS (H-4)
LIME PH MODIFIER	HAZARDOUS (H-4)
MBS SODIUM METABISULPHITE	HAZARDOUS (H-4)
SIPX SODIUM ISOPROPYL XANTHATE	HAZARDOUS (H-3 - CLASS 2 WATER REACTIVE)

THE XANTHATE IS REACTIVE WITH WATER AND THIS REACTION CREATES POTENTIALLY LETHAL OR EXPLOSIVE FUMES. PER 2006 IBC TABLE 508.3.3, THE SEPARATION OF A H-3 FROM AN H-4 OCCUPANCY DOES NOT REQUIRE A SEPARATION AS LONG AS IT IS SPRINKLED. SINCE XANTHATE IS WATER REACTIVE, SPRINKLING IS NOT AN OPTION. IBC 903.3.1.1.1 PROVIDES AN EXCEPTION TO REQUIRING THIS SPRINKLING REQUIREMENT. INSTEAD OF THIS SPRINKLER REQUIREMENT, THIS PROJECT HAS DECIDED TO PUT THE H-3 CLASSIFIED MIBC, AND XANTHATE CHEMICALS IN THEIR OWN SEPARATE INDEPENDENT ENCLOSED ROOMS/BUILDINGS WITHIN THE REAGENT BUILDING. CONTRACTOR TO PROVIDE DESIGN AND CONSTRUCTION FOR THESE ROOMS AS DESCRIBED IN DETAIL 9/700-SS-104. THESE ROOMS WILL PROVIDE A ONE HOUR SEPARATION BETWEEN THESE CHEMICALS AND THE REST OF THE H-4 CLASSIFIED CHEMICALS IN THE REAGENT BUILDING. A THREE HOUR MINIMUM UNSPRINKLERED SEPARATION WALL WILL BE PROVIDED BETWEEN THE REAGENT ADDITION AND THE COMPRESSOR ADDITION TO SEPARATE H-4 OCCUPANCIES FROM F-2 OCCUPANCIES.

2. HVAC AND VENTILATION DESIGNS PROVIDED BY OTHERS. AT MINIMUM, THE TWO ENCLOSED ROOMS REQUIRE VENTILATION. THE ADDITIONS MAY REQUIRE UNIT HEATERS. CONTRACTOR TO COORDINATE WITH OWNER TO DETERMINE WHAT IS IN THE CONTRACTOR'S SCOPE.

3. PROVIDE INSULATION AS FOLLOWS:

EXTERIOR WALLS	R = 20 MIN.
ROOF	R = 49 MIN.

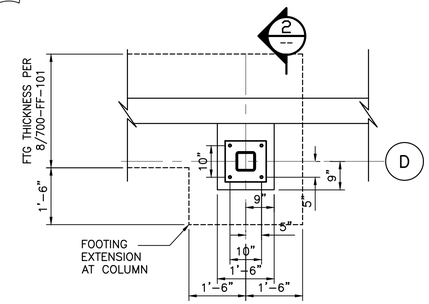
COMPRESSOR ADDITION IS NOT HAZARDOUS. POLYURETHANE OR FOAM INSULATION (EITHER BOARDS OR SPRAY FOAM MAY USED).

REAGENT ADDITION IS HAZARDOUS. NON-FLAMMABLE INSULATION SHOULD BE UTILIZED. USE FIBERGLASS BATT INSULATION BELOW ROOF. ADD LAGGING AS NECESSARY TO HOLD IN PLACE. USE MINERAL WOOL INSULATION BOARD ATTACHED TO INSIDE OF WALLS.

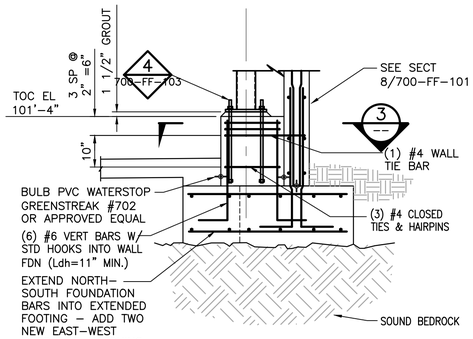
4. SITE GRADING DESIGN IS BY OTHERS. GRADING OF SITE SHALL BE PROVIDED TO FLOW WATER FROM WEST TO EAST ALONG SOUTH SIDE OF REAGENT AND COMPRESSOR ROOM ADDITIONS, AND THEN FROM SOUTH TO NORTH ALONG THE EAST SIDE OF THE REAGENT BUILDING. SITE WILL REQUIRE GRADING OF MOUNTAINSIDE TO ALLOW SPACE FOR BUILDING AND FOUNDATION. OWNER WILL PROVIDE ROUGH EXCAVATION OF MOUNTAINSIDE. CONTRACTOR MAY BE RESPONSIBLE FOR SOME FINISH EXCAVATION (COORDINATE WITH OWNER REGARDING EXCAVATION SCOPE). FOUNDATION DRAWINGS ASSUME TOP OF ROCK ELEVATION IS AT APPROXIMATE ELEVATION 98'-0" THROUGHOUT TO MATCH EXISTING FILTER BUILDING FOUNDATION DRAWINGS. NEW FOOTINGS ARE DESIGNED TO BEAR ON ROCK, AND SITE EXCAVATION SHALL BE EXTENDED TO ROCK SURFACE.

5. PROVIDE THE FOLLOWING DOORS AND ALL RELATED HARDWARE (REFER TO 700-GA-001 FOR DOOR SWINGS). ALL EXTERIOR DOORS TO BE COATED FOR EXTERIOR EXPOSURE.

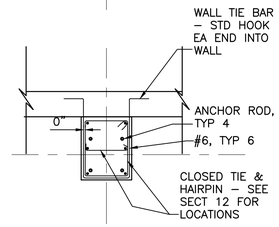
- (2) ONE HOUR RATED OVERHEAD ROLL UP DOORS - ROUGH OPENING 6'-0" WIDE x 8'-0" TALL IN MIBC AND XANTHATE ROOM WALLS. THESE DOORS TO BE AUTOMATICALLY CLOSING DURING A FIRE.
- (2) ONE HOUR RATED MAN-DOORS - ROUGH OPENING 3'-4" WIDE x 7'-2" TALL IN MIBC AND XANTHATE ROOM WALLS FOR 3'-0"x7'-0" DOORS. THESE DOORS TO ALL BE SELF-CLOSING AND OPEN AWAY FROM THE ROOMS. DOORS TO HAVE PANIC BARS AND RELATED HARDWARE ON THE INTERIOR OF THE ROOMS.
- (1) THREE HOUR RATED MAN-DOOR - ROUGH OPENING 3'-4" WIDE x 7'-2" TALL IN 12" CONCRETE WALL BETWEEN REAGENT AND COMPRESSOR ADDITIONS (DOOR SIZE 3'-0" x 7'-0"). THIS DOOR TO BE SELF-CLOSING AND OPEN AWAY FROM THE REAGENT ADDITION AND INTO THE COMPRESSOR ADDITION. DOOR TO HAVE PANIC BAR AND RELATED HARDWARE ON THE REAGENT SIDE OF THE DOOR.
- (3) EXTERIOR INSULATED MAN-DOORS - ROUGH OPENING 3'-4" WIDE x 7'-2" TALL. TWO DOORS ARE FOR EXITING THE REAGENT AND COMPRESSOR ADDITIONS ON THE NORTH SIDE OF THE BUILDING, AND ONE DOOR IS FOR EXITING THE COMPRESSOR ADDITION ON THE SOUTH SIDE NEAR EXISTING SEPTIC TANK (DOOR SIZE 3'-0"x7'-0", TYPICAL).
- (1) EXTERIOR INSULATED OVERHEAD ROLL UP OR TRACKED DOOR - ROUGH OPENING 8'-0"x10'-0" TALL AT NORTH WALL ENTERING REAGENT ADDITION. CONTRACTOR TO SUPPLY A DOOR THAT WORKS WITH THE GEOMETRY. REFER TO SECTION 9 ON DRAWING 700-SS-103 FOR GEOMETRY. DOOR TO HAVE AN ELECTRIC OPENER.
- (1) EXTERIOR INSULATED OVERHEAD ROLL UP OR TRACKED DOOR - ROUGH OPENING 12'-0"x10'-0" TALL AT NORTH WALL ENTERING COMPRESSOR ADDITION. DOOR TO HAVE AN ELECTRIC OPENER.



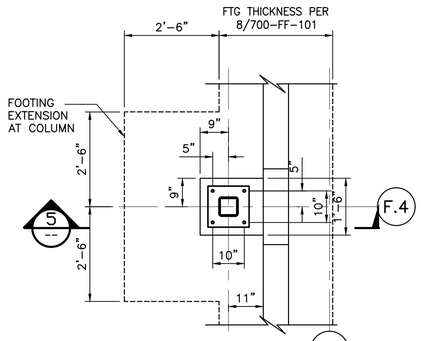
1 700-FF-100 DETAIL: 1/2"=1'-0"



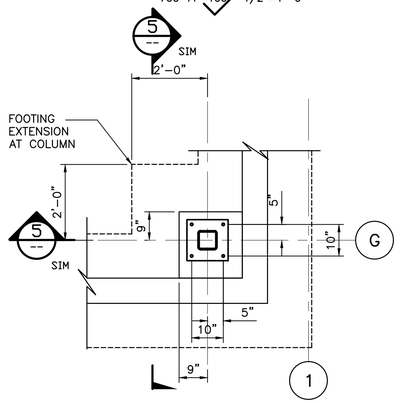
2 SECTION: 1/2"=1'-0"



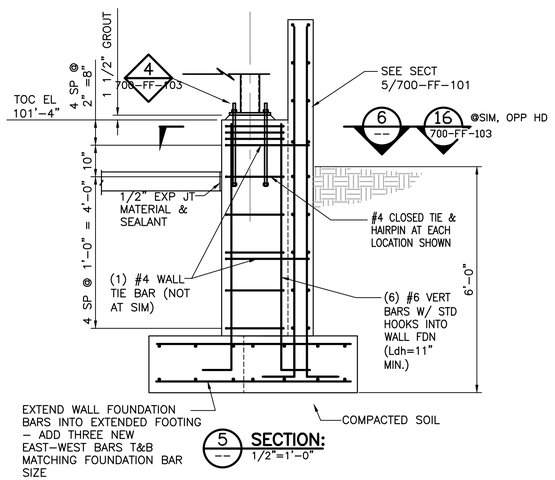
3 SECTION: 1/2"=1'-0"



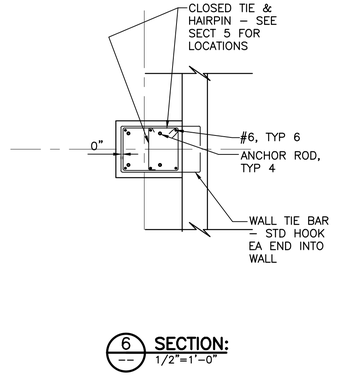
4 DETAIL: 1/2"=1'-0"



7 700-FF-100 DETAIL: 1/2"=1'-0"



5 SECTION: 1/2"=1'-0"



6 SECTION: 1/2"=1'-0"

NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
					CLIENT
					BID
					CONSTRUCTION
1	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION - ADD SECTIONS & DETAILS 1 THROUGH 7
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR

A	B	C	0	1	2	3
			4/28/17	10/23/20		
			4/28/17	10/23/20		
			4/28/17	10/23/20		

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277
Project Office: BARR ENGINEERING CO. 170 SOUTH MAIN STREET SUITE 500 SALT LAKE CITY, UT 84101 Ph: 1-800-632-2277 Fax: (952) 832-2601 www.barr.com

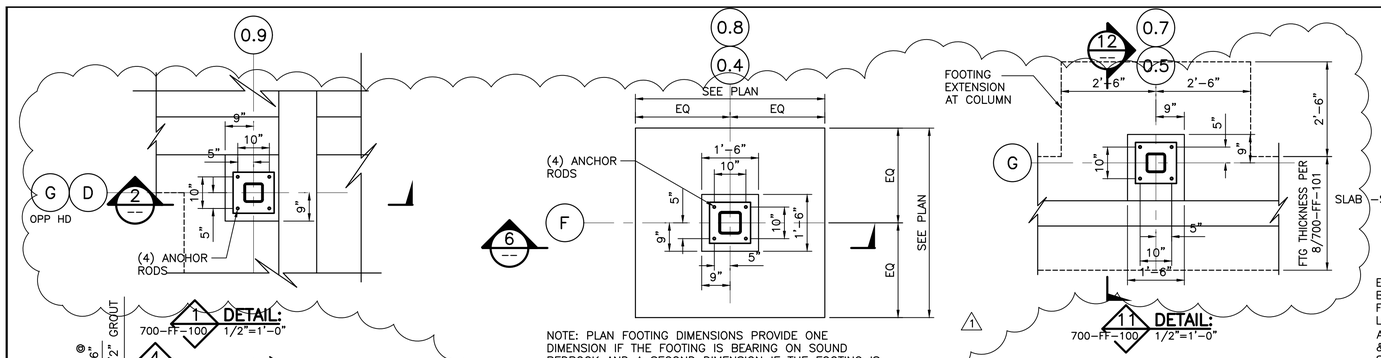
Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

REAGENT & COMPRESSOR ADDITION
STRUCTURAL NOTES & CMU

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-FF-102
REV. No. 1



CADD USER: John Trullinger FILE: M:\DEPTWORK\JGT\06461001.00_700-FF-103A.DWG PLOT SCALE: 1:1 PLOT DATE: 10/23/2020 2:19 PM
BAR M:\AutoCAD 2011\AutoCAD 2011 Support\enu\Template\Barr_2011_Template.dwt Plot at 1 10/05/2010 14:03:50

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION -REVISE DETAILS 1,5,8,11,14,17 & SECTIONS 3,6,12,13
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT				4/28/17	10/23/20		
BID				4/28/17	10/23/20		
CONSTRUCTION				4/28/17	10/23/20		
DATE RELEASED							

COLORADO LICENSED JOHN T. TRULLINGER 51916 PROFESSIONAL ENGINEER
Exp Date 10/31/21

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Ph: 1-800-632-2277
Fax: (952) 832-2601
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Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

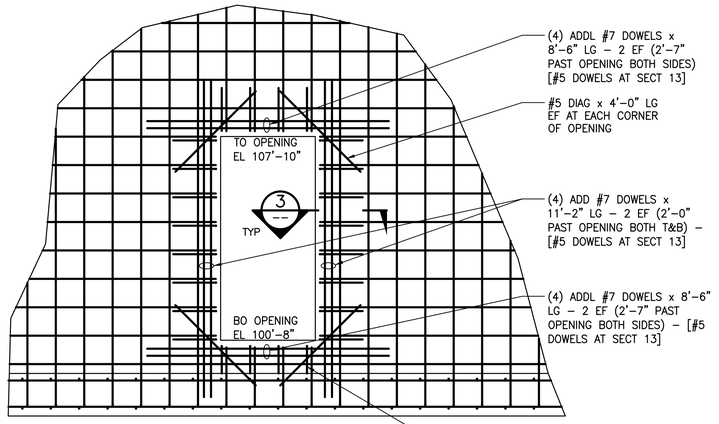
OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

CONCRETE AND FOUNDATION
REAGENT BUILDING CONCRETE DETAILS

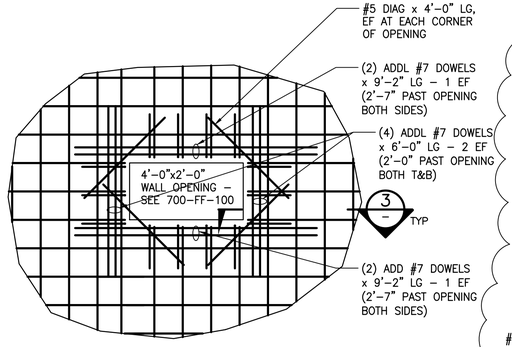
BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-FF-103
REV. No. 1

ISSUED FOR CONSTRUCTION

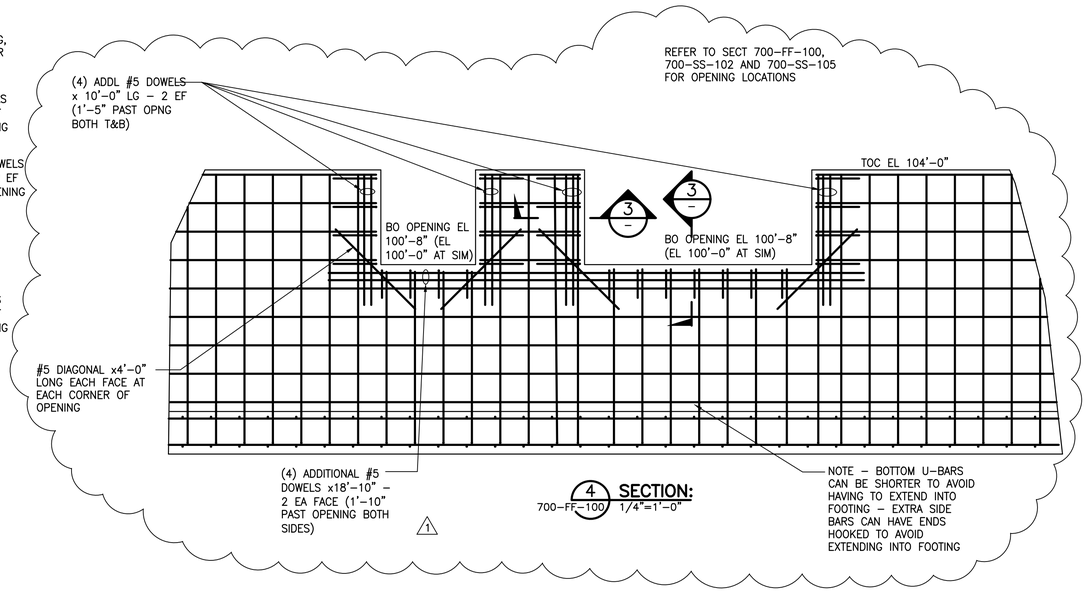


1 SECTION: 700-FF-100 1/4"=1'-0"

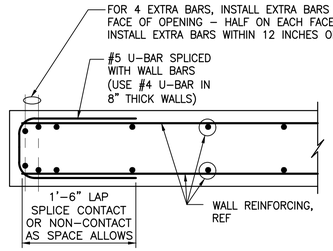
13 SECTION: 700-FF-100 1/4"=1'-0"



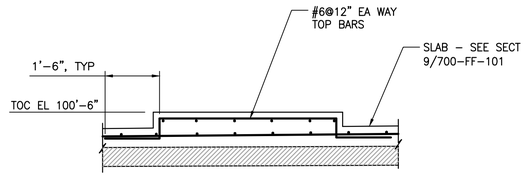
2 SECTION: 700-FF-100 1/4"=1'-0"



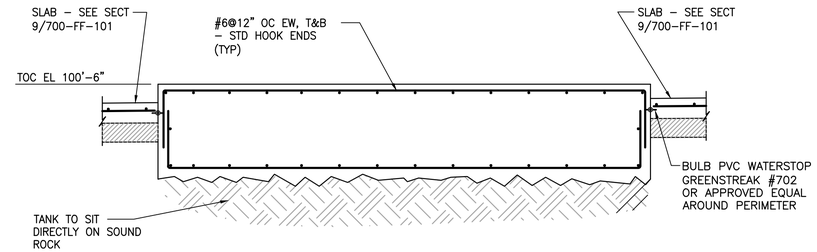
4 SECTION: 700-FF-100 1/4"=1'-0"



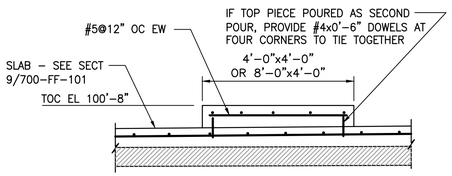
3 SECTION: 1"=1'-0"



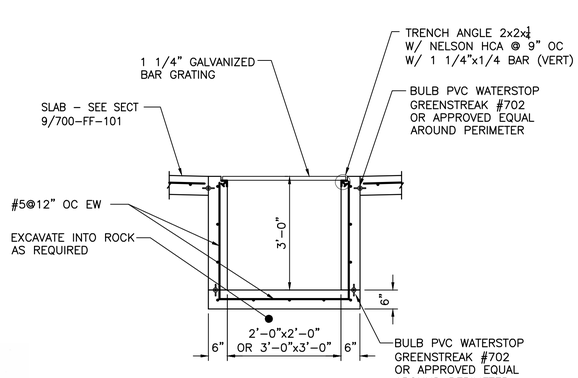
TYPICAL REAGENT TANK FOUNDATION
6 OCTAGON 7 FT OR LESS ACROSS
700-FF-100 1/2"=1'-0"



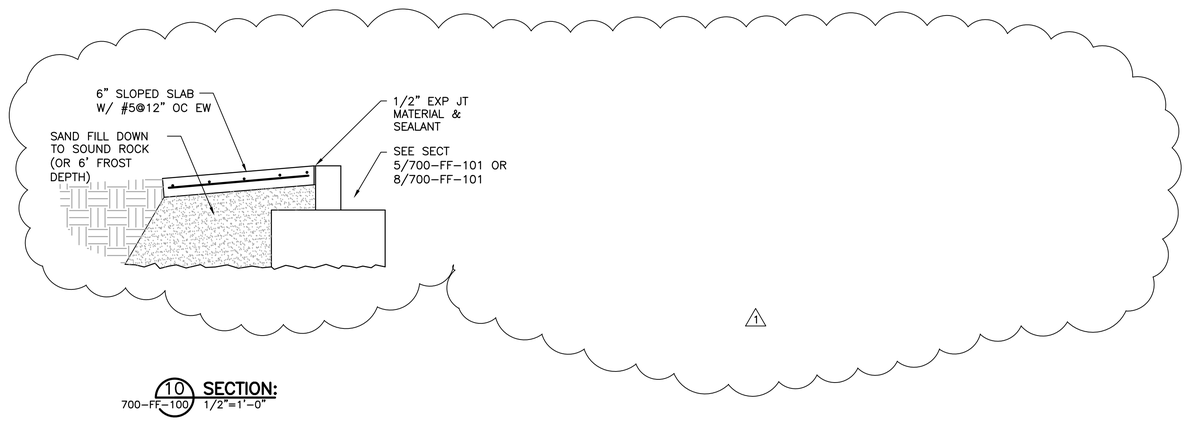
TYPICAL REAGENT TANK FOUNDATION
7 OCTAGON LARGER THAN 7 FT ACROSS
700-FF-100 1/2"=1'-0"



8 TYPICAL INTERIOR DOOR PAD
700-FF-100 1/2"=1'-0"



9 SECTION: 700-FF-100 1/4"=1'-0"



10 SECTION: 700-FF-100 1/2"=1'-0"

NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
					CLIENT
					BID
					CONSTRUCTION
1	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION - MODIFY SECT 4 & 10, DELETE SECT 11 & 12
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR

A	B	C	0	1	2	3
			4/28/17	10/23/20		
			4/28/17	10/23/20		
			4/28/17	10/23/20		

DATE RELEASED

BARR
Corporate Headquarters: Minneapolis, Minnesota Ph: 1-800-632-2277

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Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

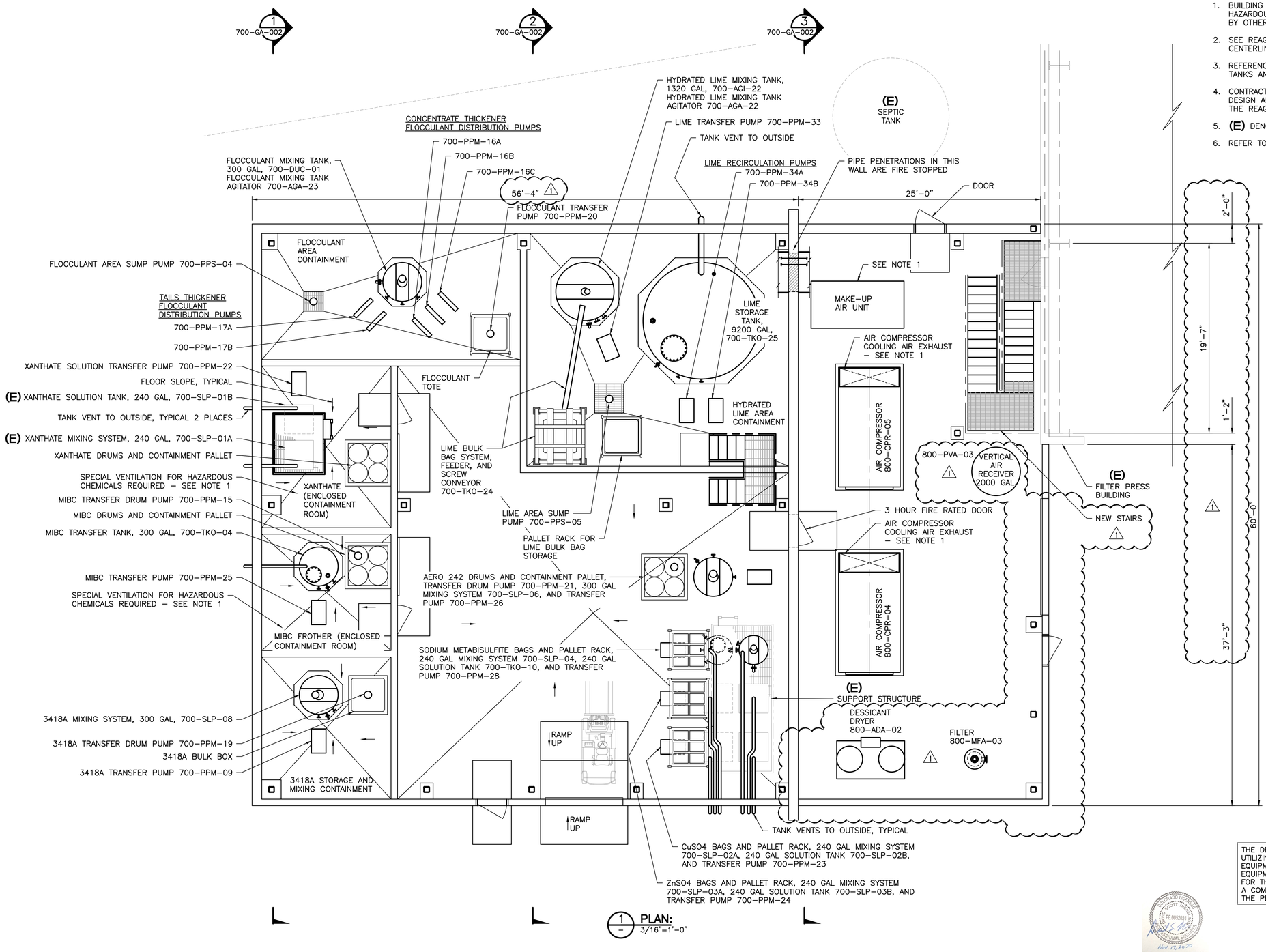
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

CONCRETE AND FOUNDATION
REAGENT & COMPRESSOR AREA DETAILS

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-FF-104
REV. No. 1

NOTES:

1. BUILDING HVAC AND UTILITIES INCLUDING SPECIAL VENTILATION FOR HAZARDOUS CHEMICALS, MAKE-UP AIR UNIT, AND AIR COMPRESSOR COOLING BY OTHERS AND WILL REQUIRE ADDITIONAL DESIGN.
2. SEE REAGENT BUILDING STRUCTURAL DRAWINGS FOR LOCATING TANK CENTERLINES.
3. REFERENCE 300 SERIES GAs FOR LOCATIONS OF ADDITIONAL REAGENT DAY TANKS AND METERING PUMPS.
4. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH OWNER ON THE DESIGN AND INSTALLATION OF SAFETY SHOWERS AND EYE WASH STATIONS IN THE REAGENT BUILDING.
5. (E) DENOTES EXISTING EQUIPMENT.
6. REFER TO 700-MC SERIES DRAWINGS FOR TANK DETAILS.



1 PLAN: 3/16"=1'-0"

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

Nov. 17, 2020

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	DAK	DSM	DSM	11/17/2020	ISSUED FOR CONSTRUCTION
0	DAK	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 11/17/2020; BID 4/28/17 11/17/2020; CONSTRUCTION 4/28/17 11/17/2020

A	B	C	0	1	2	3
DATE RELEASED						

BARR
Corporate Headquarters: Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
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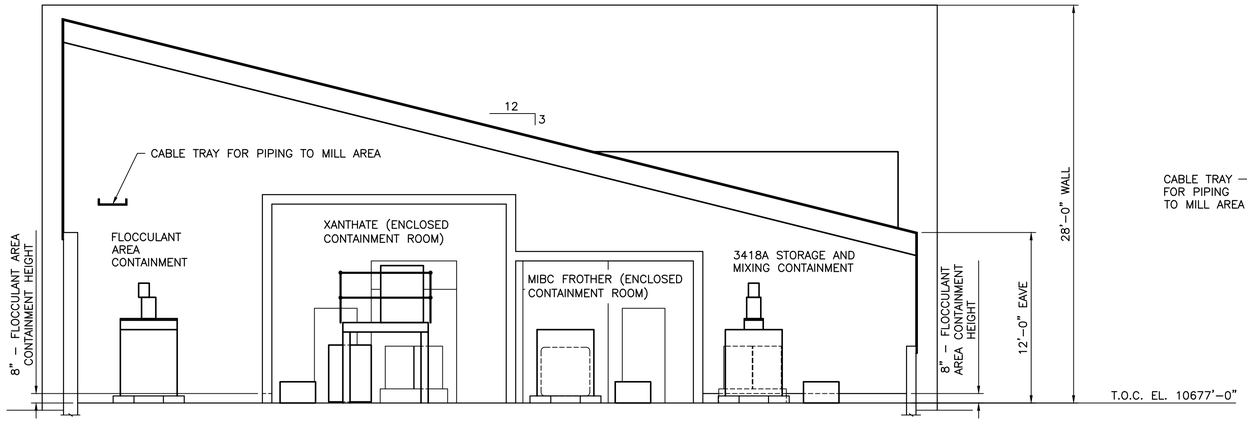
Scale	AS SHOWN
Date	2/14/17
Drawn	DAK
Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

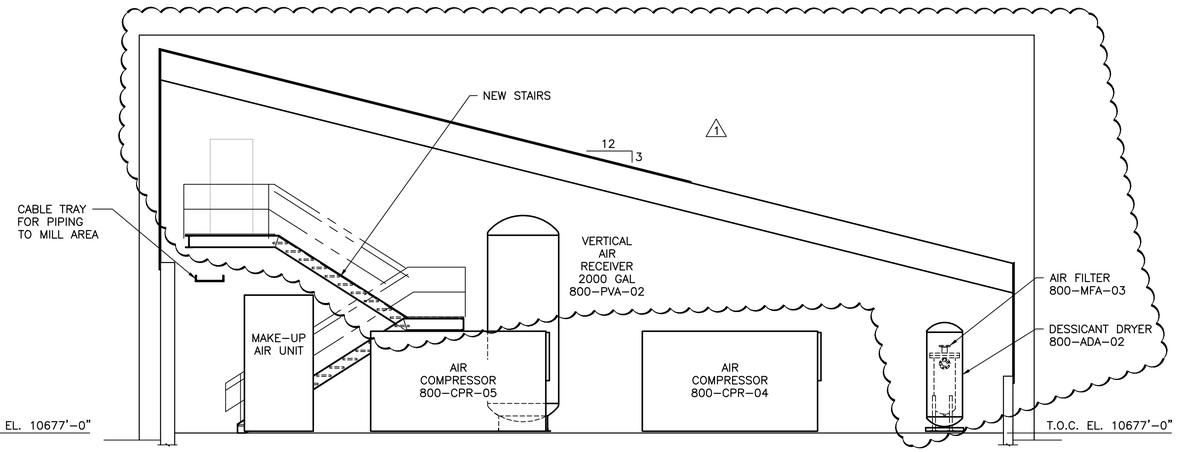
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

GENERAL ARRANGEMENT
AIR COMPRESSOR AND REAGENT BUILDING PLAN

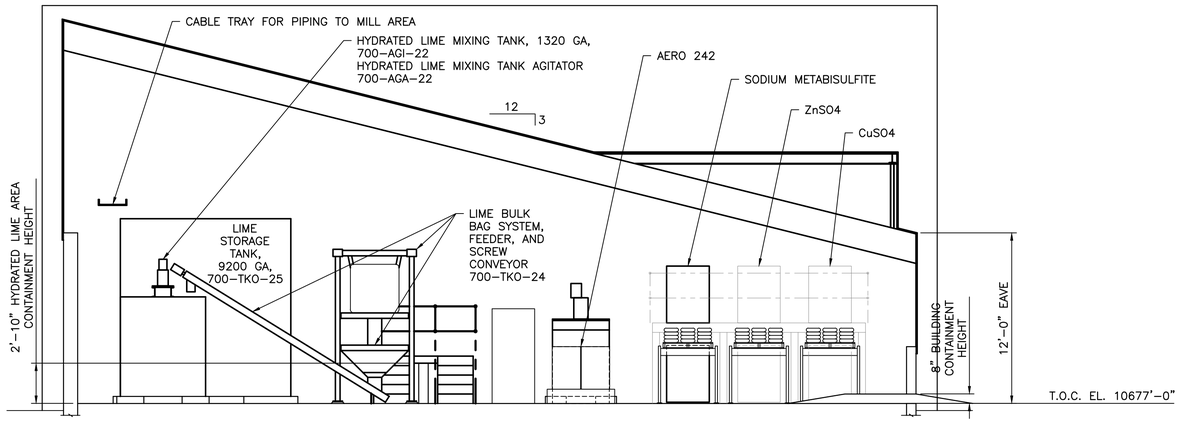
BARR PROJECT No. 06/46-1001
CLIENT PROJECT No.
DWG. No. 700-GA-001
REV. No. 1



1 SECTION: 700–GA–001 3/16"=1'–0"



3 SECTION: 700–GA–001 3/16"=1'–0"



2 SECTION: 700–GA–001 3/16"=1'–0"

NOTES:

1. **(E)** DENOTES EXISTING EQUIPMENT.

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

COLORADO LICENSED PROFESSIONAL ENGINEER PE.0052024 Nov. 17, 2020

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	DAK	DSM	DSM	11/17/2020	ISSUED FOR CONSTRUCTION
0	DAK	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT — BID — CONSTRUCTION

DATE RELEASED: A 4/28/17 | B — | C — | 0 1/11/2020 | 1 — | 2 — | 3 —

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Ph: 1–800–632–2277
Fax: (952) 832–2601
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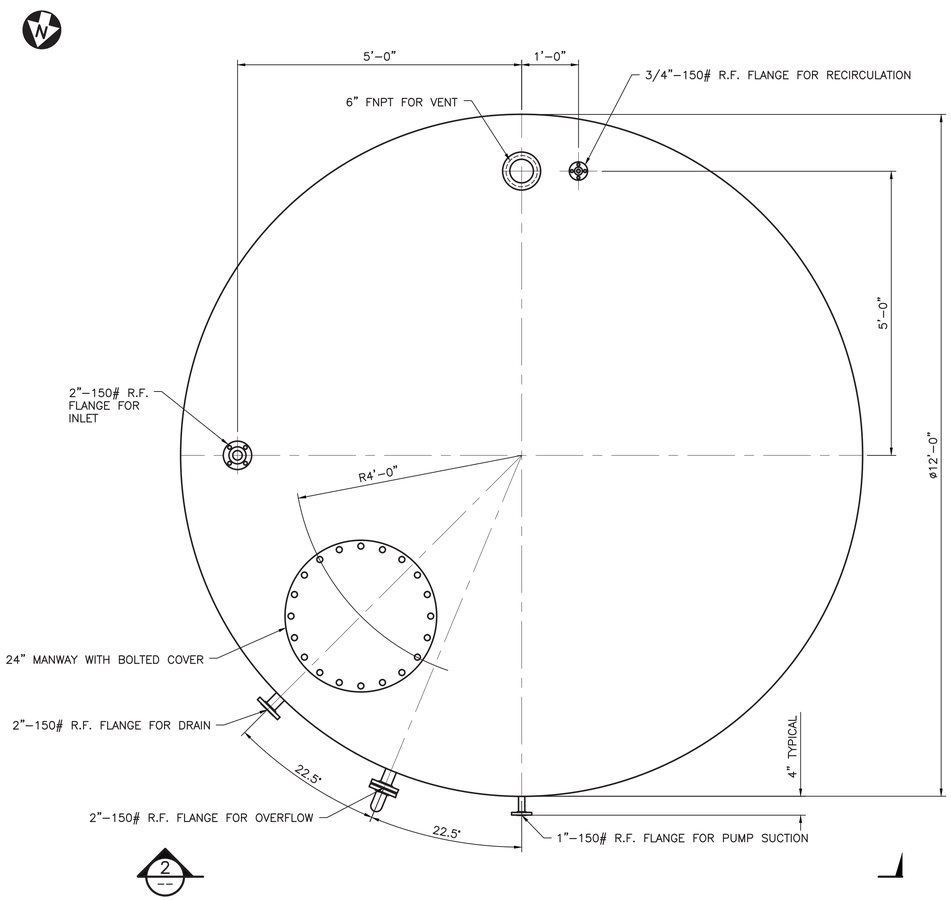
Scale	AS SHOWN
Date	3/23/17
Drawn	DAK
Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

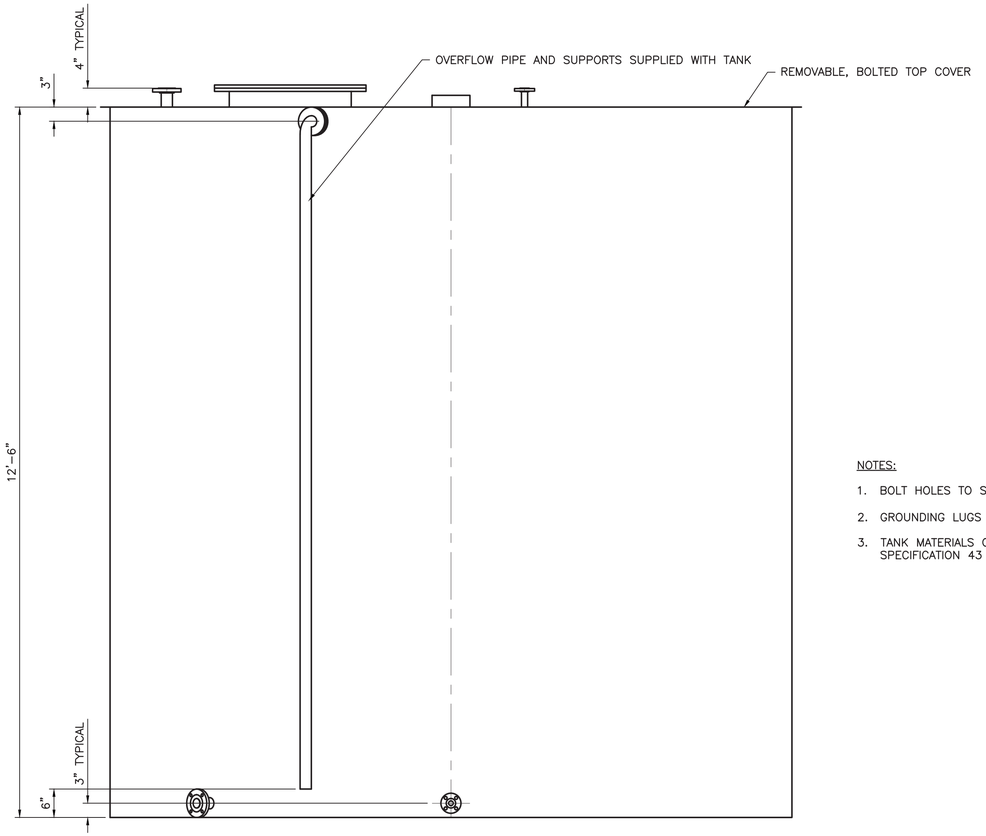
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

GENERAL ARRANGEMENT
AIR COMPRESSOR AND REAGENT BUILDING SECTIONS

BARR PROJECT No. 06/46–1001
CLIENT PROJECT No.
DWG. No. 700–GA–002
REV. No. 1



1 PLAN: LIME STORAGE TANK 700-TK-025
3/4"=1'-0"



2 ELEVATION: LIME STORAGE TANK 700-TK-025
3/4"=1'-0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.

COLORADO LICENSED
SCOTT MICHEL
PE.0052024
PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	DAK	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17; BID 4/28/17; CONSTRUCTION

DATE RELEASED: A B C 0 1 2 3

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Corporate Headquarters: Minneapolis, Minnesota
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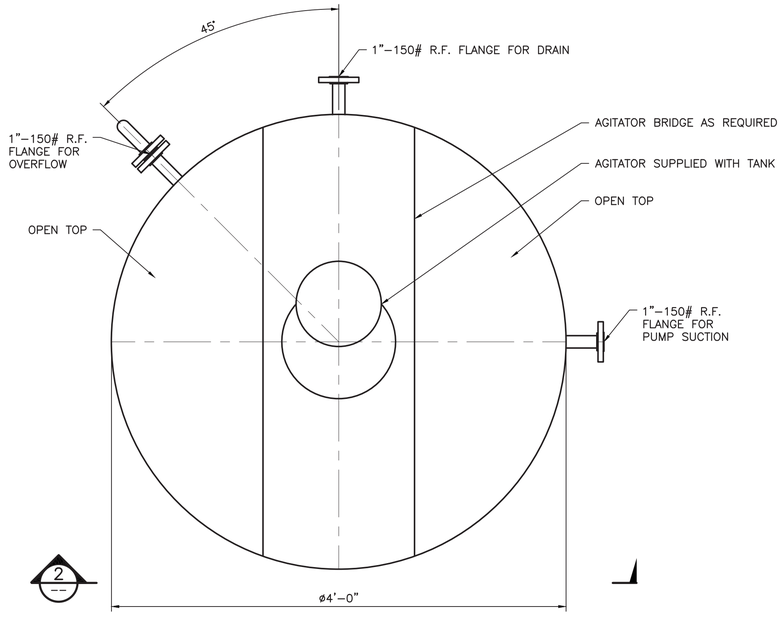
Scale	AS SHOWN
Date	4/12/17
Drawn	DAK
Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

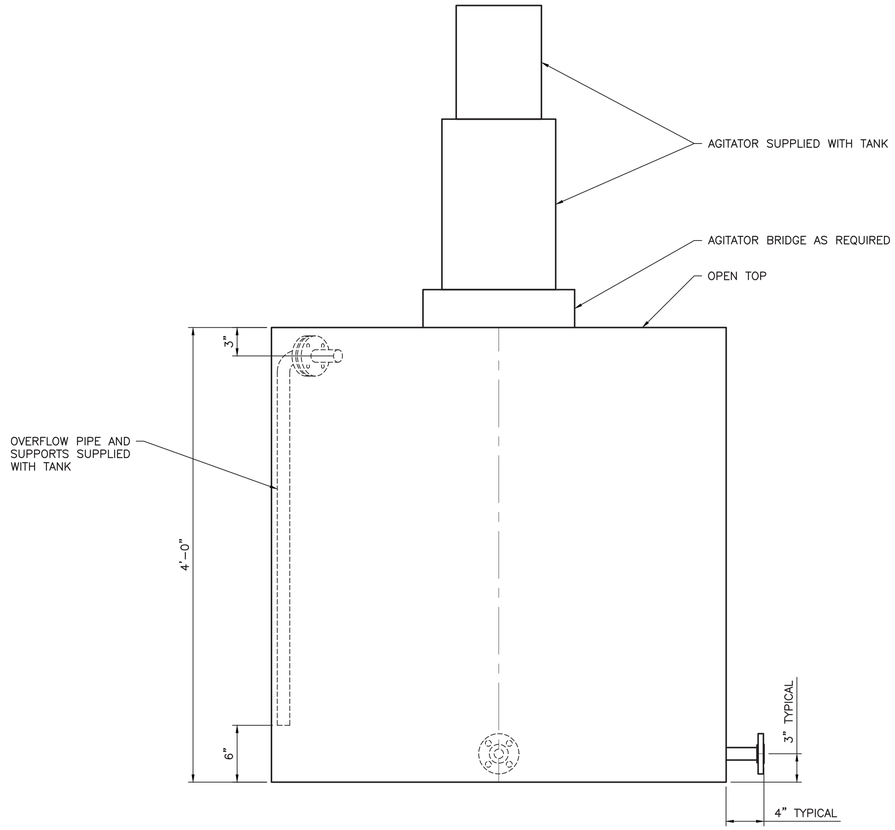
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
LIME STORAGE TANK 700-TKO-25

BARR PROJECT No. 06/46-1001.00
CLIENT PROJECT No.
DWG. No. 700-MC-001
REV. No. 0



1 PLAN: AERO 242 MIXING SYSTEM 700–SLP–06
1 1/2"=1'–0"



2 ELEVATION: AERO 242 MIXING SYSTEM 700–SLP–06
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.
4. AGITATOR TO BE SUPPORTED FROM STRUCTURAL STEEL MOUNTED ON TOP OF TANK.

COLORADO LICENSED
SCOTT MICHAEL
PE.0052024
PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	DAK	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR

CLIENT		4/28/17
BID		4/28/17
CONSTRUCTION		4/28/17

A B C 0 1 2 3
DATE RELEASED

BARR
Corporate Headquarters:
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Ph: 1–800–632–2277

Project Office:
BARR ENGINEERING CO.
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SUITE 500
SALT LAKE CITY, UT 84101
Ph: 1–800–632–2277
Fax: (952) 832–2601
www.barr.com

Scale	AS SHOWN
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Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
AERO 242 MIXING SYSTEM 700–SLP–06

BARR PROJECT No. 06/46–1001.00
CLIENT PROJECT No.
DWG. No. 700–MC–002
REV. No. 0

CADD USER: Adepluser FILE: \\PWEDINA\EDINA PW\EDINA PW IN\50E164EB-6630-4335-B2B2-22BFEBFE48CE\7BC3143B-72C2-4C46-930C-39ED502CCCA9\0646100100_700-MC-002.DWG PLOT SCALE: 1:1 PLOT DATE: 4/28/2017 11:48 AM
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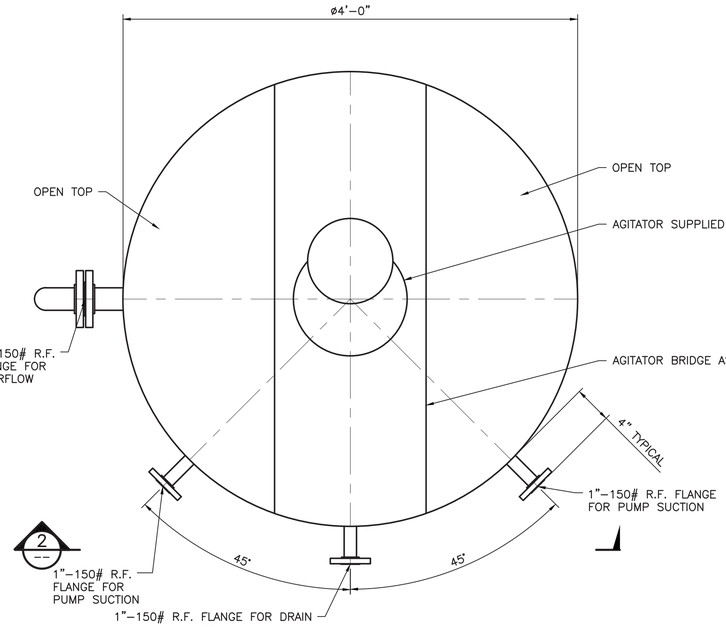
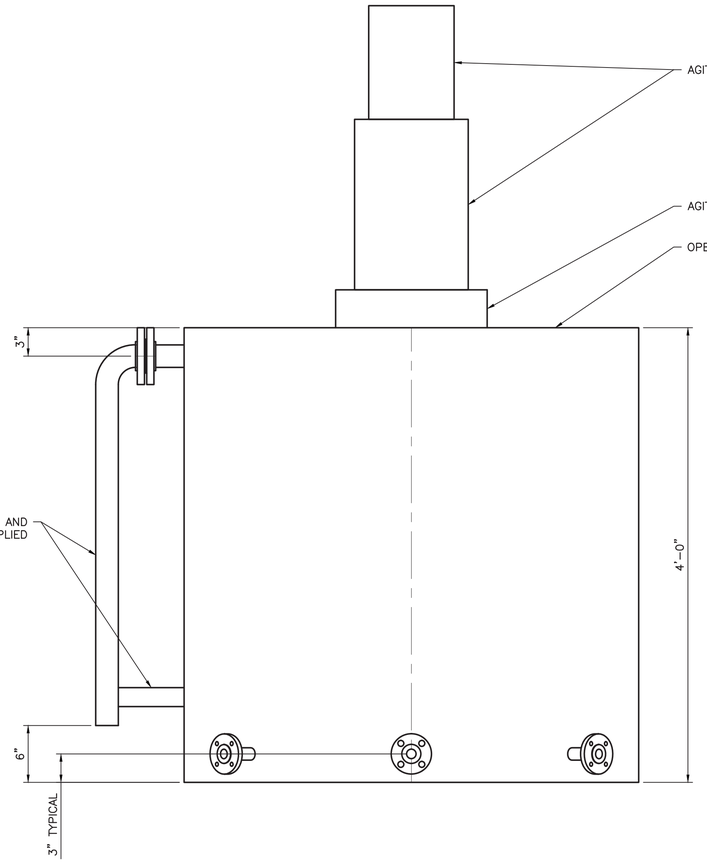


1 PLAN: FLOCCULANT MIXING TANK 700–DUC–01
1 1/2"=1'–0"



2 ELEVATION: FLOCCULANT MIXING TANK 700–DUC–01
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.
4. AGITATOR TO BE SUPPORTED FROM STRUCTURAL STEEL MOUNTED ON TOP OF TANK.

COLORADO LICENSED SCOTT MICKEY PE.0052024 PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	DAK	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

CLIENT				4/28/17			
BID				4/28/17			
CONSTRUCTION				4/28/17			
RELEASED TO/FOR	A	B	C	0	1	2	3
DATE RELEASED							

BARR
Corporate Headquarters:
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170 SOUTH MAIN STREET
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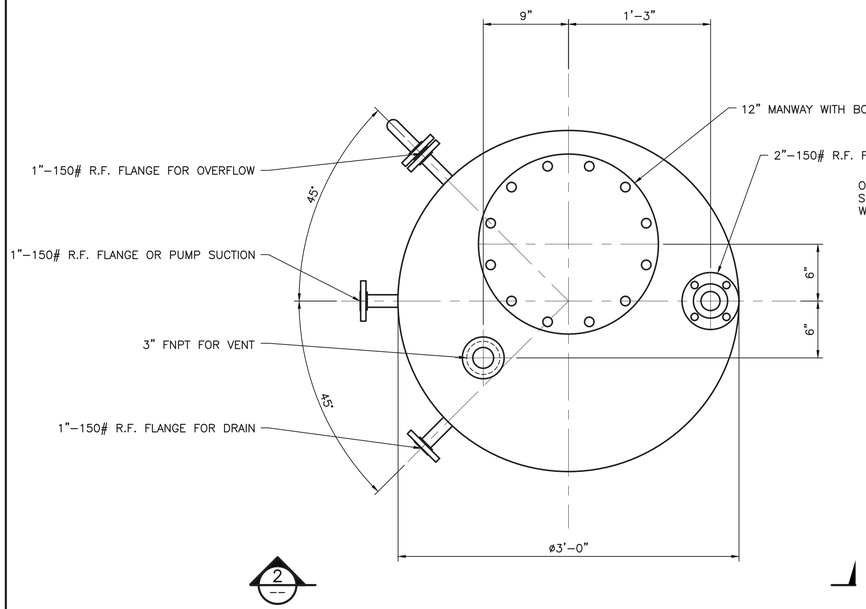
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

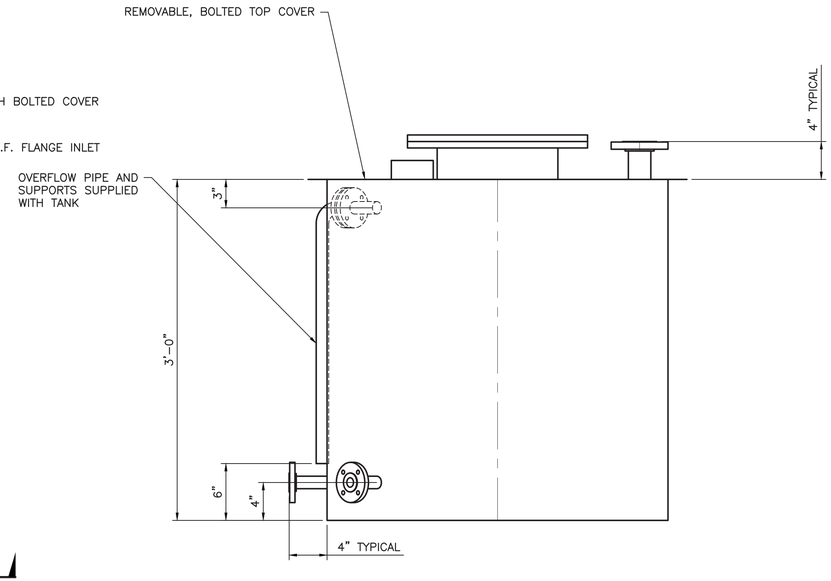
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
FLOCCULANT MIXING TANK 700–DUC–01

BARR PROJECT No.	
06/46–1001.00	
CLIENT PROJECT No.	
DWG. No.	REV. No.
700–MC–003	0



1 PLAN: SODIUM METABISULFITE SOLUTION TANK 700–TKO–10
1 1/2"=1'–0"



2 ELEVATION: SODIUM METABISULFITE SOLUTION TANK 700–TKO–10
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.

COLORADO LICENSED DAVID SCOTT MICHEL PE.0052024 PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

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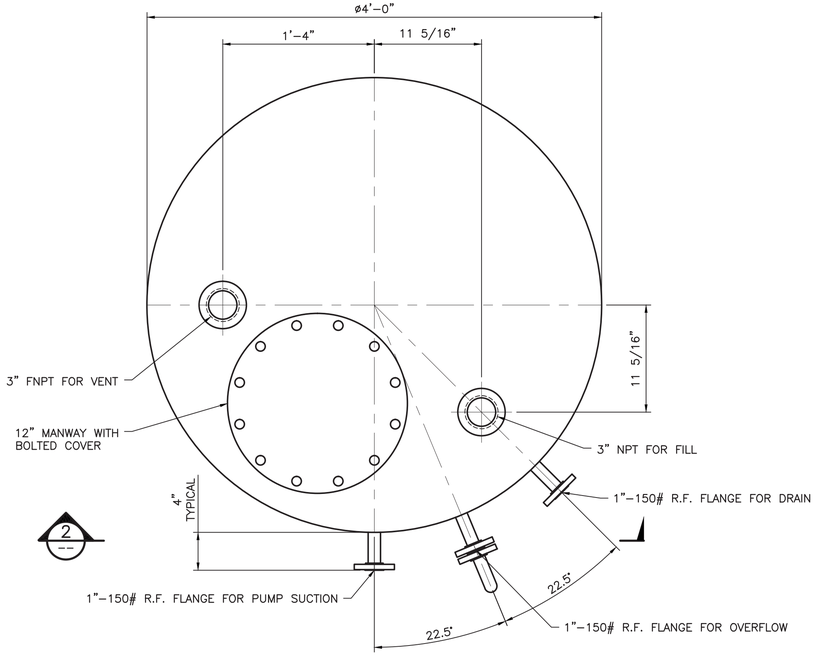
OURAY SILVER MINES, INC.
OURAY, COLORADO

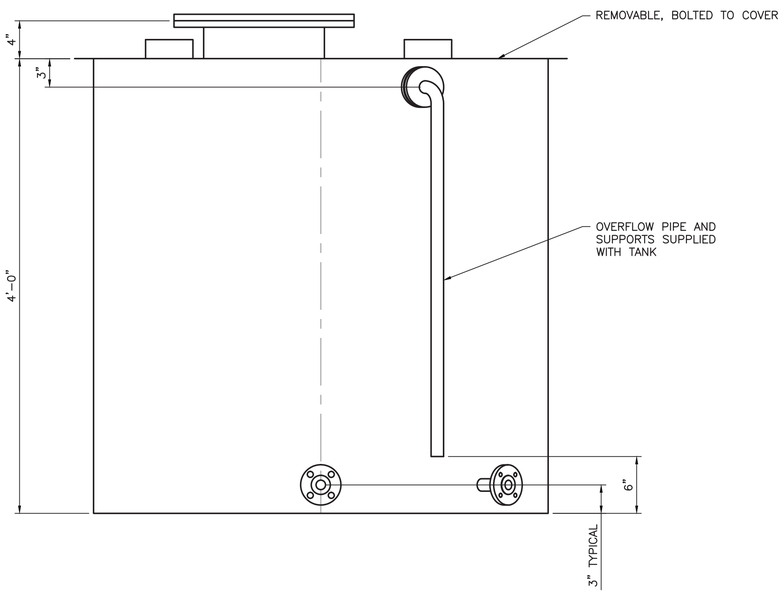
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
SODIUM METABISULFITE SOLUTION TANK 700–TKO–10

BARR PROJECT No.	
06/46–1001.00	
CLIENT PROJECT No.	
DWG. No.	REV. No.
700–MC–004	0



1 — PLAN: MIBC TRANSFER TANK 700–TKO–04
1 1/2"=1'–0"



2 — ELEVATION: MIBC TRANSFER TANK 700–TKO–04
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.

COLORADO LICENSED SCOTT MICHAEL PE.0052024 PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

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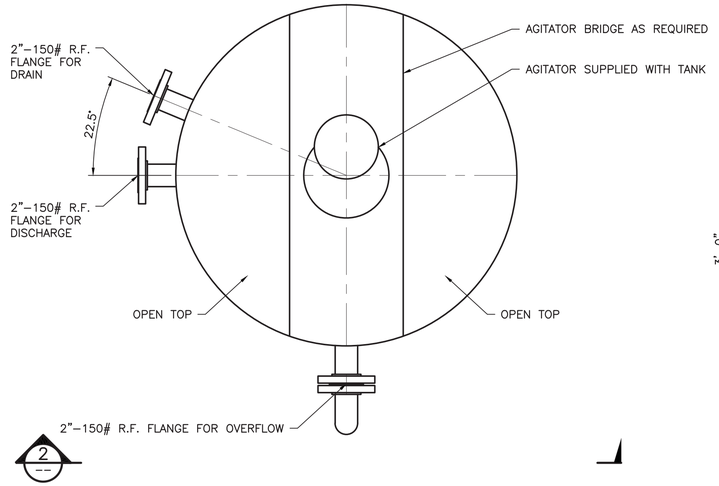
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

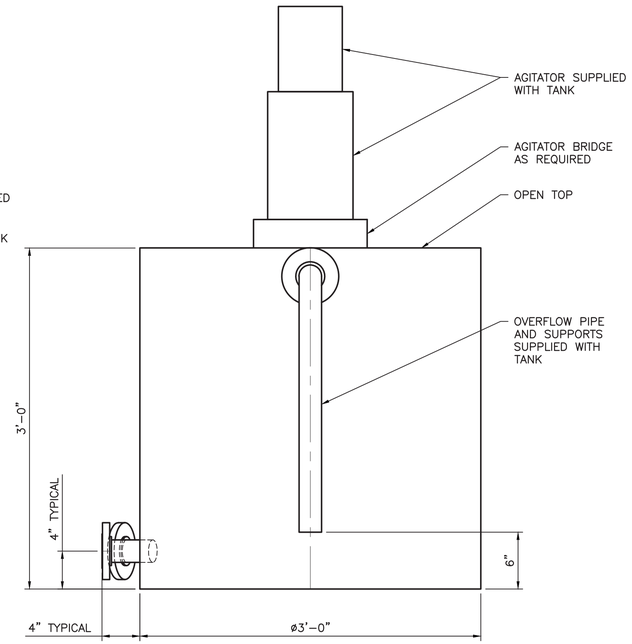
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
MIBC TRANSFER TANK 700–TKO–04

BARR PROJECT No. 06/46–1001.00
CLIENT PROJECT No.
DWG. No. 700–MC–005
REV. No. 0



1 PLAN: SODIUM METABISULFITE MIXING SYSTEM 700–SLP–04
1 1/2"=1'–0"



2 ELEVATION: SODIUM METABISULFITE MIXING SYSTEM 700–SLP–04
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.
4. AGITATOR TO BE SUPPORTED FROM STRUCTURAL STEEL MOUNTED TO TOP OF TANK.

COLORADO LICENSED DAVID SCOTT MICHEL PE.0052024 PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

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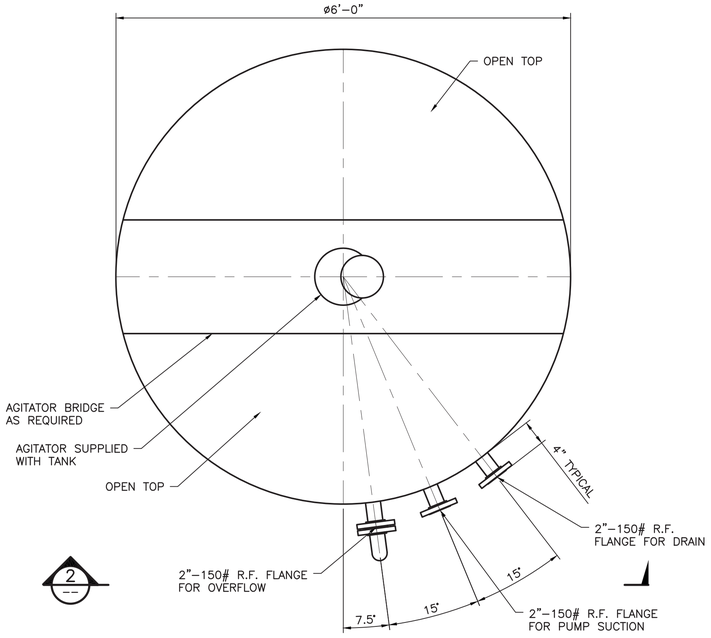
OURAY SILVER MINES, INC.
OURAY, COLORADO

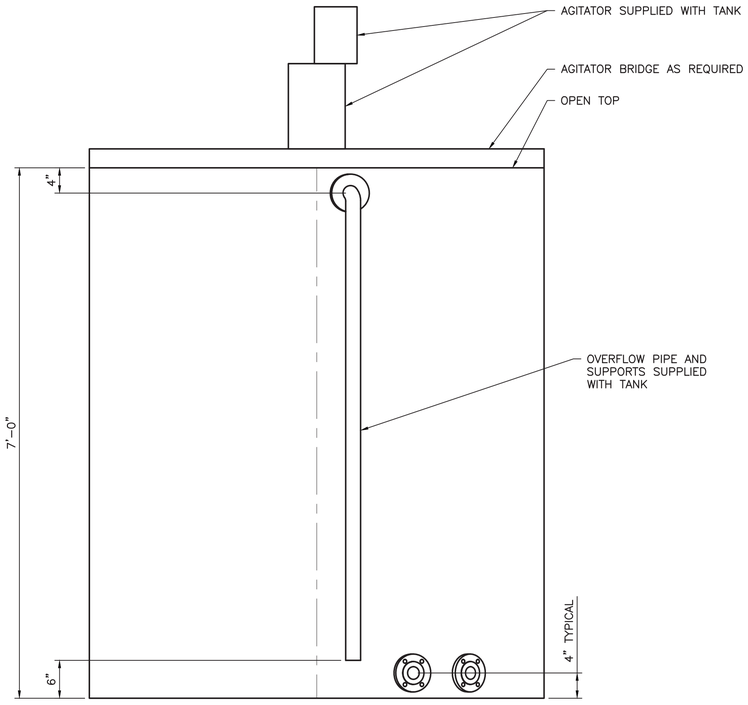
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
SODIUM METABISULFITE SOLUTION MIXING SYSTEM 700–SLP–04

BARR PROJECT No.	
06/46–1001.00	
CLIENT PROJECT No.	
DWG. No.	REV. No.
700–MC–006	0



1 PLAN: HYDRATED LIME MIXING TANK 700–AGI–22
1"=1'–0"



2 ELEVATION: HYDRATED LIME MIXING TANK 700–AGI–22
1"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.
4. AGITATOR TO BE SUPPORTED FROM STRUCTURAL STEEL MOUNTED ON TOP OF TANK.

COLORADO LICENSED
SCOTT MICKELSON
PE.0052024
PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

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CLIENT	— — —	4/28/17
BID	— — —	4/28/17
CONSTRUCTION	— — —	4/28/17

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SALT LAKE CITY, UT 84101
Ph: 1–800–632–2277
Fax: (952) 832–2601
www.barr.com

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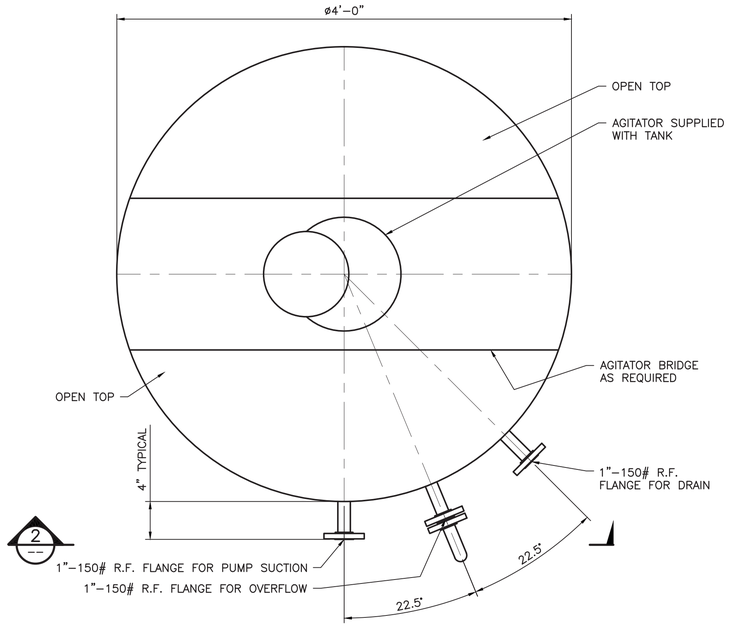
Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

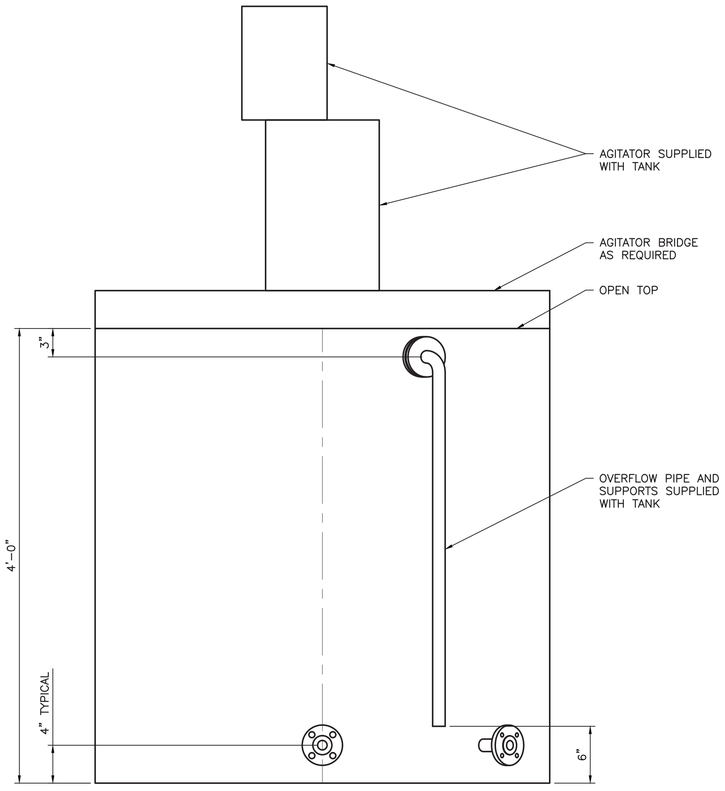
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
HYDRATED LIME MIXING TANK 700–AGI–22

BARR PROJECT No. 06/46–1001.00
CLIENT PROJECT No.
DWG. No. 700–MC–007
REV. No. 0



1/– PLAN: 3418A MIXING SYSTEM 700–SLP–08
1 1/2"=1'–0"



2/– ELEVATION: 3418A MIXING SYSTEM 700–SLP–08
1 1/2"=1'–0"

NOTES:

1. BOLT HOLES TO STRADDLE FLANGE CENTERLINES.
2. GROUNDING LUGS BY VENDOR (2) REQUIRED 180° APART.
3. TANK MATERIALS OF CONSTRUCTION SHALL CONFORM TO SPECIFICATION 43 20 00.
4. AGITATOR TO BE SUPPORTED FROM STRUCTURAL STEEL MOUNTED ON TOP OF TANK.

COLORADO LICENSED DAVID SCOTT MICKELSEN PE.0052024 PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

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CLIENT				4/28/17			
BID				4/28/17			
CONSTRUCTION				4/28/17			
DATE RELEASED							

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170 SOUTH MAIN STREET
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Fax: (952) 832–2601
www.barr.com

Scale	AS SHOWN
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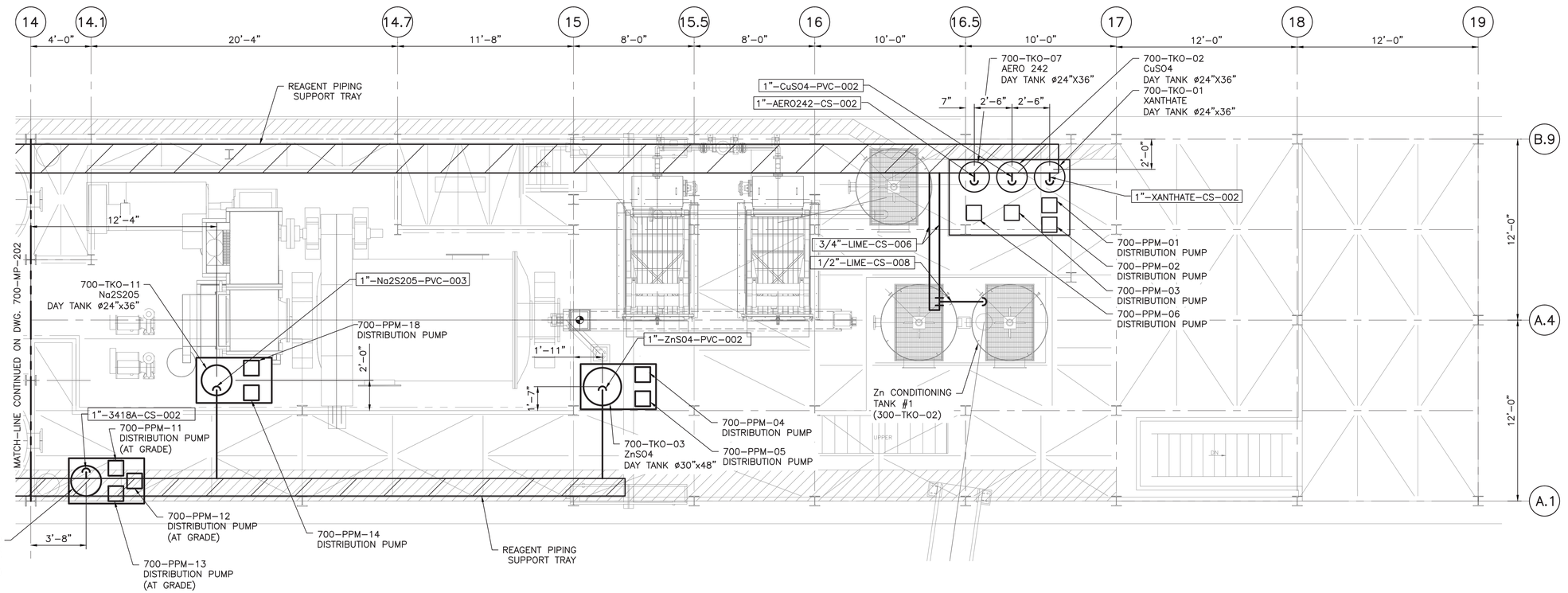
Checked	PGJ
Designed	DAK
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PLATEWORK
3418A MIXING SYSTEM 700–SLP–08

BARR PROJECT No. 06/46–1001.00
CLIENT PROJECT No.
DWG. No. 700–MC–008
REV. No. 0



1 REAGENT PIPING PLAN: UPPER LEVEL PLAN COL. 14 TO 19
1/4"=1'–0"

NOTES

1. IT IS RECOMMENDED THAT REAGENT PIPING IS ROUTED AND SUPPORTED IN CABLE TRAY IN AREAS WHERE IT MAKES SENSE TO DO SO. CONTRACTOR IS TO FIELD ROUTE CABLE TRAY.
2. PIPING IS SHOWN SCHEMATICALLY AND SHALL BE FIELD ROUTED BY CONTRACTOR TO AVOID INTERFERENCES WITH EXISTING AND NEW EQUIPMENT AND FACILITIES.
3. REFER TO PIPING SPECIFICATIONS FOR MATERIALS OF CONSTRUCTION, VALVES, INSTRUMENTS, ETC.
4. VALVES, INSTRUMENTS, ETC. SHALL BE LOCATED PER THE P&IDs AND IN COORDINATION WITH OWNER.
5. PIPE SUPPORTS SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL MEET MAXIMUM SPAN REQUIREMENTS AS GIVEN IN LATEST EDITION OF ANVIL PIPE HANGER CATALOG UNLESS OTHERWISE SPECIFIED. CONSIDERATION SHALL BE GIVEN TO EXTRA WEIGHT ADDED BY VALVES OR OTHER IN–LINE COMPONENTS.

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

COLORADO LICENSED SCOTT MICHEL PE.0052024 PROFESSIONAL ENGINEER

ISSUED FOR CONSTRUCTION

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Corporate Headquarters: Minneapolis, Minnesota Ph: 1–800–632–2277
Project Office: BARR ENGINEERING CO. 3128 14TH AVENUE EAST HIBBING, MN 55746 Ph: 1–800–225–1966 Fax: (218) 262–3460 www.barr.com

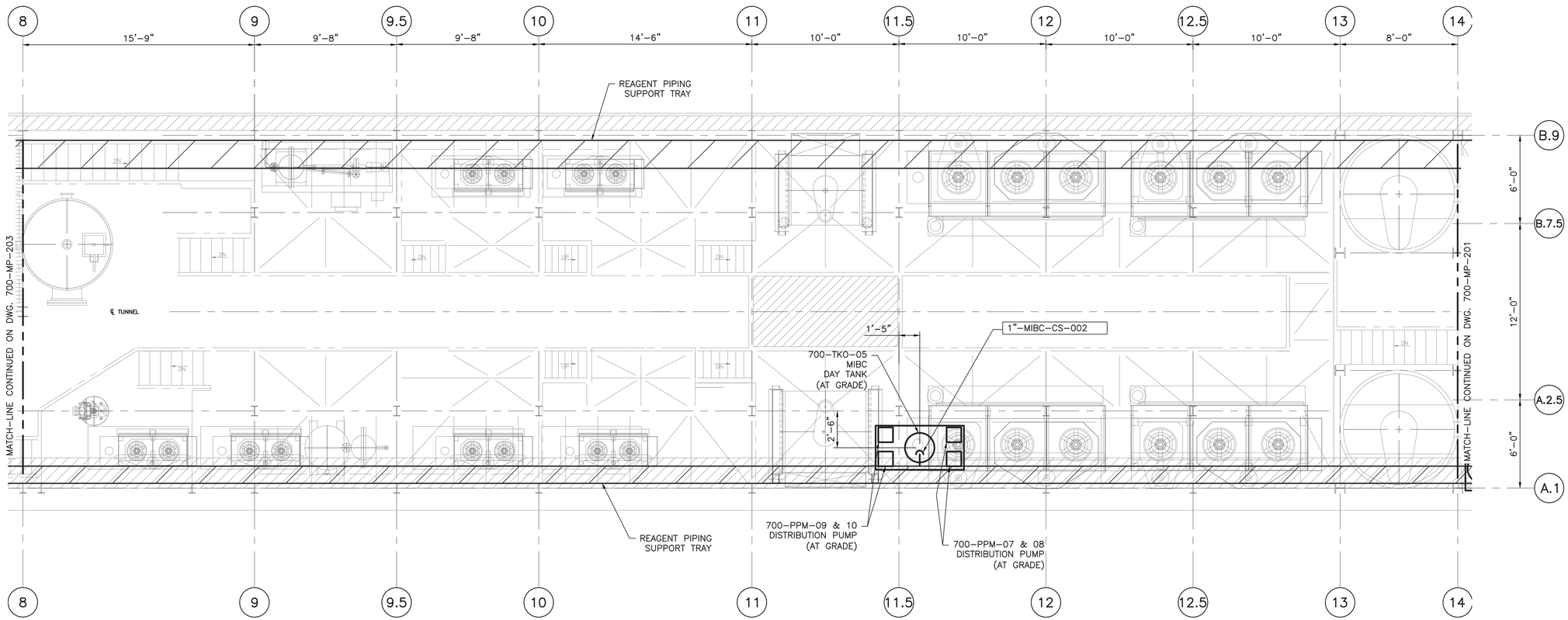
Scale	AS SHOWN
Date	3/30/17
Drawn	DTJ
Checked	PGJ
Designed	SMG
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
PIPING PLAN UPPER LEVEL COLUMN 14 TO 19

BARR PROJECT No. 06/46–1001
CLIENT PROJECT No. –
DWG. No. 700–MP–201
REV. No. 0



2 REAGENT PIPING PLAN: CONCENTRATOR UPPER LEVEL COLUMN 8 TO 14

1/4"=1'–0"

NOTES

1. IT IS RECOMMENDED THAT REAGENT PIPING IS ROUTED AND SUPPORTED IN CABLE TRAY IN AREAS WHERE IT MAKES SENSE TO DO SO. CONTRACTOR IS TO FIELD ROUTE CABLE TRAY.
2. PIPING IS SHOWN SCHEMATICALLY AND SHALL BE FIELD ROUTED BY CONTRACTOR TO AVOID INTERFERENCES WITH EXISTING AND NEW EQUIPMENT AND FACILITIES.
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4. VALVES, INSTRUMENTS, ETC. SHALL BE LOCATED PER THE P&IDs AND IN COORDINATION WITH OWNER.
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COLORADO LICENSED
SCOTT MICEK
PE.0052024
PROFESSIONAL ENGINEER

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
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CONSTRUCTION				4/28/17					
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DATE RELEASED									

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3128 14TH AVENUE EAST
HIBBING, MN 55746
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Fax: (218) 262–3460
www.barr.com

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Date	3/30/17
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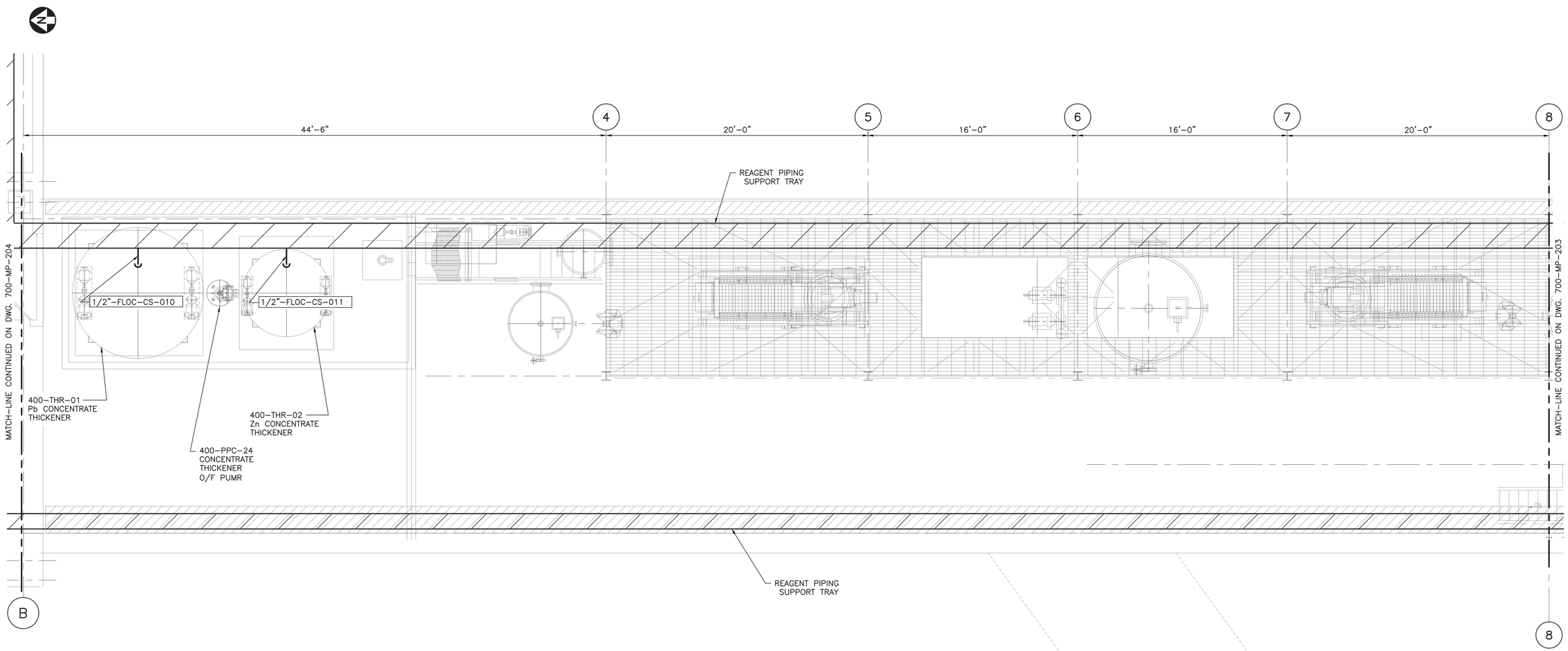
Approved	DSM

OURAY SILVER MINES, INC
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
PIPING PLAN UPPER LEVEL COLUMN 8 TO 14

BARR PROJECT No. 06/46–1001
CLIENT PROJECT No. –
DWG. No. 700–MP–202
REV. No. 0



NOTES

1. IT IS RECOMMENDED THAT REAGENT PIPING IS ROUTED AND SUPPORTED IN CABLE TRAY IN AREAS WHERE IT MAKES SENSE TO DO SO. CONTRACTOR IS TO FIELD ROUTE CABLE TRAY.
2. PIPING IS SHOWN SCHEMATICALLY AND SHALL BE FIELD ROUTED BY CONTRACTOR TO AVOID INTERFERENCES WITH EXISTING AND NEW EQUIPMENT AND FACILITIES.
3. REFER TO PIPING SPECIFICATIONS FOR MATERIALS OF CONSTRUCTION, VALVES, INSTRUMENTS, ETC.
4. VALVES, INSTRUMENTS, ETC. SHALL BE LOCATED PER THE P&IDs AND IN COORDINATION WITH OWNER.
5. PIPE SUPPORTS SHALL BE PROVIDED BY THE CONTRACTOR AND SHALL MEET MAXIMUM SPAN REQUIREMENTS AS GIVEN IN LATEST EDITION OF ANVIL PIPE HANGER CATALOG UNLESS OTHERWISE SPECIFIED. CONSIDERATION SHALL BE GIVEN TO EXTRA WEIGHT ADDED BY VALVES OR OTHER IN-LINE COMPONENTS.

3/– REAGENT PIPING PLAN: CONCENTRATOR UPPER LEVEL COLUMN LINE B TO 8

1/4"=1'-0"

COLORADO LICENSED
SCOTT MICHAEL
PE.0052024
PROFESSIONAL ENGINEER

THE DESIGN DRAWINGS FOR THIS PROJECT HAVE BEEN PREPARED UTILIZING SPECIFIC MAKES AND MODELS OF EQUIPMENT. IF THE FINAL EQUIPMENT SELECTED FOR CONSTRUCTION DIFFERS FROM THE EQUIPMENT USED FOR THE DESIGN, THE CONTRACTOR IS RESPONSIBLE FOR THE ENGINEERING AND DESIGN OF MODIFICATIONS REQUIRED FOR A COMPLETE AND FUNCTIONAL INSTALLATION AND FOR ENSURING THAT THE PERFORMANCE REQUIREMENTS OF THE PROJECT ARE MET.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
0	DTJ	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR	A	B	C	0	1	2	3
CLIENT				4/28/17			
BID				4/28/17			
CONSTRUCTION				4/28/17			
DATE RELEASED							

BARR
Corporate Headquarters:
Minneapolis, Minnesota
Ph: 1-800-632-2277

Project Office:
BARR ENGINEERING CO.
3128 14TH AVENUE EAST
HIBBING, MN 55746
Ph: 1-800-225-1966
Fax: (218) 262-3460
www.barr.com

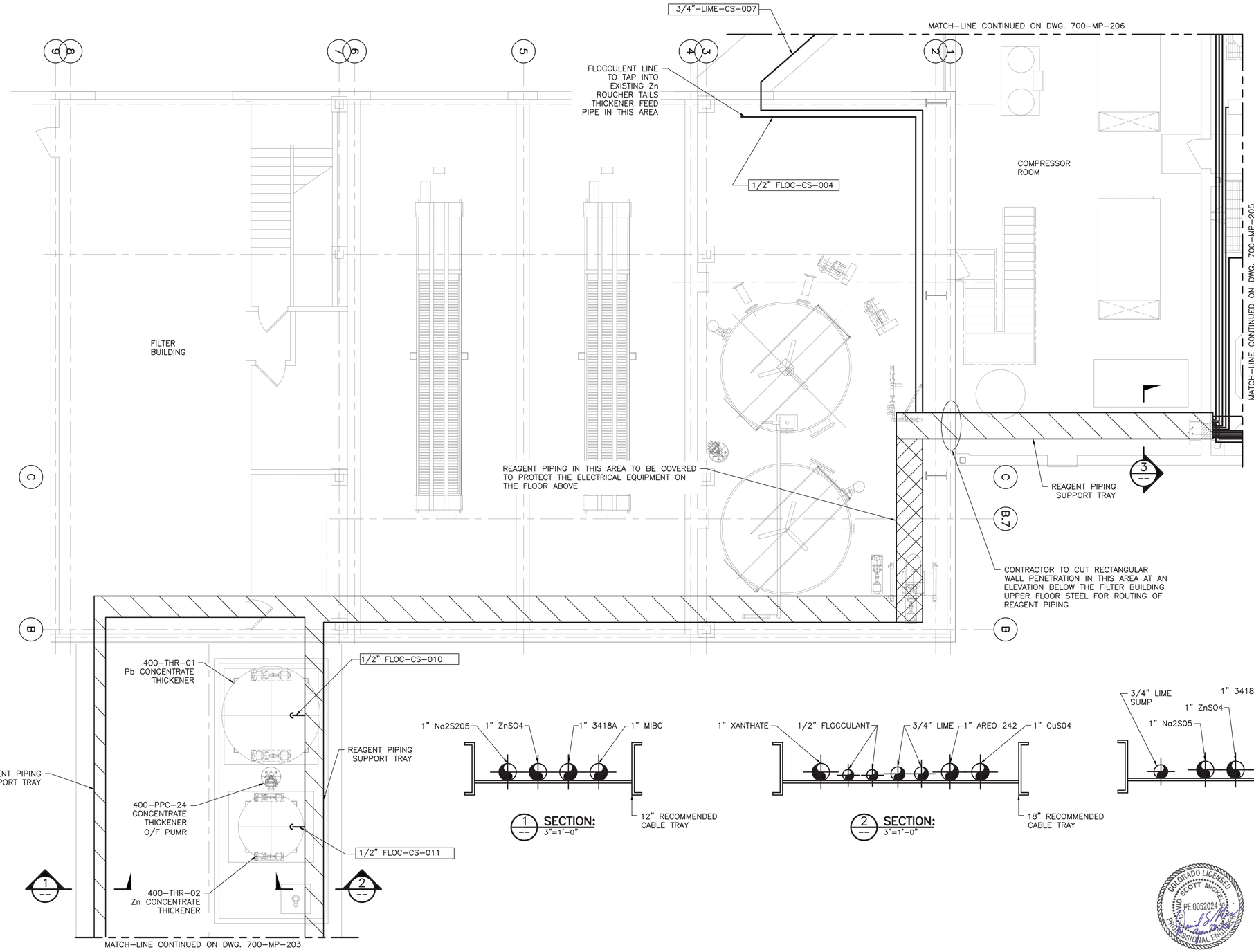
Scale	AS SHOWN
Date	3/30/17
Drawn	DTJ
Checked	PGJ
Designed	SMG
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
PIPING PLAN UPPER LEVEL COLUMN 4 TO B

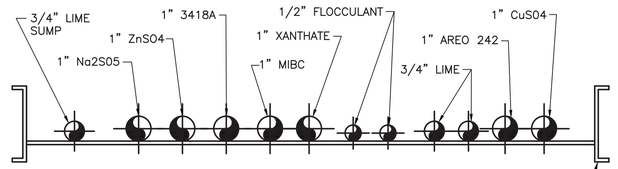
BARR PROJECT No.	
06/46-1001	
CLIENT PROJECT No.	
–	
DWG. No.	REV. No.
700-MP-203	0



4 REAGENT PIPING PLAN: FILTER BUILDING
3/16"=1'-0"

1 SECTION: 3"=1'-0"

2 SECTION: 3"=1'-0"



3 SECTION: 3"=1'-0"

NOTES

1. IT IS RECOMMENDED THAT REAGENT PIPING IS ROUTED AND SUPPORTED IN CABLE TRAY IN AREAS WHERE IT MAKES SENSE TO DO SO. CONTRACTOR IS TO FIELD ROUTE CABLE TRAY.
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COLORADO LICENSED SCOTT MICHAEL PE.0052024 PROFESSIONAL ENGINEER

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Scale	AS SHOWN
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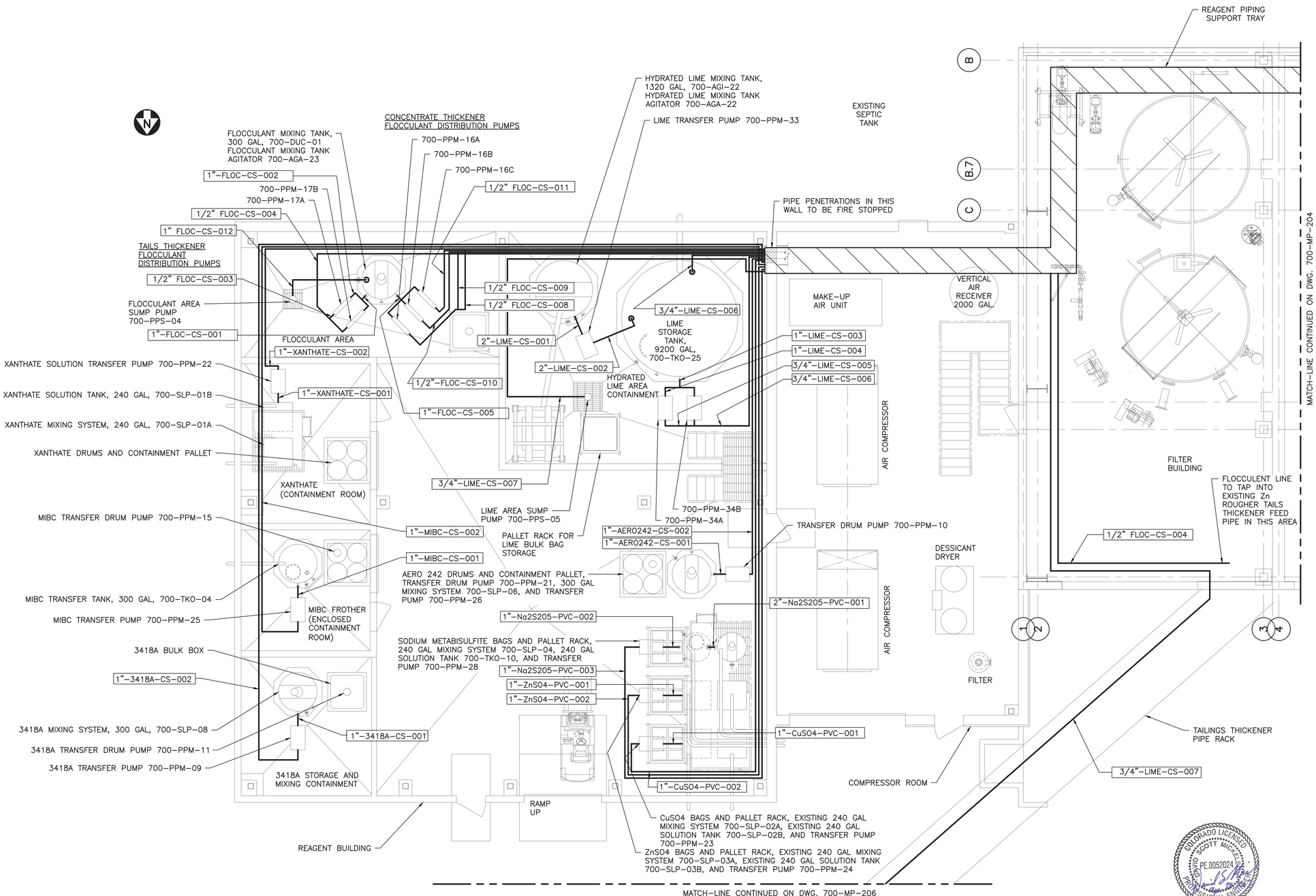
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLOTADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
FILTER BUILDING

BARR PROJECT No.	
06/46-1001	
CLIENT PROJECT No.	
–	
DWG. No.	REV. No.
700-MP-204	0



5 REAGENT PIPING PLAN: AIR COMPRESSOR & REAGENT BUILDING
3/16"=1'-0"

NOTES

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COLORADO LICENSED SCOTT MICHEL PE.0052024 PROFESSIONAL ENGINEER

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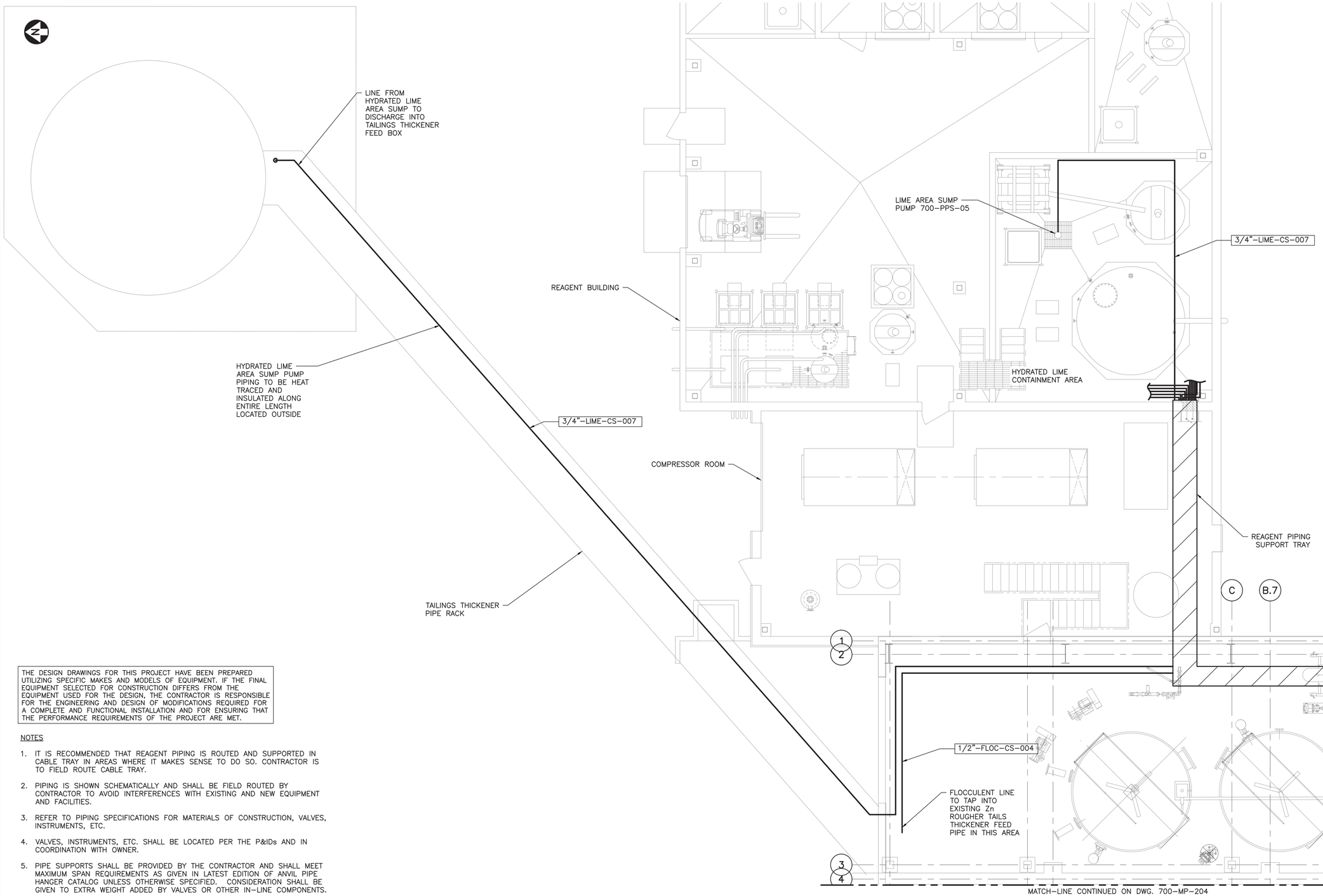
Scale	AS SHOWN
Date	3/30/17
Drawn	DTJ
Checked	SMG
Designed	SMG
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT AIR COMPRESSOR AND REAGENT BUILDING

BARR PROJECT No. 06/46-1001
CLIENT PROJECT No. –
DWG. No. 700-MP-205
REV. No. 0



6 REAGENT PIPING PLAN: TAILINGS THICKENER
3/16"=1'-0"

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COLORADO LICENSED SCOTT MICHEL PE.0052024 PROFESSIONAL ENGINEER

ISSUED FOR CONSTRUCTION

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DATE RELEASED: A B C 0 1 2 3

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Scale	AS SHOWN
Date	3-30-17
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Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT TAILINGS THICKENER

BARR PROJECT No. 06/461001
CLIENT PROJECT No. –
DWG. No. 700-MP-206
REV. No. 0

Pipe Line Number				Associated Equipment		Process Piping Estimated Length and Fitting Table						
Size	Service	Material	Seq. #	Start	End	Length of Pipe (ft)	LR 90 deg Elbows	LR 60 deg Elbows	LR 45 deg Elbows	LR 22.5 deg Elbows	Tees	45 deg laterals
XANTHATE												
1"	XANTHATE	CS	001	700-SLP-01B XANTHATE SOLUTION TANK	700-PPM-22 XANTHATE DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	XANTHATE	CS	002	700-PPM-22 XANTHATE DIAPHRAGM PUMP	700-TKO-01 XANTHATE DAY TANK	535	16	-	-	-	-	-
1/16"ID	XANTHATE	PT	003	700-TKO-01 XANTHATE DAY TANK	300-FCC-06A-B Zn CLEANER FLOTATION CELLS BANK #1	130	-	-	-	-	-	-
1/16"ID	XANTHATE	PT	004	700-TKO-01 XANTHATE DAY TANK	300-TKO-03 Zn CONDITIONING TANK #2	12	-	-	-	-	-	-
CuSO4												
1"	CuSO4	PVC	001	700-SLP-02B CuSO4 SOULUTION TANK	700-PPM-23 CuSO4 DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	CuSO4	PVC	002	700-PPM-23 CuSO4 DIAPHRAGM PUMP	700-TKO-02 CuSO4 DAY TANK	475	16	-	-	-	-	-
1/16"ID	CuSO4	PT	003	700-TKO-02 CuSO4 DAY TANK	300-TKO-03 Zn CONDITIONING TANK #2	12	-	-	-	-	-	-
ZnSO4												
1"	ZnSO4	PVC	001	700-SLP-03B ZnSO4 SOLUTION TANK	700-PPM-24 ZnSO4 DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	ZnSO4	PVC	002	700-PPM-24 ZnSO4 DIAPHRAGM PUMP	700-TKO-03 ZnSO4 DAY TANK	465	16	-	-	-	-	-
1/16"ID	ZnSO4	PT	003	700-TKO-03 ZnSO4 DAY TANK	300-FCC-32A Pb CLEANER FLOTATION TANK CELL #1	125	-	-	-	-	-	-
1/8"ID	ZnSO4	PT	004	700-TKO-03 ZnSO4 DAY TANK	300-ZM-03 BALL MILL FEED SPOUT	12	-	-	-	-	-	-
MIBC												
1"	MIBC	CS	001	700-TKO-04 MIBC TRANSFER TANK	700-PPM-25 MIBC DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	MIBC	CS	002	700-PPM-25 MIBC DIAPHRAGM PUMP	700-TKO-05 MIBC DAY TANK	440	16	-	-	-	-	-
1/16"ID	MIBC	PT	003	700-TKO-05 MIBC DAY TANK	300-FCC-32A Pb CLEANER FLOTATION TANK CELL #1	20	-	-	-	-	-	-
1/16"ID	MIBC	PT	004	700-TKO-05 MIBC DAY TANK	300-FCC-06A-B Zn CLEANER FLOTATION CELLS BANK #1	60	-	-	-	-	-	-
1/8"ID	MIBC	PT	005	700-TKO-05 MIBC DAY TANK	300-TKO-01 Pb CONDITIONING TANK	130	-	-	-	-	-	-
1/8"ID	MIBC	PT	006	700-TKO-05 MIBC DAY TANK	300-TKO-03 Zn CONDITIONING TANK #2	120	-	-	-	-	-	-
AERO 242												
1"	AERO242	CS	001	700-SLP-06 AERO 242 MIXING SYSTEM	700-PPM-26 AERO 242 DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	AERO242	CS	002	700-PPM-26 AERO 242 DIAPHRAGM PUMP	700-TKO-07 AERO 242 DAY TANK	455	16	-	-	-	-	-
1/16"ID	AERO242	PT	003	700-TKO-07 AERO 242 DAY TANK	300-TKO-01 Pb CONDITIONING TANK	10	-	-	-	-	-	-

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COLORADO LICENSED DAVID SCOTT MINCKLER PE.0052024 PROFESSIONAL ENGINEER

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	SMG	PGJ	DSM	5/26/17	UPDATED SEVERAL METERING TUBING SIZES
0	DTJ	PGJ	DSM	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 6/26/17; BID 4/28/17; CONSTRUCTION 4/28/17 6/26/17

DATE RELEASED: A B C 0 1 2 3

BARR
Corporate Headquarters: Minneapolis, Minnesota
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HIBBING, MN 55746
Ph: 1-800-225-1966
Fax: (218) 262-3460
www.barr.com

Scale	AS SHOWN
Date	4/24/17
Drawn	DTJ
Checked	SMG
Designed	JAK3
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
DETAIL – ESTIMATED PIPE LENGTHS AND FITTINGS

BARR PROJECT No. 06/46-1001.00
CLIENT PROJECT No. –
DWG. No. 700-MP-207
REV. No. 1

Pipe Line Number				Associated Equipment		Process Piping Estimated Length and Fitting Table						
Size	Service	Material	Seq. #	Start	End	Length of Pipe (ft)	LR 90 deg Elbows	LR 60 deg Elbows	LR 45 deg Elbows	LR 22.5 deg Elbows	Tees	45 deg laterals
FLOCCULANT												
1"	FLOC	CS	001	700-DUC-01 FLOCCULANT MIXING TANK	700-PPM-17B TAILS THICKENER FLOCCULANT PUMP	4	2	-	-	-	1	-
1"	FLOC	CS	002	700-DUC-01 FLOCCULANT MIXING TANK	700-PPM-17A TAILS THICKENER FLOCCULANT PUMP	2	1	-	-	-	-	-
1/2"	FLOC	CS	003	700-PPM-17A TAILS THICKENER FLOCCULANT PUMP	500-THR-01 TAILINGS THICKENER	2	1	-	-	-	-	-
1/2"	FLOC	CS	004	700-PPM-17B TAILS THICKENER FLOCCULANT PUMP	500-THR-01 TAILINGS THICKENER	150	10	-	-	-	-	-
1"	FLOC	CS	005	700-DUC-01 FLOCCULANT MIXING TANK	700-PPM-16A CONCENTRATE THICKENER FLOCCULANT PUMP	6	2	-	-	-	2	-
1"	FLOC	CS	006	700-DUC-01 FLOCCULANT MIXING TANK	700-PPM-16B CONCENTRATE THICKENER FLOCCULANT PUMP	2	1	-	-	-	-	-
1"	FLOC	CS	007	700-DUC-01 FLOCCULANT MIXING TANK	700-PPM-16C CONCENTRATE THICKENER FLOCCULANT PUMP	2	1	-	-	-	-	-
1/2"	FLOC	CS	008	700-PPM-16A CONCENTRATE THICKENER FLOCCULANT PUMP	400-THR-01 Pb CONCENTRATE THICKENER	8	2	-	-	-	-	-
1/2"	FLOC	CS	009	700-PPM-16A CONCENTRATE THICKENER FLOCCULANT PUMP	400-THR-02 Zn CONCENTRATE THICKENER	8	2	-	-	-	-	-
1/2"	FLOC	CS	010	700-PPM-16B CONCENTRATE THICKENER FLOCCULANT PUMP	400-THR-01 Pb CONCENTRATE THICKENER	200	12	-	-	-	1	-
1/2"	FLOC	CS	011	700-PPM-16C CONCENTRATE THICKENER FLOCCULANT PUMP	400-THR-02 Zn CONCENTRATE THICKENER	210	12	-	-	-	1	-
1"	FLOC	PVC	012	700-PPS-04 FLOCCULANT AREA SUMP PUMP	700-DUC-01 FLOCCULANT MIXING TANK	16	3	-	-	-	-	-

Pipe Line Number				Associated Equipment		Process Piping Estimated Length and Fitting Table						
Size	Service	Material	Seq. #	Start	End	Length of Pipe (ft)	LR 90 deg Elbows	LR 60 deg Elbows	LR 45 deg Elbows	LR 22.5 deg Elbows	Tees	45 deg laterals
HYDRATED LIME												
2"	LIME	CS	001	700-AGI-22 HYDRATED LIME MIXING TANK	700-PPM-33 LIME DIAPHRAGM PUMP	4	2	-	-	-	-	-
2"	LIME	CS	002	700-PPM-33 LIME DIAPHRAGM PUMP	700-TKO-25 LIME STORAGE TANK	10	2	-	-	-	-	-
1"	LIME	CS	003	700-TKO-25 LIME STORAGE TANK	700-PPM-34B LIME RECIRCULATION	4	2	-	-	-	1	-
1"	LIME	CS	004	700-TKO-25 LIME STORAGE TANK	700-PPM-34A LIME RECIRCULATION PUMP	2	1	-	-	-	-	-
3/4"	LIME	CS	005	700-PPM-34A LIME RECIRCULATION PUMP	700-TKO-02 Zn CONDITIONING TANK #1	4	2	-	-	-	-	-
3/4"	LIME	CS	006	700-PPM-34B LIME RECIRCULATION PUMP	700-TKO-02 Zn CONDITIONING TANK #1	1000	32	-	-	-	1	-
3/4"	LIME	CS	007	700-PPS-REAGENT BUILDING SUMP PUMP	500-THR-01 TAILINGS THICKENER	350	14	-	-	-	-	-
1/2"	LIME	CS	008	3/4"-LIME-CS-006 LIME RECIRCULATION HEADER	700-TKO-02 Zn CONDITIONING TANK #1	6	3	-	-	-	-	-
3418A												
1"	3418A	CS	001	700-SLP-08 3418A MIXING SYSTEM	700-PPM-09 3418A DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	3418A	CS	002	700-PPM-09 3418A DIAPHRAGM PUMP	700-TKO-09 3418A DAY TANK	500	16	-	-	-	-	-
1/16"ID	3418A	PT	003	700-TKO-09 3418A DAY TANK	300-TKO-01 Pb CONDITIONING TANK	95	-	-	-	-	-	-
1/16"ID	3418A	PT	004	700-TKO-09 3418A DAY TANK	300-FCC-30 Pb ROUGHER FLOTATION TANK CELL	50	-	-	-	-	-	-
1/16"ID	3418A	PT	005	700-TKO-09 3418A DAY TANK	Pb ROUGHER SCAVENGER FLOTATION CELLS	50	-	-	-	-	-	-
SODIUM METABISULFITE												
2"	Na2S2O5	PVC	001	700-SLP-04 Na2S2O5 MIXING SYSTEM	700-TKO-10 Na2S2O5 SOLUTION TANK	3	1	-	-	-	-	-
1"	Na2S2O5	PVC	002	700-TKO-10 Na2S2O5 SOLUTION TANK	700-PPM-28 Na2S2O5 DIAPHRAGM PUMP	3	1	-	-	-	-	-
1"	Na2S2O5	PVC	003	700-PPM-28 Na2S2O5 DIAPHRAGM PUMP	700-TKO-11 Na2S2O5 DAY TANK	505	16	-	-	-	-	-
1/16"ID	Na2S2O5	PT	004	700-TKO-11 Na2S2O5 DAY TANK	300-FCC-32A Pb CLEANER FLOTATION TANK CELL #1	75	-	-	-	-	-	-
1/8"ID	Na2S2O5	PT	005	700-TKO-11 Na2S2O5 DAY TANK	300-ZM-03 BALL MILL FEED SPOUT	25	-	-	-	-	-	-

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COLORADO LICENSED DAVID SCOTT MICKELSEN PE.0052024 PROFESSIONAL ENGINEER

ISSUED FOR CONSTRUCTION

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DATE RELEASED: A 4/28/17; B 5/26/17; C; 0; 1; 2; 3

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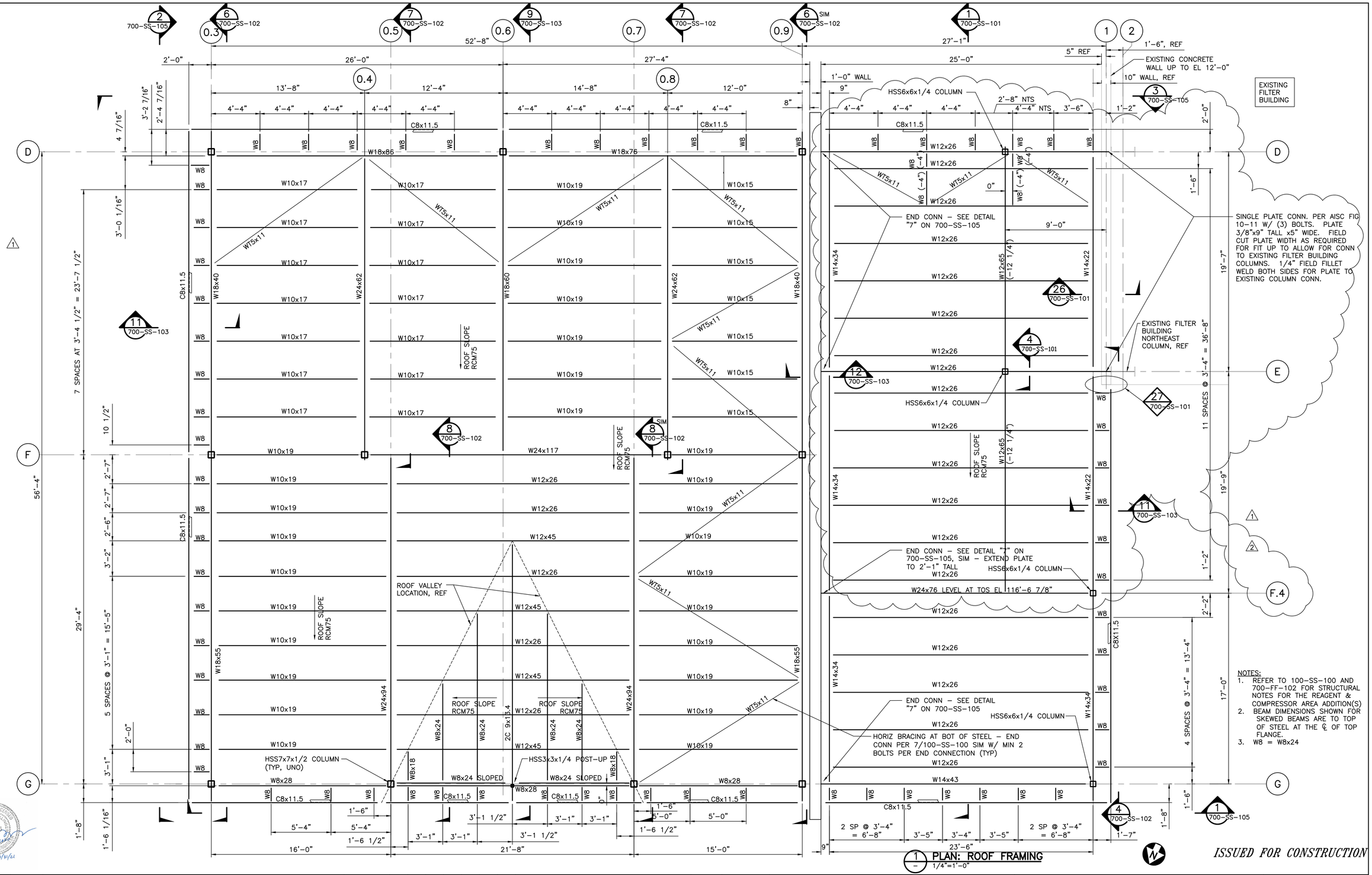
Approved	DSM

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

PIPING – REAGENT
DETAIL – ESTIMATED PIPE LENGTHS AND FITTINGS

BARR PROJECT No. 06/46-1001.00
CLIENT PROJECT No. –
DWG. No. 700-MP-208
REV. No. 1



NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)
2. BEAM DIMENSIONS SHOWN FOR SKEWED BEAMS ARE TO TOP OF STEEL AT THE ℄ OF TOP FLANGE.
3. W8 = W8x24

1 PLAN: ROOF FRAMING
1/4"=1'-0"

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION – MODIFY STRUCTURE TO AVOID DUCT BANK
1	SWO	JGT	JGT	10/13/20	ISSUED FOR CONSTRUCTION – MOVED 15' NORTH & REVISED COMPRESSOR AREA
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/13/20 10/23/20; BID 4/28/17 10/13/20 10/23/20; CONSTRUCTION 4/28/17 10/13/20 10/23/20

DATE RELEASED: A B C 0 1 2 3

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Fax: (952) 832-2601
www.barr.com

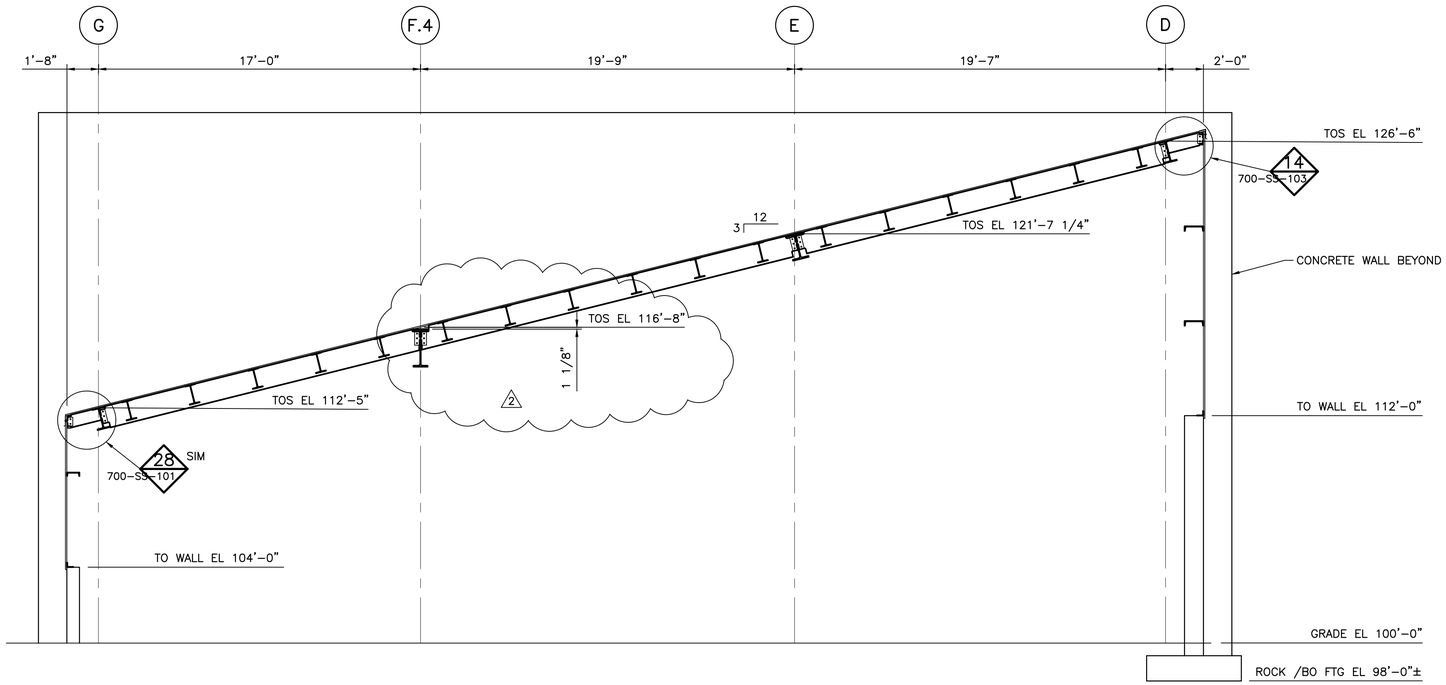
Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

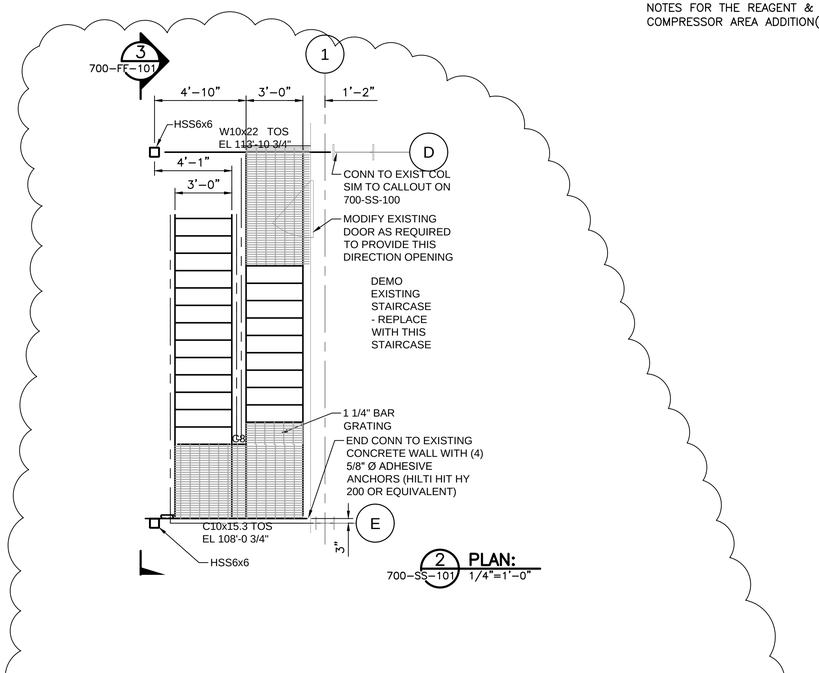
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

STRUCTURAL STEEL
REAGENT BUILDING ROOF PLAN

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-SS-100
REV. No. 2

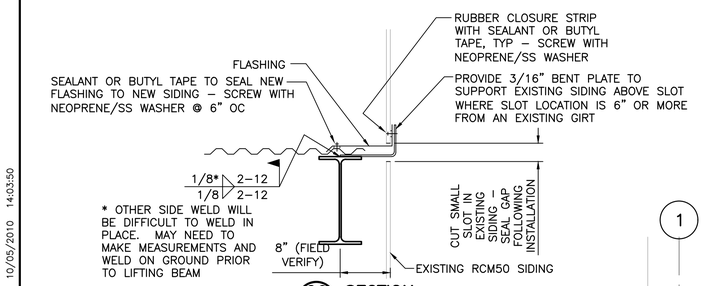


1 SECTION:
700–SS–100 1/4"=1'–0"

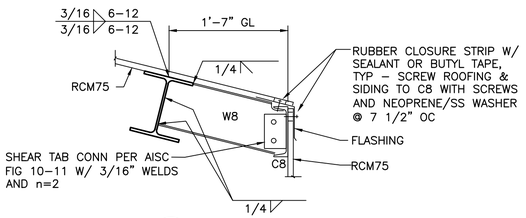


2 PLAN:
700–SS–101 1/4"=1'–0"

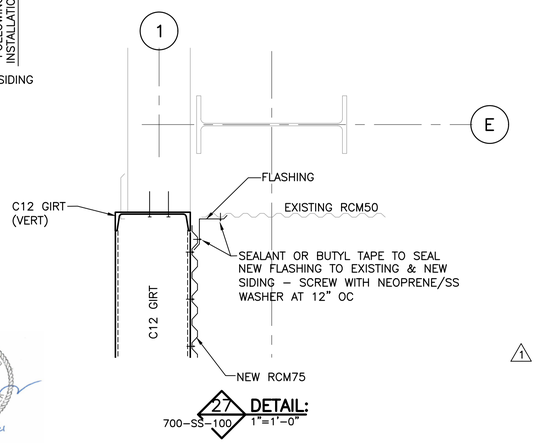
NOTES:
1. REFER TO 100–SS–100 AND 700–FF–102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)



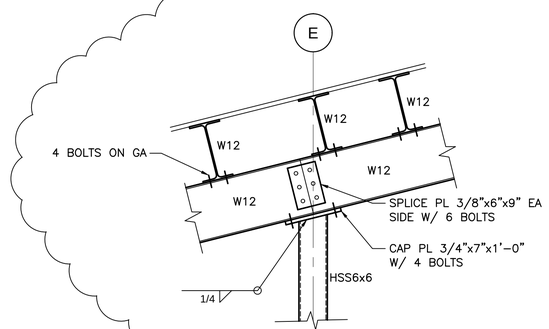
26 SECTION:
700–SS–100 1"=1'–0"



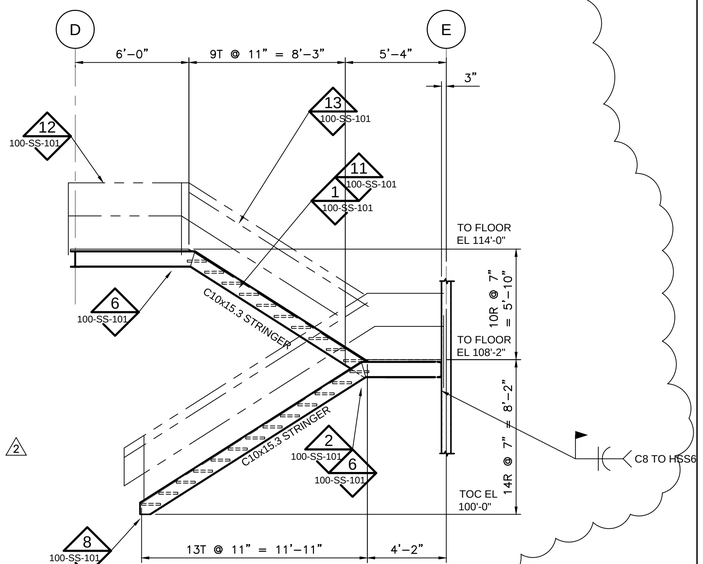
28 SECTION:
700–SS–100 1"=1'–0"



27 DETAIL:
700–SS–100 1"=1'–0"



4 SECTION:
700–SS–101 3/4"=1'–0"



3 SECTION:
-- 1/4"=1'–0"

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION	RELEASED TO/FOR	A	B	C	0	1	2	3
						CLIENT				4/28/17	10/13/20	10/23/20	
						BID				4/28/17	10/13/20	10/23/20	
						CONSTRUCTION				4/28/17	10/13/20	10/23/20	
2	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION – MODIFY STAIR & SECT 1, ADD SECT 4	DATE RELEASED							
1	SWO	JGT	JGT	10/13/20	ISSUED FOR CONSTRUCTION – MOVED 15' NORTH & REVISED COMPRESSOR AREA								
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION								

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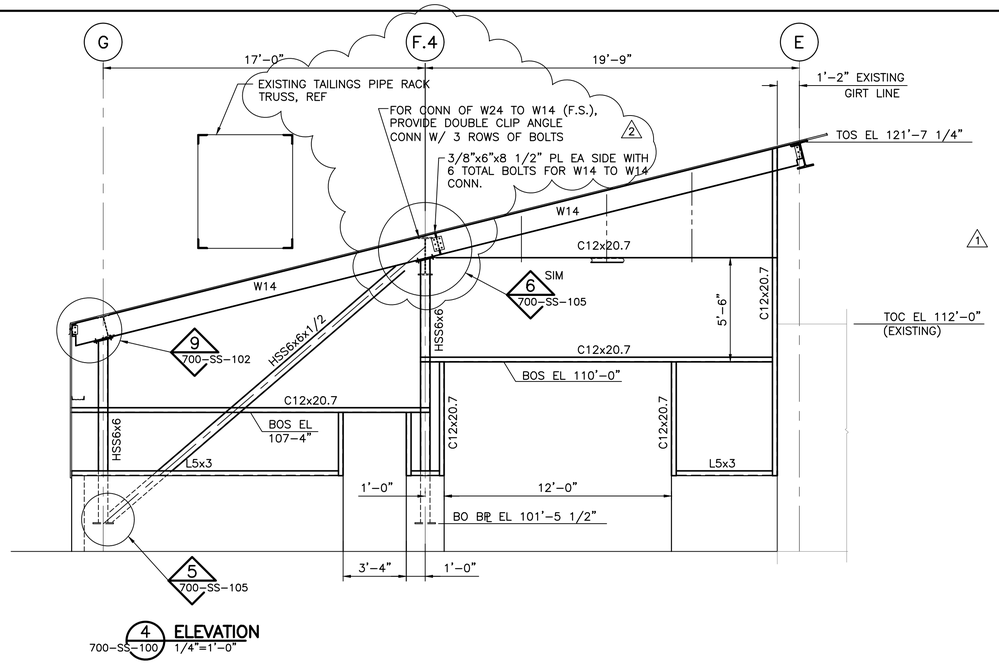
Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

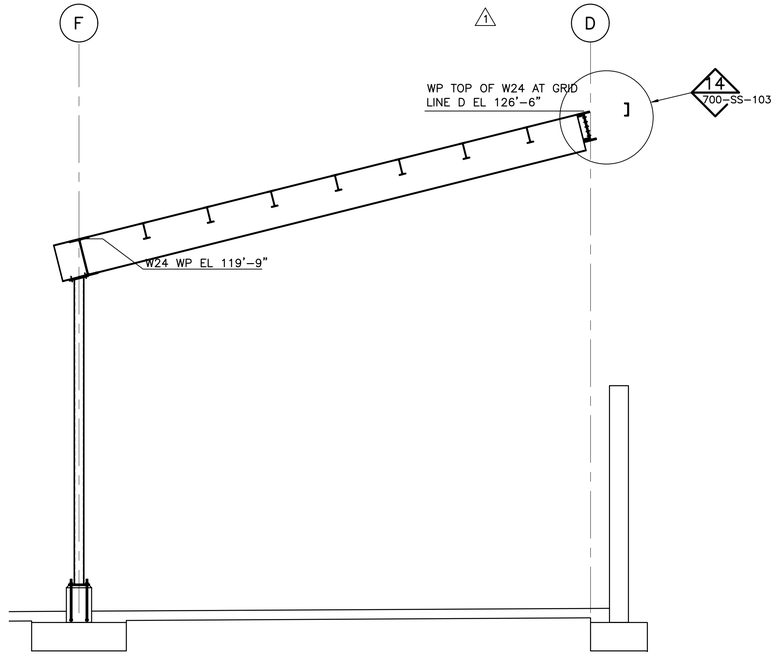
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

STRUCTURAL STEEL
REAGENT BUILDING ROOF PLAN

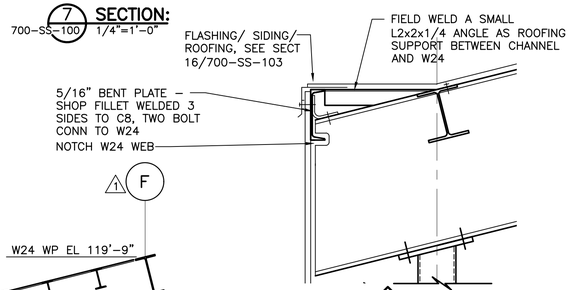
BARR PROJECT No. 06/46–1001.04
CLIENT PROJECT No.
DWG. No. 700–SS–101
REV. No. 2



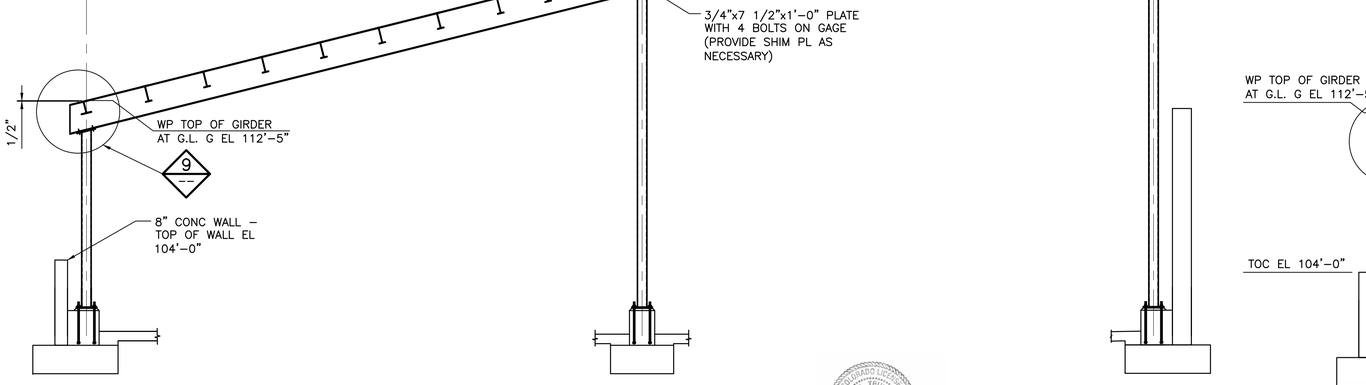
4 700-SS-100 **ELEVATION** 1/4"=1'-0"



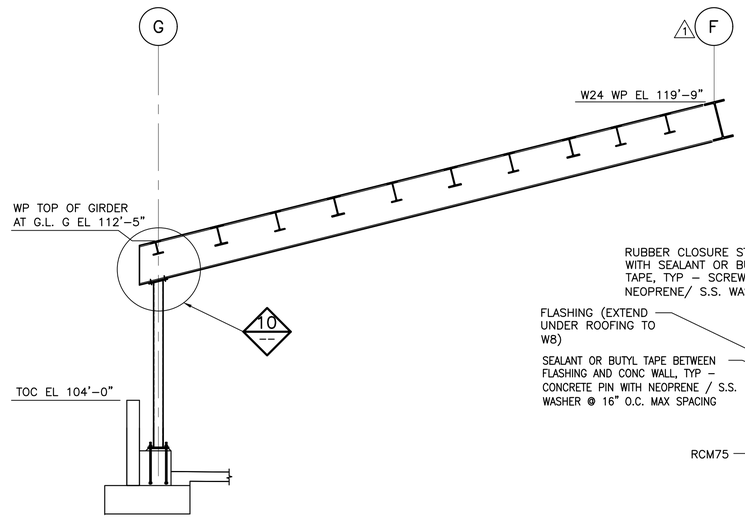
7 700-SS-100 **SECTION:** 1/4"=1'-0"



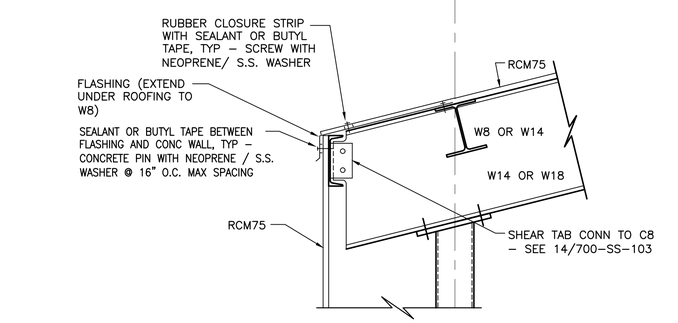
10 - **DETAIL:** 1"=1'-0"



6 700-SS-100 **SECTION:** 1/4"=1'-0"



8 700-SS-100 **SECTION:** 1/4"=1'-0"



9 - **DETAIL:** 1"=1'-0"

NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION - MODIFY ELEVATION 4
1	SWO	JGT	JGT	10/13/20	ISSUED FOR CONSTRUCTION - MOVED 15' NORTH & REVISED COMPRESSOR AREA
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/13/20 10/23/20; BID 4/28/17 10/13/20 10/23/20; CONSTRUCTION 4/28/17 10/13/20 10/23/20

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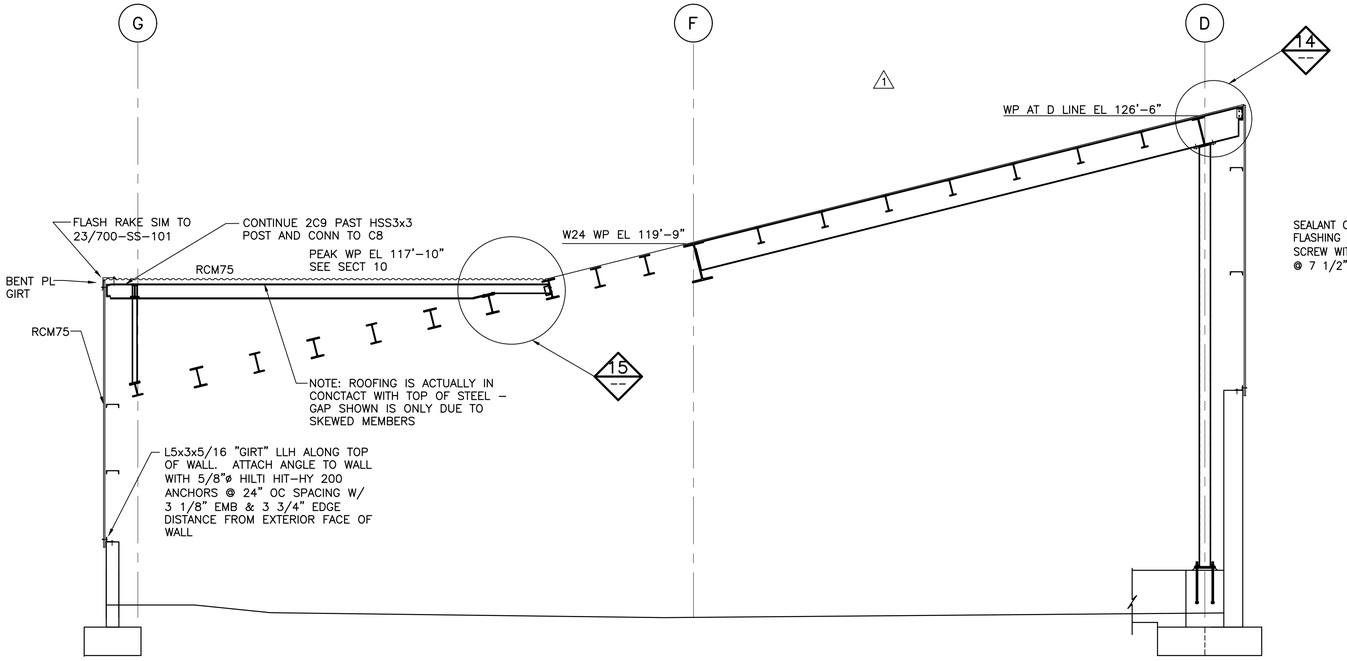
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

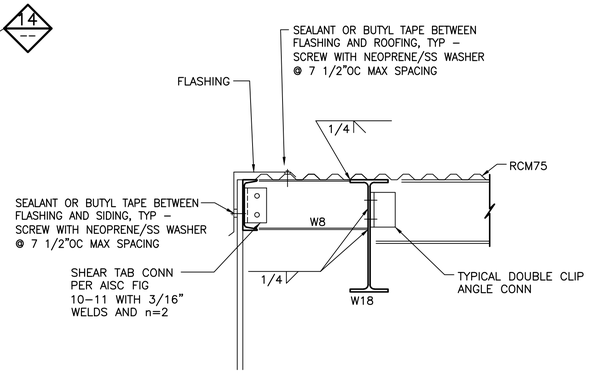
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

STRUCTURAL STEEL
REAGENT BUILDING ROOF PLAN

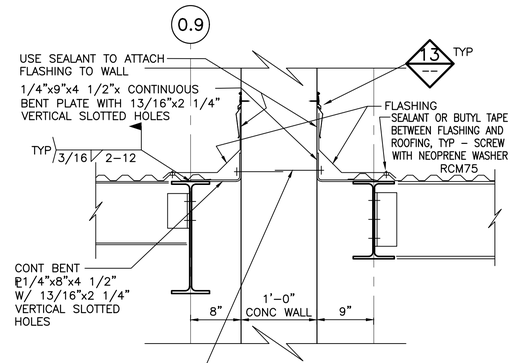
BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-SS-102
REV. No. 2



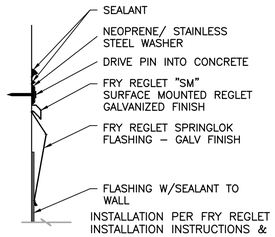
9 SECTION:
700-SS-100 1/4"=1'-0"



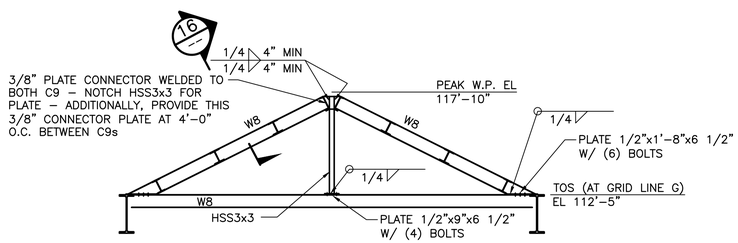
11 SECTION:
700-SS-100 1"=1'-0"



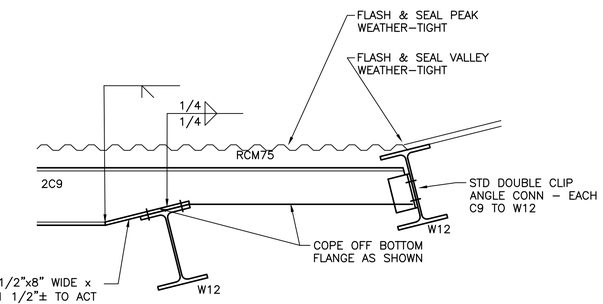
12 SECTION:
700-SS-100 1"=1'-0"



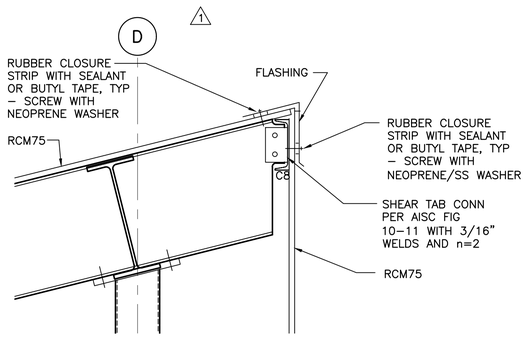
NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)



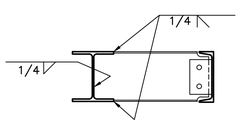
10 SECTION:
700-SS-105 1/4"=1'-0"



15 DETAIL:
3"=1'-0"



14 DETAIL:
700-SS-102 1"=1'-0"



SIDING/ ROOFING/ FLASHING SIMILAR TO SECTION 11

16 SECTION:
- 1"=1'-0"

13 DETAIL:
3"=1'-0"

COLUMN SCHEDULE	SIZE	BASE PLATE	BOT OF BP EL	NOTES:
REAGENT ADDITION				
0.3/D	HSS7x7x1/2	1"x1'-1"x1'-3"	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.3/F	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.3/G	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.4/F	HSS7x7x1/2	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.5/G	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.6/D	HSS7x7x1/2	1"x1'-1" SQ	102'-7 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.7/G	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.8/F	HSS7x7x1/2	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.9/D	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.9/F	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
0.9/G	HSS7x7x1/2	3/4"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
2 COMPRESSOR ADDITION				
BETWEEN 0.9&1/D 1	HSS6x6x1/4	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
BETWEEN 0.9&1/E	HSS6x6x1/4	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
BETWEEN 0.9&1/F.4	HSS6x6x1/4	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA
BETWEEN 0.9&1/G	HSS6x6x1/4	1"x1'-1" SQ	101'-5 1/2"	4 HOLES - 1 5/16" MAX HOLE DIA - 10" SQ GA

1. COLUMNS TO BE WELDED TO BASE PLATE WITH 1/4" FILLET WELD ALL AROUND, MINIMUM. HSS7x7 SHALL HAVE A 5/16" FILLET WELD.
2. UNLESS NOTED OTHERWISE, COLUMN SHALL HAVE CAP PLATE WITH SAME THICKNESS AS BASE PLATE, SAME WELD AS COLUMN TO BASE PLATE. CAP PLATE WIDTH TO BE THE MINIMUM OF: COLUMN WIDTH PLUS ONE INCH, OR BEAM WIDTH. CAP PLATE TO BEAM CONNECTION SHALL BE FOUR BOLTS AT BEAM STANDARD GAGE WITH BOLT SPACING AT THE SUM OF COLUMN SIZE PLUS THREE INCHES.

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
2	JGT	JGT	JGT	10/23/20	ISSUED FOR CONSTRUCTION - MODIFY COLUMN SCHEDULE
1	SWO	JGT	JGT	10/13/20	ISSUED FOR CONSTRUCTION - MOVED 15' NORTH & REVISED COPRESSOR AREA
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/13/20 10/23/20; BID 4/28/17 10/13/20 10/23/20; CONSTRUCTION 4/28/17 10/13/20 10/23/20

DATE RELEASED: A B C 0 1 2 3

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Scale	AS SHOWN
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Approved	JGT

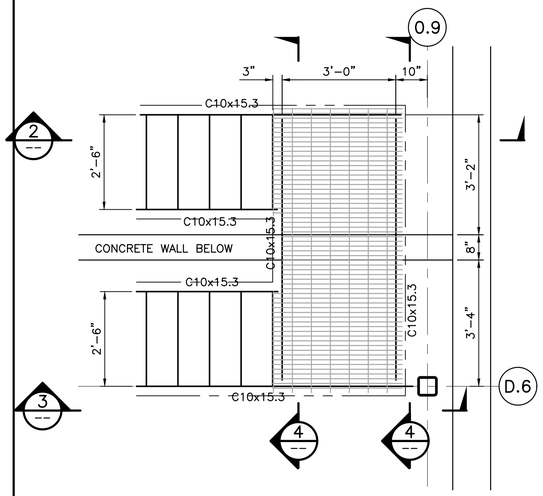
OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

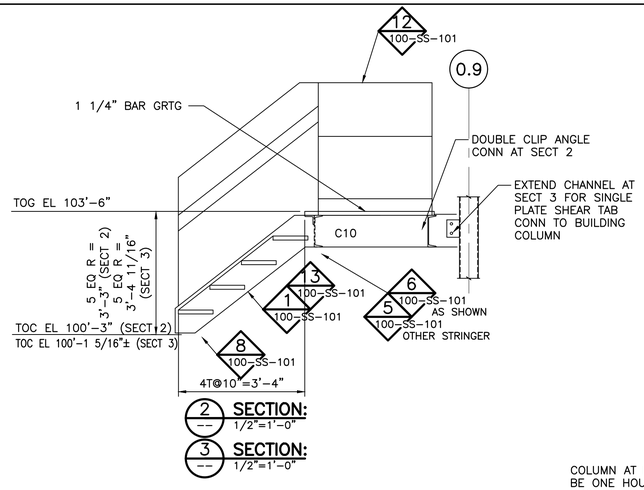
STRUCTURAL STEEL
REAGENT BUILDING ROOF PLAN

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-SS-103
REV. No. 2

CADD USER: John Trullinger FILE: M:\ADEPTWORK\JGT\06461001\04_700-SS-103.DWG PLOT SCALE: 1:1 PLOT DATE: 10/23/2020 2:34 PM
BAR M:\AutoCAD 2011\AutoCAD 2011 Support\enu\Template\Barr_2011_Template.dwt Plot at 1 10/05/2010 14:03:50

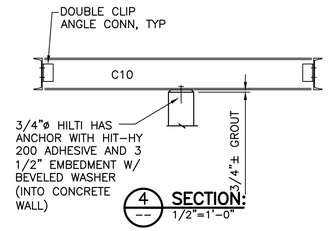


1 CROSSOVER STAIR PLAN:
1/2"=1'-0"



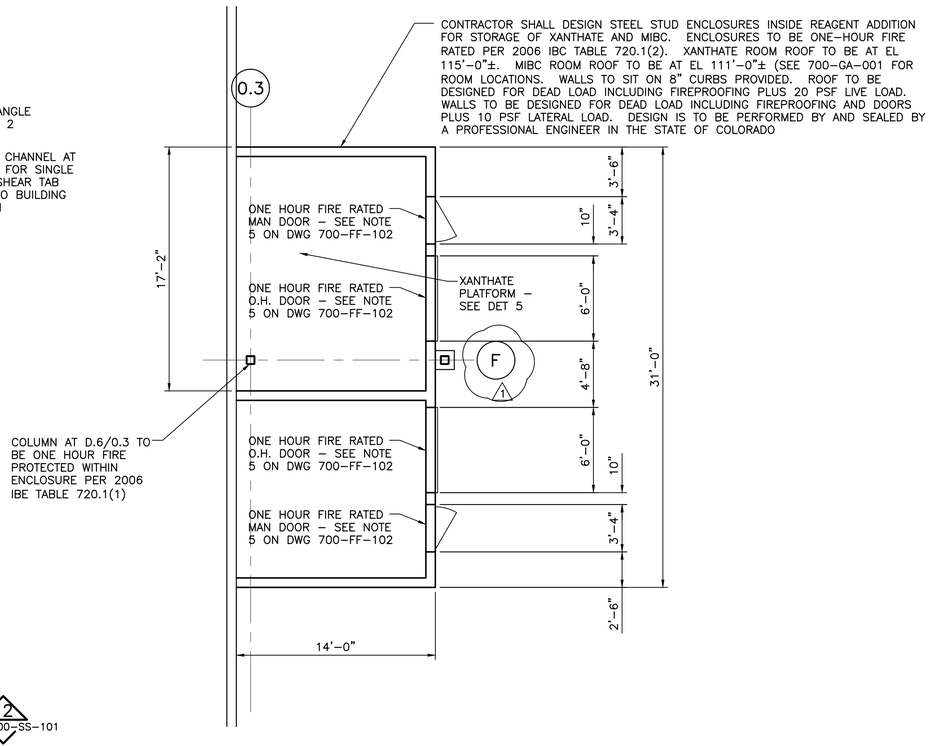
2 SECTION:
1/2"=1'-0"

3 SECTION:
1/2"=1'-0"

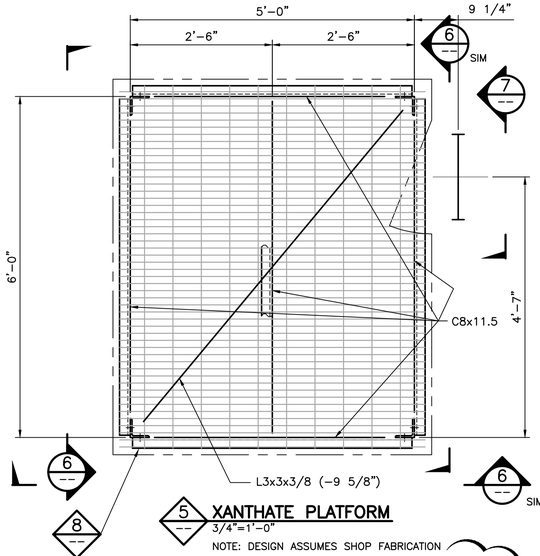


4 SECTION:
1/2"=1'-0"

NOTES:
1. REFER TO 100-SS-100 AND 700-FF-102 FOR STRUCTURAL NOTES FOR THE REAGENT & COMPRESSOR AREA ADDITION(S)

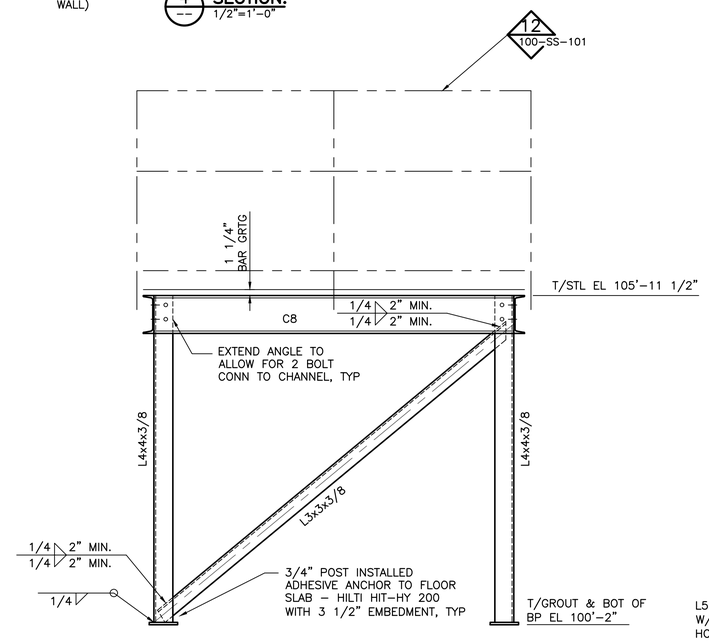


9 PLAN - XANTHATE & MIBC ROOMS:
700-FF-100 3/16"=1'-0"

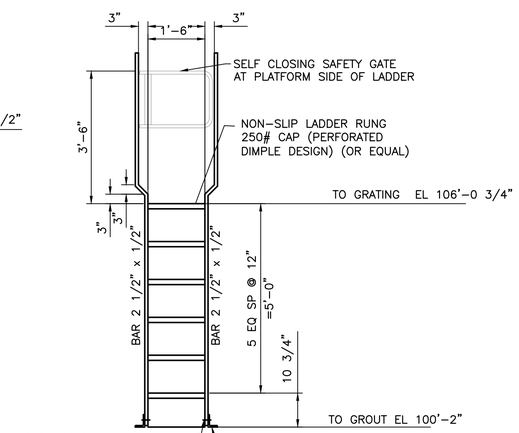


5 XANTHATE PLATFORM
3/4"=1'-0"

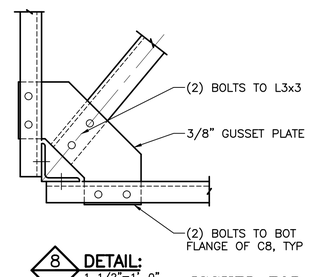
NOTE: DESIGN ASSUMES SHOP FABRICATION
NOTE: GEOMETRY OF XANTHATE TANK ON PLATFORM UNKNOWN. ADDITIONAL STEEL MEMBERS MAY BE REQUIRED.
PROVIDE BID BASED ON THIS GEOMETRY - CONFIRM WITH ENGINEER PRIOR TO CONSTRUCTION (HOLD)



6 ELEVATION
3/4"=1'-0"



7 ELEVATION: LADDER
1/2"=1'-0" 3 PLACES



8 DETAIL:
1 1/2"=1'-0"

ISSUED FOR CONSTRUCTION

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION	RELEASED TO/FOR
						CLIENT
						BID
						CONSTRUCTION
1	JGT	TOP	JGT	10/13/20	ISSUED FOR CONSTRUCTION - MOVED 15' NORTH & REVISED COMPRESSOR AREA	
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION	

DATE RELEASED	A	B	C	0	1	2	3
				4/28/17	10/13/20		
				4/28/17	10/13/20		
				4/28/17	10/13/20		

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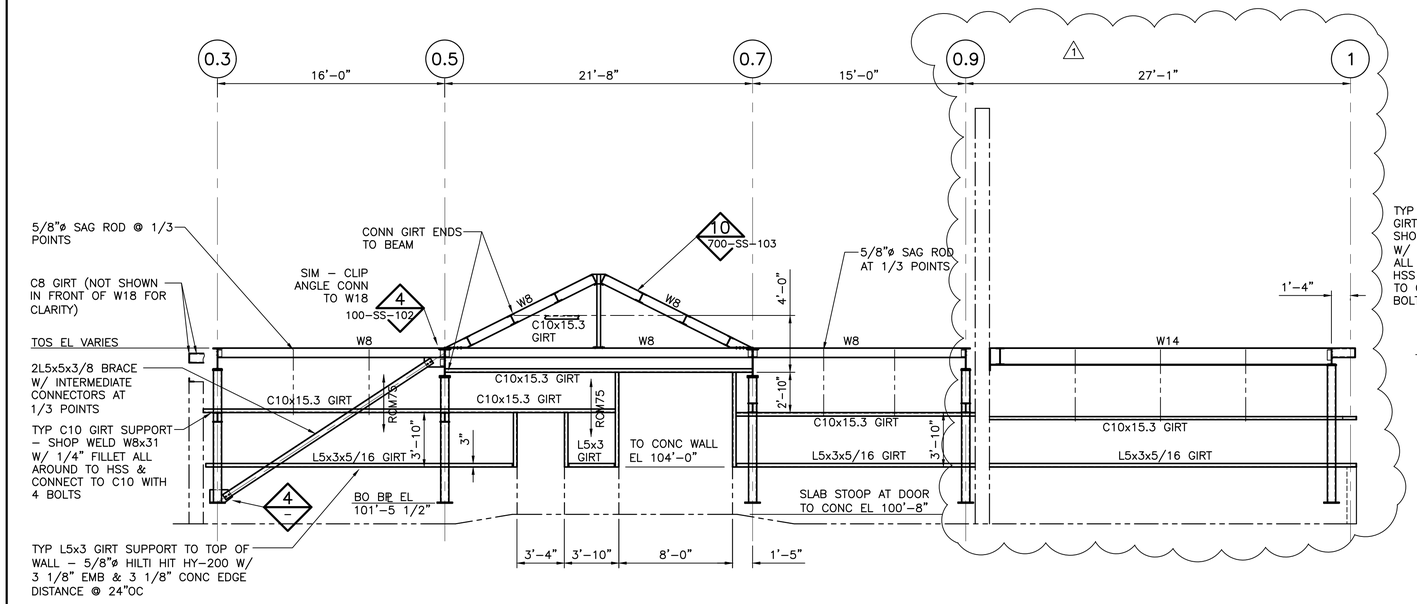
Scale	AS SHOWN
Date	3/16/17
Drawn	JGT
Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

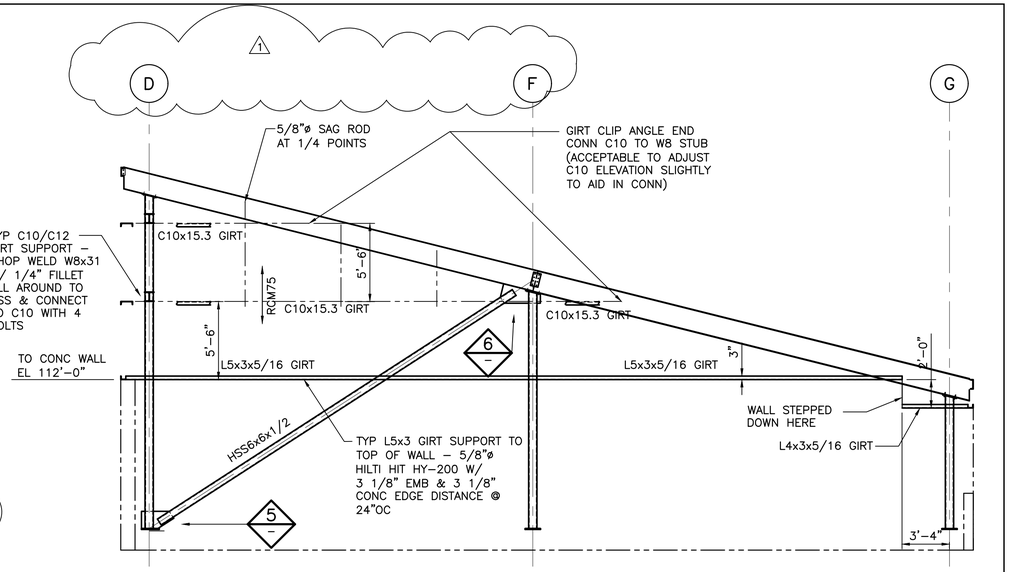
PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

STRUCTURAL STEEL
REAGENT MISC STRUCTURES

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-SS-104
REV. No. 1



1 ELEVATION: 700-SS-100 3/16"=1'-0"



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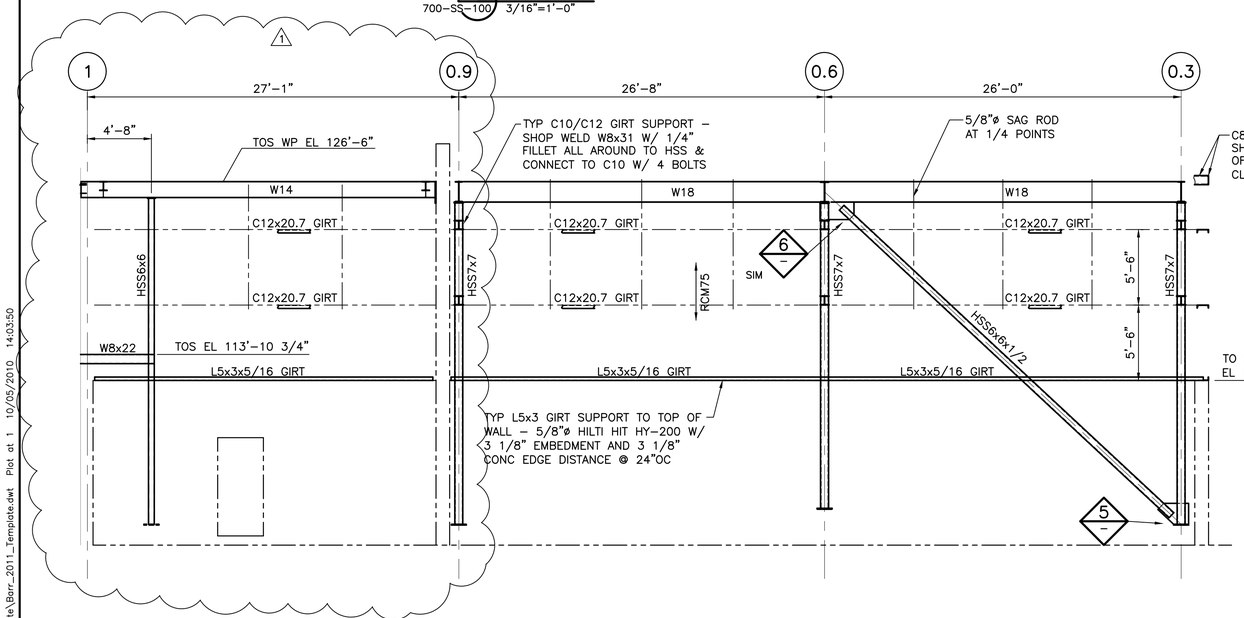
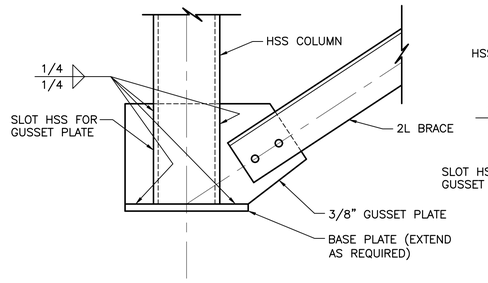
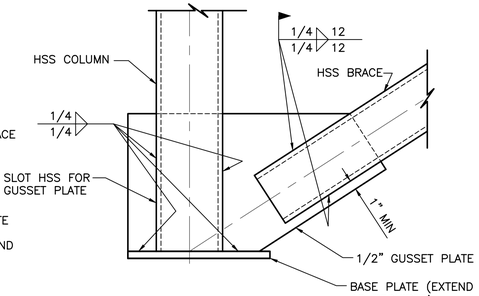


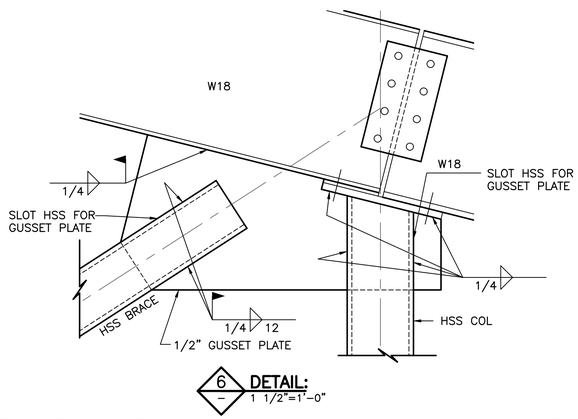
3 ELEVATION: 700-SS-100 3/16"=1'-0"



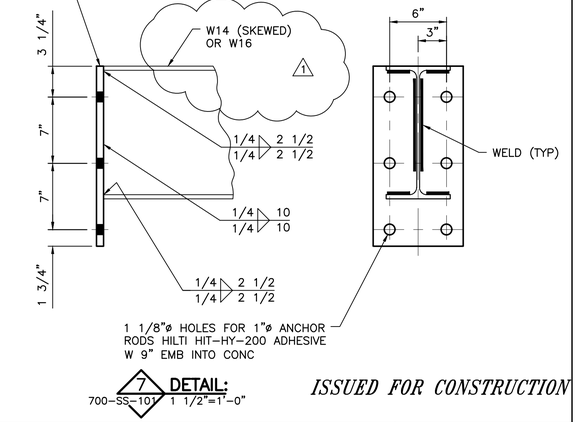
4 DETAIL: 1 1/2"=1'-0"



5 DETAIL: 1 1/2"=1'-0"



6 DETAIL: 1 1/2"=1'-0"



7 DETAIL: 700-SS-101 1 1/2"=1'-0"

ISSUED FOR CONSTRUCTION

COLORADO LICENSED JOHN G. TRULLINGER 51916 PROFESSIONAL ENGINEER
Oct 14 2020
Exp Date Oct 31, 2021

NO.	BY	CHK.	APP.	DATE	REVISION DESCRIPTION
1	JGT	TOP	JGT	10/13/20	ISSUED FOR CONSTRUCTION - MOVED 15' NORTH & REVISED COMPRESSOR AREA
0	JGT	TOP	JGT	4/28/17	ISSUED FOR CONSTRUCTION

RELEASED TO/FOR: CLIENT 4/28/17 10/13/20; BID 4/28/17 10/13/20; CONSTRUCTION 4/28/17 10/13/20

DATE RELEASED: A B C 0 1 2 3

BARR
Corporate Headquarters: Minneapolis, Minnesota
Ph: 1-800-632-2277
Project Office: BARR ENGINEERING CO. 170 SOUTH MAIN STREET SUITE 500 SALT LAKE CITY, UT 84101
Ph: 1-800-632-2277
Fax: (952) 832-2601
www.barr.com

Scale	AS SHOWN
Date	3/16/17
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Checked	TOP
Designed	JGT
Approved	JGT

OURAY SILVER MINES, INC.
OURAY, COLORADO

PROCESS PLANT UPGRADES
REVENUE VIRGINIUS MINE

STRUCTURAL STEEL
REAGENT BUILDING ELEVATIONS

BARR PROJECT No. 06/46-1001.04
CLIENT PROJECT No.
DWG. No. 700-SS-105
REV. No. 1

Appendix 2

Reagent Safety Data Sheets

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

- Trade name AEROFLOAT® 242 PROMOTER

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the Substance / Mixture

- Mining chemicals

1.3 Details of the supplier of the safety data sheet

Company

CYTEC INDUSTRIES INC.
504 CARNEGIE CENTER
PRINCETON, NJ 08540 USA

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT CHEMTREC (24-Hour Number): 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

Acute toxicity, Category 4	H302: Harmful if swallowed.
Acute toxicity, Category 3	H311: Toxic in contact with skin.
Skin corrosion, Category 1B	H314: Causes severe skin burns and eye damage.
Serious eye damage, Category 1	H318: Causes serious eye damage.
Skin sensitization, Category 1	H317: May cause an allergic skin reaction.
Reproductive toxicity, Category 2	H361: Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - repeated exposure, Category 2	H373: May cause damage to organs through prolonged or repeated exposure. (Thyroid)

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

Pictogram

Signal Word

- Danger

Hazard Statements

- H302	Harmful if swallowed.
- H311	Toxic in contact with skin.
- H314	Causes severe skin burns and eye damage.
- H317	May cause an allergic skin reaction.
- H361	Suspected of damaging fertility or the unborn child.
- H373	May cause damage to organs (Thyroid) through prolonged or repeated exposure.

Precautionary Statements

Prevention

- P201	Obtain special instructions before use.
- P202	Do not handle until all safety precautions have been read and understood.
- P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
- P264	Wash skin thoroughly after handling.
- P270	Do not eat, drink or smoke when using this product.
- P272	Contaminated work clothing must not be allowed out of the workplace.
- P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

- P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
- P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
- P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
- P308 + P313	IF exposed or concerned: Get medical advice/ attention.
- P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
- P362	Take off contaminated clothing and wash before reuse.

Storage

- P405	Store locked up.

Disposal

- P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards which do not result in classification

- H402: Harmful to aquatic life.
- H412: Harmful to aquatic life with long lasting effects.

SECTION 3: Composition/information on ingredients

3.1 Substance

- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Mixture of cresol and ammonium salt of aryldithiophosphoric acid in water

Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [%]
Dithiophosphate salt	*****	60 - 80
Phenol, methyl-	1319-77-3	<= 10
Thiourea, N,N'-diphenyl-	102-08-9	<= 10
Ammonium hydroxide ((NH4)(OH))	1336-21-6	<= 1

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.
- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms

- Symptoms will depend on the target organs.
- Inhalation may provoke the following symptoms:
- Cough
- Breathing difficulties
- Irritation
- Redness

- Swelling of tissue
- Ingestion may provoke the following symptoms:
- Nausea
- Diarrhea
- Abdominal pain
- May cause respiratory tract irritation.
- allergic rhinitis
- Severe allergic skin reactions, bronchiospasm and anaphylactic shock
- Itching
- Dermatitis
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.
- The gas deadens the sense of smell. Do not depend on odor to detect presence of gas.

Effects

- Serious effects on health can appear after exposure.
- Effects on health may appear after prolonged or repeated exposure.
- The effects will depend on target organs.
- Chronic exposure is suspected of causing effects on fertility or on the unborn child on basis of animal data. Effects on human have not been proven.
- Chronic exposure may cause allergic dermatitis.
- Exposure may cause allergic rhinitis, conjunctivitis, asthma or shock.
- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
- In case of inhalation, irritation/corrosion of the respiratory tract.
- Risk of respiratory disorder
- May cause irreversible skin damage.
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Be aware to maintain life support if necessary.
- Take victim immediately to hospital.
- Immediate medical attention is required.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Treat symptomatically.
- Contact a poison control center.
- Keep under medical supervision for at least 48 hours.
- Contact the occupational physician in case of exposure.

SECTION 5: Firefighting measures

Flash point	closed cup No flash up to boiling point
Autoignition temperature	No data available
Flammability / Explosive limit	No data available

5.1 Extinguishing media

Suitable extinguishing media

- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- Under fire conditions:
- Will burn
- On combustion, toxic gases are released.

Hazardous combustion products:

- Sulfur dioxide or hydrogen sulfide may be formed under fire conditions.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Wear a positive-pressure supplied-air respirator with full facepiece.
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Do not flush to sewer which may contain acid.
- This could result in generation of toxic and flammable hydrogen sulfide.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Where exposure level is not known, wear approved, positive pressure, self-contained respirator.
- Where exposure level is known, wear approved respirator suitable for level of exposure.
- Avoid contact with the skin and the eyes.
- In addition to the protective clothing/equipment in Section 8, wear a two piece PVC suit with hood or PVC overalls with hood.

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.

- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Large quantities of undiluted product should not be mixed with acids, since evolution of toxic and flammable hydrogen sulfide could result. In particular, precautions must be taken to avoid the accidental discharge of large volumes of the product in acid storage tanks or any tank or containment containing acidic materials. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation, where the reagent amounts are small and instantly diluted to concentrations well below the solubility limits.

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Recommended storage temperature: 32 - 95 °F (0 - 35 °C)

- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

Components with workplace occupational exposure limits

Components	Value type	Value	Basis
Phenol, methyl-	TWA	20 mg/m3	American Conference of Governmental Industrial Hygienists
	Form of exposure : Inhalable fraction and vapor Danger of cutaneous absorption		

Phenol, methyl-	TWA	5 ppm 22 mg/m3	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
	Skin designation, The value in mg/m3 is approximate.		
Phenol, methyl-	PEL	5 ppm 22 mg/m3	
	Skin		
Ammonium hydroxide ((NH4)(OH))	TWA	50 ppm 35 mg/m3	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.		
Ammonium hydroxide ((NH4)(OH))	TWA	25 ppm	American Conference of Governmental Industrial Hygienists
	Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	STEL	35 ppm	American Conference of Governmental Industrial Hygienists
	Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	TWA	25 ppm 18 mg/m3	National Institute for Occupational Safety and Health
	Often used in an aqueous solution.Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	ST	35 ppm 27 mg/m3	National Institute for Occupational Safety and Health
	Often used in an aqueous solution.Expressed as :Ammonia		

NIOSH IDLH (Immediately Dangerous to Life or Health Concentrations)

Components	CAS-No.	Concentration
Phenol, methyl-	1319-77-3	250 parts per million

8.2 Exposure controls

Control measures

Engineering measures
- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection
- Keep in a well-ventilated place.

Hand protection
- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Suitable material
- Nitrile or fluorinated rubber gloves.

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Full protective suit
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Appearance	Physical state: liquid Color: Yellow-brown
Odor	Ammonia sulfur
Odor Threshold	No data available
Molecular weight	Mixture
pH	> 10.0 (77 °F (25 °C))
Melting point/freezing point	Freezing point: -4.5 °F (-20.3 °C)
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	closed cup No flash up to boiling point
Evaporation rate (Butylacetate = 1)	No data available
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available
Flammability / Explosive limit	No data available
Autoignition temperature	No data available
Vapor pressure	No data available

Vapor density	No data available
Density	1.159 g/cm3 (77 °F (25 °C))
Relative density	No data available
Solubility	Water solubility: completely soluble
Partition coefficient: n-octanol/water	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidizing properties	No data available

9.2 Other information

Corrosion of Metals	Not classified due to data which are conclusive although insufficient for classification.
Reactions with water / air	Contact with acids liberates toxic gas.

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- Keep away from oxidizing agents, strongly acid or alkaline materials and amines.
- Free radical initiators

10.5 Incompatible materials

- Strong acids and oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products

- Ammonia
- Carbon dioxide (CO2)

Thermal decomposition

- Carbon monoxide
- Sulfur oxides
- Phenol
- toluene
- Benzene
- Methane

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	This product is classified as acute toxicity category 4 According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Acute inhalation toxicity	Not classified as hazardous for acute inhalation toxicity according to GHS. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Acute dermal toxicity	
Dithiophosphate salt	Rabbit This product is classified as acute toxicity category 3
Phenol, methyl-	LD50 : 301 mg/kg - Rabbit This product is classified as acute toxicity category 3 Unpublished reports According to the available data on the constituents
Thiourea, N,N'-diphenyl-	LD50 : > 2,000 mg/kg - Rat , male and female Method: OECD Test Guideline 402 Not classified as hazardous for acute dermal toxicity according to GHS.
Acute toxicity (other routes of administration)	Not applicable
Skin corrosion/irritation	Corrosive to skin According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Serious eye damage/eye irritation	Risk of serious damage to eyes. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

Respiratory or skin sensitization

Thiourea, N,N'-diphenyl-	Maximization Test - Guinea pig ≥ 30 % responding at ≤ 0,1 % intradermal induction dose Method: OECD Test Guideline 406 Unpublished reports

Mutagenicity

Genotoxicity in vitro	Product is not considered to be genotoxic According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Genotoxicity in vivo	Product is not considered to be genotoxic According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Carcinogenicity	The product is not considered to be carcinogenic. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

This product does not contain any ingredient designated as probable or suspected human carcinogens by:
NTP
IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility

Ammonium hydroxide ((NH4)(OH))	By analogy Reproduction / developmental toxicity screening test - Rat, male and female, Oral General Toxicity Parent NOAEL: 1,500 mg/kg bw/day OECD Test Guideline 422 Gavage, No toxicity to reproduction, Published data

Developmental Toxicity/Teratogenicity

Thiourea, N,N'-diphenyl-	Developmental Toxicity - Rat, male and female, Oral General Toxicity Maternal NOAEL: > 200 mg/kg bw/day Teratogenicity NOAEL F1:> 200mg/kg bw/day Developmental Toxicity NOAEL F1: 100 mg/kg bw/day Embryo-fetal toxicity. NOAEL F1: 50 mg/kg bw/day Method: OECD Test Guideline 414 Published data
Ammonium hydroxide ((NH4)(OH))	By analogy Reproduction / developmental toxicity screening test - Rat, male and female, Oral General Toxicity Maternal NOAEL: 1,500 mg/kg bw/day Method: OECD Test Guideline 422 Gavage, The product is not considered to be toxic for development., Unpublished reports By analogy

reproductive and developmental toxicity study - Rabbit, female, Oral Gavage, The product is not considered to be embryotoxic / fetotoxic., Published data

STOT

STOT-single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

STOT-repeated exposure

The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2 according to GHS criteria.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

The product itself has not been tested.

Experience with human exposure

Experience with human exposure : Inhalation

In contact with acid

Symptoms: Released substances:
Hydrogen sulphide
Inhalation may provoke the following symptoms:
Irritating to the respiratory system and mucous membranes.
Coma
cardiorespiratory failure
Neurological disorders
Gastrointestinal disturbance

Experience with human exposure : Skin contact

No data is available on the product itself.

Experience with human exposure : Eye contact

No data is available on the product itself.

Experience with human exposure : Ingestion

No data is available on the product itself.

CMR effects

Teratogenicity

Thiourea, N,N'-diphenyl-

Suspected of damaging the unborn child.

Aspiration toxicity

No aspiration toxicity classification, According to the available data on the components, According to the classification criteria for mixtures.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish	LC50 - 96 h : ca.66 mg/l - Oncorhynchus mykiss (rainbow trout) static test Method: OECD Test Guideline 203 Published data
Acute toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.
Toxicity to aquatic plants	The product itself has not been tested.
Toxicity to microorganisms	The product itself has not been tested.
Chronic toxicity to fish	The product itself has not been tested.
Chronic toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.

Sediment compartment

Toxicity to benthic organisms	The product itself has not been tested.

Terrestrial Compartment

Toxicity to soil dwelling organisms	The product itself has not been tested.
Toxicity to terrestrial plants	The product itself has not been tested.
Toxicity to above ground organisms	The product itself has not been tested.

M-Factor

Ammonium hydroxide ((NH4)(OH))	Acute aquatic toxicity = 1 (according to the Globally Harmonized System (GHS))

12.2 Persistence and degradability

Abiotic degradation

Stability in water	Conclusion is not possible for a mixture as a whole.
Photodegradation	Conclusion is not possible for a mixture as a whole.
Other Physicochemical reactions	Conclusion is not possible for a mixture as a whole.

Physical- and photo-chemical elimination

Physico-chemical removability	Conclusion is not possible for a mixture as a whole.

Biodegradation

Biodegradability	< 70 % - 28 Days Information given is based on data obtained from similar products Expert judgment
Ratio BOD / COD	Conclusion is not possible for a mixture as a whole.

Ratio BOD / ThOD	Conclusion is not possible for a mixture as a whole.
Biochemical Oxygen Demand (BOD)	Conclusion is not possible for a mixture as a whole.
Dissolved organic carbon (DOC)	Conclusion is not possible for a mixture as a whole.
Chemical Oxygen Demand (COD)	Conclusion is not possible for a mixture as a whole.
Adsorbed organic bound halogens (AOX)	Conclusion is not possible for a mixture as a whole.

Degradability assessment

Phenol, methyl-	The product is considered to be rapidly degradable in the environment
Thiourea, N,N'-diphenyl-	The product is not considered to be rapidly degradable in the environment
Ammonium hydroxide ((NH4)(OH))	The product is considered to be rapidly degradable in the environment Expert judgment

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	Conclusion is not possible for a mixture as a whole.
Bioconcentration factor (BCF)	As bioaccumulation is not relevant for mixtures, all the components of the mixture were assessed individually. Conclusion is not possible due to incomplete or heterogeneous data on the components Unpublished reports Published data

12.4 Mobility in soil

Adsorption potential (Koc)	Conclusion is not possible for a mixture as a whole.
Known distribution to environmental compartments	Conclusion is not possible due to incomplete or heterogeneous data on the components

12.5 Results of PBT and vPvB assessment	This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT). This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB). According to the available data on the components

12.6 Other adverse effects

Ecotoxicity assessment

Short-term (acute) aquatic hazard	Harmful to aquatic life. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Long-term (chronic) aquatic hazard	Harmful to aquatic life with long lasting effects. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

Transportation status: IMPORTANT! Statements below provide additional data on listed transport classification.
The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

DOT

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUIDS, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
ERG No	154
14.5 Environmental hazards	NO
Marine pollutant	

14.6 Special precautions for user

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101.

Reportable quantities	:	RQ substance: CRESOL (CRESYLIC ACID) RQ limit for substance: 100 lb

TDG

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II

ERG No	154
14.5 Environmental hazards **Marine pollutant**	NO

NOM

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
ERG No	154
14.5 Environmental hazards **Marine pollutant**	NO

IMDG

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, Cresol (Cresylic Acid))
IMDG Code segregation group	Alkalis (SGG18)
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
14.5 Environmental hazards **Marine pollutant**	NO
14.6 Special precautions for user	
EmS	F-A , S-B

For personal protection see section 8.

14.7 Transport in bulk vessels according to IMO instruments
No data available

IATA

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, Cresol (Cresylic Acid))
14.3 Transport hazard class	8
Subsidiary hazard class:	6.1
Label(s):	8 (6.1)
14.4 Packing group	
Packing group	II
Packing instruction (cargo aircraft)	855
Max net qty / pkg	30.00 L
Packing instruction (passenger aircraft)	851
Max net qty / pkg	1.00 L
14.5 Environmental hazards	NO

14.6 Special precautions for user
For personal protection see section 8.

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- One or more components not listed on inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIOC inventory. The HSNO status of the product has not been assessed.

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA HAZARD DESIGNATION SECTIONS 311/312 (40 CFR 370)

Acute toxicity (any route of exposure)	Yes
Skin corrosion or irritation	Yes
Serious eye damage or eye irritation	Yes
Respiratory or skin sensitization	Yes
Reproductive toxicity	Yes
Specific target organ toxicity (single or repeated exposure)	Yes

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)
The following components are subject to reporting levels established by SARA Title III, Section 313:

Components	CAS-No.	Concentration
Phenol, methyl-	1319-77-3	<= 10%

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)
This material does not contain any components with a section 302 EHS TPQ.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)
This material does not contain any components with a SARA 302 RQ.

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)
This material does not contain any components with a section 304 EHS RQ.

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

Components	CAS-No.	Reportable quantity
Ammonium hydroxide ((NH4)(OH))	1336-21-6	1000 lb
Phenol, methyl-	1319-77-3	100 lb

15.3 State Regulations

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

Further information

- Distribute new edition to clients
- Update
- See section 2

Date Prepared: 09/20/2019

Key or legend to abbreviations and acronyms used in the safety data sheet

- PEL	Permissible exposure limit
- ST	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
- STEL	Short-term exposure limit
- TWA	8-hour, time-weighted average
- ACGIH	American Conference of Governmental Industrial Hygienists
- OSHA	Occupational Safety and Health Administration
- NTP	National Toxicology Program
- IARC	International Agency for Research on Cancer
- NIOSH	National Institute for Occupational Safety and Health

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in any other manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

AEROPHINE® 3418A PROMOTER

Revision Date 04/17/2020

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

- Trade name AEROPHINE® 3418A PROMOTER

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the Substance / Mixture

- Mining chemicals

1.3 Details of the supplier of the safety data sheet

Company

CYTEC INDUSTRIES INC.
504 CARNEGIE CENTER
PRINCETON, NJ 08540 USA
Telephone: +1-973-357-3193

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT CHEMTREC (24-Hour Number): 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

Serious eye damage, Category 1	H318: Causes serious eye damage.
Skin sensitization, Category 1	H317: May cause an allergic skin reaction.

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

Pictogram

Signal Word

- Danger

Hazard Statements

- H317 May cause an allergic skin reaction.

- H318 Causes serious eye damage.

Precautionary Statements

Prevention

- P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P272 Contaminated work clothing must not be allowed out of the workplace.
- P280 Wear protective gloves/ eye protection/ face protection.

Response

- P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
- P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
- P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
- P363 Wash contaminated clothing before reuse.

Disposal

- P501 Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards which do not result in classification

None identified

SECTION 3: Composition/information on ingredients

3.1 Substance

- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Modified dithiophosphinate

Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [%]
Dithiophosphinate	*****	48 - 60

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.
- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.
- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- Effects on health may appear after exposure.
- The effects will depend on target organs.
- Chronic exposure may cause allergic dermatitis.
- Exposure may cause allergic rhinitis, conjunctivitis, asthma or shock.
- Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.
- Risk of respiratory disorder
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

Symptoms

- Symptoms will depend on the target organs.
- Inhalation may provoke the following symptoms:
- Cough
- Breathing difficulties
- Irritation
- Redness
- Swelling of tissue
- Ingestion may provoke the following symptoms:
- Nausea
- Diarrhea
- Abdominal pain
- allergic rhinitis
- Severe allergic skin reactions, bronchiospasm and anaphylactic shock
- Itching
- Dermatitis
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.
- The gas deadens the sense of smell. Do not depend on odor to detect presence of gas.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Be aware to maintain life support if necessary.
- Take victim to hospital if symptoms persist.
- Get medical advice/ attention.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Treat symptomatically.
- Contact a poison control center.
- Keep under medical follow up for at least 48 hours.

SECTION 5: Firefighting measures

Flash point	Pensky-Martens closed cup No flash up to boiling point
Autoignition temperature	819 °F (437 °C)
Flammability / Explosive limit	Lower flammability/explosion limit : Not applicable Upper flammability/explosion limit : Not applicable

5.1 Extinguishing media

Suitable extinguishing media

- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- Under fire conditions:
- Will burn
- On combustion, toxic gases are released.

Hazardous combustion products:

- Sulfur dioxide or hydrogen sulfide may be formed under fire conditions.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Wear a positive-pressure supplied-air respirator with full facepiece.
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Do not flush to sewer which may contain acid.
- This could result in generation of toxic and flammable hydrogen sulfide.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Where exposure level is not known, wear approved, positive pressure, self-contained respirator.
- Where exposure level is known, wear approved respirator suitable for level of exposure.
- In addition to the protective clothing/equipment in Section 8, wear a two piece PVC suit with hood or PVC overalls with hood.

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.
- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Large quantities of undiluted product should not be mixed with acids, since evolution of toxic and flammable hydrogen sulfide could result. In particular, precautions must be taken to avoid the accidental discharge of large volumes of the product in acid storage tanks or any tank or containment containing acidic materials. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation, where the reagent amounts are small and instantly diluted to concentrations well below the solubility limits.

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

- Do not freeze.

Requirements for storage rooms and vessels

Recommended storage temperature: 32 - 95 °F (0 - 35 °C)

- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

- Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Control measures

Engineering measures
- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection
- Keep in a well-ventilated place.

Hand protection
- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Suitable material
- Nitrile or fluorinated rubber gloves.

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Full protective suit
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.

- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Appearance	Physical state: liquid Color: colorless to pale yellow
Odor	odorless
Odor Threshold	No data available
Molecular weight	232 g/mol
pH	9.0 - 11.0
Melting point/freezing point	Crystallization temperature: ca. 10 °F (-12 °C)
Initial boiling point and boiling range	Boiling point/boiling range: 223 °F (106 °C)
Flash point	Pensky-Martens closed cup No flash up to boiling point
Evaporation rate (Butylacetate = 1)	Not applicable
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available
Flammability / Explosive limit	Lower flammability/explosion limit: Type: Lower flammability limit Not applicable Upper flammability/explosion limit: Type: Upper flammability limit Not applicable
Autoignition temperature	819 °F (437 °C)
Vapor pressure	17.5 mmHg (23.33 hPa) (68 °F (20 °C)) water, The product itself has not been tested.
Vapor density	Not applicable
Density	1.1 g/cm3 (77 °F (25 °C))
Relative density	No data available
Solubility	Water solubility: completely soluble

Partition coefficient: n-octanol/water	Not applicable
Decomposition temperature	> 662 °F (> 350 °C)
Viscosity	Viscosity, dynamic : 16.6 mPa.s (77 °F (25 °C))
Explosive properties	No data available
Oxidizing properties	Not considered as oxidizing.

9.2 Other information

Corrosion of Metals	Not corrosive to metals.
Peroxides	The substance or mixture is not classified as organic peroxide.
Reactions with water / air	Contact with acids liberates toxic gas.

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- Contact with strong acids or bases may liberate toxic gases.

10.5 Incompatible materials

- Mineral acids.
- Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products
- Carbon dioxide (CO_2)

Thermal decomposition
- Carbon monoxide
- Sulfur oxides

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	LD50 : 3,350 mg/kg - Rat Unpublished internal reports

Acute inhalation toxicity

Not classified as hazardous for acute inhalation toxicity according to GHS.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

Acute dermal toxicity

Dithiophosphinate

LD50 : > 2,000 mg/kg - Rat , male and female
Method: OECD Test Guideline 402
Not classified as hazardous for acute dermal toxicity according to GHS.
Occlusive
No mortality observed at this dose.
Unpublished reports

Acute toxicity (other routes of administration)

Not applicable

Skin corrosion/irritation

Dithiophosphinate

Human
No skin irritation
Method: OECD Test Guideline 439
Unpublished reports

Serious eye damage/eye irritation

Dithiophosphinate

Bovine cornea
Corrosive
Method: OECD Test Guideline 437
Unpublished reports

Respiratory or skin sensitization

Dithiophosphinate

Local lymph node assay - Mouse
EC 3 value > 2 %
Classified as a skin sensitizer sub-category 1B according to GHS criteria
Method: OECD Test Guideline 429
Unpublished reports

Mutagenicity

Genotoxicity in vitro

Dithiophosphinate

Mutagenicity (Salmonella typhimurium - reverse mutation assay)
with and without metabolic activation

negative
Method: OECD Test Guideline 471
Unpublished reports

Chromosome aberration test in vitro
Strain: Human lymphocytes
with and without metabolic activation

negative
Method: OECD Test Guideline 473
Unpublished reports

Gene mutation assays in mammalian cells.
Strain: mouse lymphoma cells
with and without metabolic activation

negative
Method: OECD Test Guideline 476
Unpublished reports

Genotoxicity in vivo

Product is not considered to be genotoxic
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

Carcinogenicity

The product is not considered to be carcinogenic.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

This product does not contain any ingredient designated as probable or suspected human carcinogens by:
NTP
IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility

The product is not considered to affect fertility.,According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

Developmental Toxicity/Teratogenicity

The product is not considered to be toxic for development.,According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

STOT

STOT-single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

STOT-repeated exposure

The substance or mixture is not considered to cause damage to organs through prolonged or repeated exposure.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

The product itself has not been tested.

Experience with human exposure

Experience with human exposure : Inhalation

In contact with acid

Symptoms: Released substances:
Hydrogen sulphide
Inhalation may provoke the following symptoms:
Irritating to the respiratory system and mucous membranes.
Coma
cardiorespiratory failure
Neurological disorders
Gastrointestinal disturbance

Experience with human exposure : Skin contact

No data is available on the product itself.

Experience with human exposure : Eye contact

No data is available on the product itself.

Experience with human exposure : Ingestion

No data is available on the product itself.

Aspiration toxicity

No aspiration toxicity classification, According to the available data on the components, According to the classification criteria for mixtures.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish

Dithiophosphinate	LC50 - 96 h : 375 mg/l - Lepomis macrochirus (Bluegill sunfish) static test Analytical monitoring: yes Method: OECD Test Guideline 203 Not harmful to fish (LC/LL50 > 100 mg/L) Unpublished reports

Acute toxicity to daphnia and other aquatic invertebrates

Dithiophosphinate	EC50 - 48 h : 149 mg/l - Daphnia magna (Water flea) static test Analytical monitoring: yes Method: OECD Test Guideline 202 Not harmful to aquatic invertebrates. (EC/EL50 > 100 mg/L) Unpublished reports

Toxicity to aquatic plants

Dithiophosphinate	ErC50 - 96 h : 115 mg/l - Pseudokirchneriella subcapitata (microalgae) static test Analytical monitoring: yes Endpoint: Growth rate Method: OECD Test Guideline 201 Not harmful to algae (EC/EL50 > 100 mg/L) Unpublished reports NOErC - 96 h : 20 mg/l - Pseudokirchneriella subcapitata (green algae) static test Analytical monitoring: yes Endpoint: Growth rate Method: OECD Test Guideline 201 No adverse chronic effect observed up to and including the threshold of 1 mg / L. Unpublished reports
Toxicity to microorganisms	The product itself has not been tested.
Chronic toxicity to fish	The product itself has not been tested.
Chronic toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.

Sediment compartment

Toxicity to benthic organisms	The product itself has not been tested.

Terrestrial Compartment

Toxicity to soil dwelling organisms	The product itself has not been tested.
Toxicity to terrestrial plants	The product itself has not been tested.
Toxicity to above ground organisms	The product itself has not been tested.

12.2 Persistence and degradability

Abiotic degradation

Stability in water	Conclusion is not possible for a mixture as a whole.
Photodegradation	Conclusion is not possible for a mixture as a whole.
Other Physicochemical reactions	Conclusion is not possible for a mixture as a whole.

Physical- and photo-chemical elimination

Physico-chemical removability	Conclusion is not possible for a mixture as a whole.

Biodegradation

Biodegradability	Ready biodegradability study: Method: OECD Test Guideline 301 D 78.8 % - 28 Days The substance fulfills the criteria for ultimate aerobic biodegradability and ready biodegradability Published data
Ratio BOD / COD	Conclusion is not possible for a mixture as a whole.

Ratio BOD / ThOD	Conclusion is not possible for a mixture as a whole.
Biochemical Oxygen Demand (BOD)	Conclusion is not possible for a mixture as a whole.
Dissolved organic carbon (DOC)	Conclusion is not possible for a mixture as a whole.
Chemical Oxygen Demand (COD)	Conclusion is not possible for a mixture as a whole.
Adsorbed organic bound halogens (AOX)	Conclusion is not possible for a mixture as a whole.

Degradability assessment

Dithiophosphinate — The product is considered to be rapidly degradable in the environment

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	Conclusion is not possible for a mixture as a whole.
Bioconcentration factor (BCF)	As bioaccumulation is not relevant for mixtures, all the components of the mixture were assessed individually. Conclusion is not possible due to incomplete or heterogeneous data on the components Unpublished reports Published data

12.4 Mobility in soil

Adsorption potential (Koc)	Conclusion is not possible for a mixture as a whole.
Known distribution to environmental compartments	Conclusion is not possible due to incomplete or heterogeneous data on the components

12.5 Results of PBT and vPvB assessment — According to the available data on the components
This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects

Ecotoxicity assessment

Short-term (acute) aquatic hazard	No acute environmental hazard identified. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Long-term (chronic) aquatic hazard	No chronic environmental hazard identified. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

DOT
not regulated

TDG
not regulated

NOM
not regulated

IMDG
not regulated

IATA
not regulated

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- One or more components not listed on inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory

Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- One or more components not listed on inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIOC inventory. The HSNO status of the product has not been assessed.

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA Hazard Designation Sections 311/312 (40 CFR 370)

Serious eye damage or eye irritation	Yes
Respiratory or skin sensitization	Yes

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)
This material does not contain any components with a section 302 EHS TPQ.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)
This material does not contain any components with a SARA 302 RQ.

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)
This material does not contain any components with a section 304 EHS RQ.

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

Components	CAS-No.	Reportable quantity
Sodium hydroxide (Na(OH))	1310-73-2	1000 lb

Calculated RQ exceeds reasonably attainable upper limit.

15.3 State Regulations

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

Date Prepared: 04/17/2020

Key or legend to abbreviations and acronyms used in the safety data sheet

- ACGIH American Conference of Governmental Industrial Hygienists
- OSHA Occupational Safety and Health Administration
- NTP National Toxicology Program
- IARC International Agency for Research on Cancer
- NIOSH National Institute for Occupational Safety and Health
- ADR: European Agreement on International Carriage of Dangerous Goods by Road.
- ADN: European Agreement on the International Carriage of Dangerous Goods by Inland Waterways.
- RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
- IATA: International Air Transport Association.
- ICAO-TI: Technical Specification for Safe Transport of Dangerous Goods by Air.
- IMDG: International Maritime Dangerous Goods.
- TWA: Time weighted average
- ATE: Estimated value of acute toxicity
- EC: European Community number
- CAS: Chemical Abstracts Service.
- LD50: Substance that causes 50% (half) death in the test animals group (Median Fatal Dose).
- LC50: Substance concentration causing 50% (half) death in the test animals group.
- EC50: Effective Concentration of the substance causing the maximum of 50%.
- PBT: Persistent, Bioaccumulative and Toxic substance.
- vPvB: Very Persistent and Very Bioaccumulative.
- SEA: Classification, labeling, packaging regulation
- DNEL: Derived No Effect Level
- PNEC: Predicted No Effect Concentration
- BHOT: Specific Target Organ Toxicity

Not all acronyms listed above are referenced in this SDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in any other manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

OREPREP® F-549 FROTHER

Revision Date 05/10/2019

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

- Trade name OREPREP® F-549 FROTHER

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the Substance / Mixture

- Frother

1.3 Details of the supplier of the safety data sheet

Company

CYTEC INDUSTRIES INC.
504 CARNEGIE CENTER
PRINCETON, NJ 08540 USA
Telephone: +1-973-357-3193

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT CHEMTREC (24-Hour Number): 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

Skin irritation, Category 2	H315: Causes skin irritation.
Eye irritation, Category 2A	H319: Causes serious eye irritation.

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

Pictogram

Signal Word

- Warning

Hazard Statements

- H315	Causes skin irritation.
- H319	Causes serious eye irritation.

Precautionary Statements

Prevention

- P264 Wash skin thoroughly after handling.
- P280 Wear protective gloves/ eye protection/ face protection.

Response

- P302 + P352 IF ON SKIN: Wash with plenty of soap and water.
- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P332 + P313 If skin irritation occurs: Get medical advice/ attention.
- P337 + P313 If eye irritation persists: Get medical advice/ attention.
- P362 Take off contaminated clothing and wash before reuse.

2.3 Other hazards which do not result in classification

None identified

SECTION 3: Composition/information on ingredients

3.1 Substance

- Chemical nature Mixture of polyglycols

Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [%]
Mixed glycol ethers	*****	60 - 100

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

3.2 Mixture

- Not applicable, this product is a substance.

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.
- In case of inflammation (redness, irritation, ...) obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.
- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Obtain medical attention.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
- In case of inhalation, irritation/corrosion of the respiratory tract.
- May cause irreversible skin damage.
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

Symptoms

- Irritation
- Redness
- Swelling of tissue
- May cause respiratory tract irritation.
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Take victim immediately to hospital.
- Immediate medical attention is required.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Contact a poison control center.
- Keep under medical supervision for at least 48 hours.

SECTION 5: Firefighting measures

Flash point	> 200 °F (> 93 °C) Pensky-Martens closed cup
Autoignition temperature	No data available
Flammability / Explosive limit	Lower flammability/explosion limit : Not applicable Upper flammability/explosion limit : Not applicable

5.1 Extinguishing media

Suitable extinguishing media

- Water spray
- Foam
- Carbon dioxide (CO2)
- Multipurpose powders

Unsuitable extinguishing media

- High volume water jet

5.2 Special hazards arising from the substance or mixture

- Under fire conditions:
- Will burn
- On combustion, toxic gases are released.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Standard procedure for chemical fires.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
- Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Where exposure level is not known, wear approved, positive pressure, self-contained respirator.
- Where exposure level is known, wear approved respirator suitable for level of exposure.
- In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.
- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Recommended storage temperature: 41 - 95 °F (5 - 35 °C)

- Keep in a dry, cool and well-ventilated place.
- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

- Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Control measures

Engineering measures

- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection

- Keep in a well-ventilated place.

Hand protection

- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Appearance	Physical state: liquid Color: Yellow-brown
Odor	mild ether-like
Odor Threshold	No data available
Molecular weight	Mixture
pH	Not applicable
Melting point/freezing point	Freezing point: ca. -31 °F (-35 °C)
Initial boiling point and boiling range	Boiling point/boiling range: > 399.9 °F (> 204.4 °C)
Flash point	> 200 °F (> 93 °C) Pensky-Martens closed cup
Evaporation rate (Butylacetate = 1)	< 0.01
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available

Flammability / Explosive limit	Lower flammability/explosion limit: Type: Lower flammability limit Not applicable Upper flammability/explosion limit: Type: Upper flammability limit Not applicable
Autoignition temperature	No data available
Vapor pressure	< 0.02 mmHg (< 0.03 hPa) (77 °F (25 °C))
Vapor density	Very low
Density	0.99 - 1.05 g/cm3
Relative density	No data available
Solubility	Water solubility: completely soluble
Partition coefficient: n-octanol/water	No data available
Decomposition temperature	No data available
Viscosity	Viscosity, dynamic : ca. 28 mPa.s (77 °F (25 °C))
Explosive properties	No data available
Oxidizing properties	Not considered as oxidizing.

9.2 Other information

Corrosion of Metals	Not corrosive to metals.
Peroxides	The substance or mixture is not classified as organic peroxide.

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- no data available

10.5 Incompatible materials

- Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products

- Carbon monoxide
- Carbon dioxide (CO_2)

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	No data available
Acute inhalation toxicity	No data available
Acute dermal toxicity	No data available
Acute toxicity (other routes of administration)	No data available

Skin corrosion/irritation

Mixed glycol ethers	Skin irritation

Serious eye damage/eye irritation

Mixed glycol ethers	Eye irritation

Respiratory or skin sensitization	No data available

Mutagenicity

Genotoxicity in vitro	No data available
Genotoxicity in vivo	No data available
Carcinogenicity	No data available

This product does not contain any ingredient designated as probable or suspected human carcinogens by:

NTP

IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility	No data available
Developmental Toxicity/Teratogenicity	No data available

STOT

STOT-single exposure	No data available
STOT-repeated exposure	No data available
Experience with human exposure	No data available
Aspiration toxicity	No data available

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish	No data available
Acute toxicity to daphnia and other aquatic invertebrates	No data available
Toxicity to aquatic plants	No data available
Toxicity to microorganisms	No data available
Chronic toxicity to fish	No data available
Chronic toxicity to daphnia and other aquatic invertebrates	No data available

12.2 Persistence and degradability

Abiotic degradation	No data available
Physical- and photo-chemical elimination	No data available

Biodegradation No data available

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water No data available

Bioconcentration factor (BCF) No data available

12.4 Mobility in soil

Adsorption potential (Koc) No data available

Known distribution to environmental compartments No data available

12.5 Results of PBT and vPvB assessment No data available

12.6 Other adverse effects No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

DOT
not regulated

TDG
not regulated

NOM
not regulated

IMDG
not regulated

IATA
not regulated

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- Listed on Inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIOC inventory. The HSNO status of the product has not been assessed.

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA Hazard Designation Sections 311/312 (40 CFR 370)

Skin corrosion or irritation	Yes
Serious eye damage or eye irritation	Yes

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)
This material does not contain any components with a section 302 EHS TPQ.
Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)
This material does not contain any components with a SARA 302 RQ.

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)
This material does not contain any components with a section 304 EHS RQ.

US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)

This material does not contain any components with a CERCLA RQ.

15.3 State Regulations

US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health	2 moderate
Flammability	1 slight
Instability or Reactivity	0 minimal

Date Prepared: 05/10/2019

- ACGIH — American Conference of Governmental Industrial Hygienists
- OSHA — Occupational Safety and Health Administration
- NTP — National Toxicology Program
- IARC — International Agency for Research on Cancer
- NIOSH — National Institute for Occupational Safety and Health

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in any other manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.

SAFETY DATA SHEET

December 1, 2012

Product Name **Copper Sulfate Crystals**

Manufacturer Old Bridge Chemicals, Inc.
554 Waterworks Road
Old Bridge, New Jersey 08857

Telephone (732) 727-2225
Emergency Telephone: (800) 275-3924
24-hour Emergency Telephone (800) 424-9300 Chemtrec
HAZARD CLASSIFICATION: NFPA: Health-3 Fire-0 Reactivity-0
HMIS: Health-3 Fire-0 Reactivity-0

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200).

SECTION I. MATERIAL IDENTIFICATION.....

Common Name	Copper Sulfate
Synonyms	Blue Vitrol, Bluestone, Cupric Sulfate
Molecular Formula	$CuSO_4 \cdot 5H_20$
EPA Reg. Number	46923-4
EPA Signal Word	**DANGER**
CAS Number	7758-99-8
SIC Number	28199 C 29

SECTION II. COMPOSITION/INFORMATION ON INGREDIENTS……..

Exposure Limits	ACGIH TLV TWA: 1.0 mg/m^3 (as copper dust/mist)
	OSHA PEL TWA: 1.0 mg/m^3 (as copper dust/mist)

SECTION III. HAZARD INFORMATION.....

Emergency overview: Odorless blue crystals. Can cause irreversible eye damage and severe skin irritation. Harmful if swallowed or absorbed through the skin. Avoid breathing dust or mist. Avoid contact with the skin, eyes or clothes. May cause skin sensitization in certain individuals.

Swallowing	Toxic orally in accordance with FHSLA regulations. Acute oral LD50 (male rats) = 472 mg/Kg. Can cause irritation to the digestive tract and abdominal pain.
Skin	Slight skin irritant. Excessive exposure may cause skin irritation. Repeated exposure may cause allergic dermititis. May cause irritation or burns on wet skin.
Eyes	Can cause severe eye irritation and may result in irreversible eye damage.
Inhalation	Inhalation of dust may cause irritation to the mucous membranes and upper respiratory tract
Carcenogenicity	None as per NTP, OSHA, and IARC.

SECTION IV. FIRST AID PROCEDURES.....……..

Ingestion	Give large amounts of milk, egg white, gelatin solution, or if they are not available, large quantities of water. Do not induce vomiting or give anything to an unconscious person. Avoid alcohol. Call Poison Control Center or a physician.
Skin	Wash thoroughly with soap and water. Remove and wash contaminated clothing before reuse.
Eyes	Immediately flush eyes with plenty of water for 15 minutes. Hold eyelids apart during irrigation. Call a physician.
Inhalation	Remove person to fresh air. If not breathing administer artificial respiration. Get medical attention.
Cargenogenicity	None

SECTION V. FIRE AND EXPLOSION DATA.........……..

Flash Point	Not applicable
Flammable Limits	Not flammable. If heated above 400o C it can decompose to emit toxic fumes of oxide and sulfur.
Auto ignition Temperature	Not determined
Extinguishing Media	Copper Sulfate does not burn nor will it support combustion. If stored with other combustible products use water, CO_2 or dry chemical.
Special Fire Fighting Instructions:	If dry heated above 600^o C, SO_2 is evolved. If water is used it will solubalize the Copper Sulfate and care should be taken to keep such water out of streams or other water bodies.
Fire Fighting Equipment	Wear self-contained breathing apparatus
Fire and Explosion Hazards	None

SECTION VI. ACCIDENTAL RELEASE MEASURES……

Use clean-up measures that avoid dust generation. Wear NIOSH or MSHA approved respirator if dust will be generated. Cover spill with absorbent material such as seeping compound or lime. Sweep up and put into an appropriate container for proper disposal in an approved method. Prevent accidental entry of solution into streams or other bodies of water. Shovel spills into plastic bags and seal with tape.

SECTION VII. HANDLING AND STORAGE.....……

Signal Word	**DANGER**
	Handling Information: Avoid breathing dust or mist. Sweep up crystals. Eye wash stations should be available in work areas. Users should wash hands before eating, drinking, smoking or using the toilet. Remove PPE immediately after handling this product. Wash outside of gloves before removing. Wash and change into clean clothing as soon as possible.
Storage Information	Store in closed containers in a cool, dry, well-ventilated area away from heat sources and reducing agents. Store in original containers. Keep away from galvanized pipe, aluminum and nylon. Place damaged containers in plastic bags.

SECTION VIII. EXPOSURE CONTROLS/PERSONAL PROTECTION…….

Ventilation	TWA = 1 mg/l. for Copper Sulfate. When TWA exceeds this limit in the workplace, provide appropriate ventilation.
Respiratory Protection	Wear an approved respirator for dusts or mists: MSHA/NIOSH approved number prefix TC-21C, or a NIOSH approved respirator with any R, P or HE filter. Alternatively, provide respiratory protection equipment in accordance with Paragraph 1910.134 of Title 29 of the Code of Federal Regulations.
Eye Protection	Use safety glasses with side shields or goggles.
Skin Protection	Applicators and other handlers should wear long-sleeved shirts and long pants, waterproof gloves, shoes plus socks and protective eyewear. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with product's concentrate. Do not reuse them. Keep and wash PPE separately from other laundry.

SECTION IX. PHYSICAL DATA.....……

Physical State	Blue crystals or powder
Boiling Point	NA
Melting Point	Decomposition above 110^{o}C with –4H_2O
Vapor Density	NA
Specific Gravity	2.284
Solubility in H_20	22.37% @ 0^{o}C 117.95% @ 100^{o}C
Solubility in other Solvents	Soluble in methanol, glycerol and slightly soluble in ethanol.
Molecular Weight	249.68
Appearance	Transparent blue crystals
Odor	Odorless

SECTION X. REACTIVITY DATA.....

Stability	Stable
Conditions to Avoid	Product is highly soluble, but does not react with water.
Incompatibility	Solutions are mildly corrosive to steel. Store solutions in plastic or rubber or 304, 347 or 316 stainless steel. Iron and moisture should be avoided. Store in a dry area. Incompatible with aluminum powder, acetylene gas, hydroxylamine, magnesium and moisture. Contact with magnesium can generate dangerous levels of hydrogen gas. With exposure to air it will oxidize and turn whitish.
Hazardous Decomposition products	None at normal production temperatures and pressures. If dry heated above 600^{o}C toxic sulfur may evolve.
Polymerization	Will not occur.

SECTION XI. TOXICOLOGICAL INFORMATION……

Skin:	LD_{50} > 8.0 g/kg (rabbit)
Ingestion:	LD_{50} > 472.5 mg/kg (rat)
Primary Eye Irritation:	Corrosive, irreversible eye damage.
Primary Skin Irritation:	No skin irritation.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsions may be needed. Wilson's disease can be aggravated by excessive exposure. Symptoms include nausea, vomiting, epigastria pain, diarrhea, dizziness, jaundice and general debility.

SECTION XII. ENVIRONMENTAL AND DISPOSAL INFORMATION.....…….

Spills and Leaks	Comply with Federal. State and local regulations on reporting spills. Do not wash away crystals or powder. Recover dry if possible. If product is in a confined solution, react with soda ash to from an insoluble Copper Carbonate solid that can be scooped up.
Waste Disposal	Do not reuse container. Comply with Federal, State and local environmental control regulations. Sweep up crystals, powder or insoluble Copper Carbonate and dispose of in an approved landfill.
Environmental Effects	May be dangerous if it enters the public water systems. Follow local regulation. Toxic to fish and plants. Fish toxicity critical concentration is 235 mg/l. and plant toxicity is 25 mg/l.

SECTION XIII. REGULATORY INFORMATION.....

NOTICE: The information herein is presented in good faith and believed to be accurate. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ from one location to another. It is the buyer's responsibility to ensure that its activities comply with Federal,

State and local laws.

SARA 313 Information; This product contains the following substance subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372: COPPER COMPOUND > 1.0%

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following category:

ACUTE HEALTH HAZARD

OSHA: This product is considered hazardous under the OSHA Hazardous Communication Standard (29 CFR 1910.1200)

TSCA: Listed on the Chemical Inventory

CERCLA Hazardous Substances: RQ is not assigned to the broad class of copper compounds.

RCRA: When discarding this material as supplied, it does not meet RCRA characteristic definition if ignitability, corrositivity reactivity and is not listed in 40CFR 261.33.

This product contains Copper Sulfate and is subject to the reporting requirements of Section 13 of the Emergency Planning and Community-Right-to-Know-Act of 1986 (40 CFR 372).

SECTION XIV. SHIPPING INFORMATION…….

DOT Shipping Name RQ, Environmentally Hazardous Substance, Solid, NOS, (CUPRIC SULFATE), 9, UN3077, PGIII, ERG 171 Marine Pollutant

Reportable Quantity (RQ): 10 pounds (4.54 kg)

Not hazardous when shipping less than 10 pounds

SECTION XV MISCELLANEOUS INFORMATION.....…….

This is an NSF Certified Product to ANSI/NSF 60. Maximum use in potable water is not to exceed 2 mg. per liter

SECTION. XVI MSDS PREPARATION INFORMATION.....……

Prepared By: Regulatory Dept.

BRENNTAG

SAFETY DATA SHEET

1. Identification

Product identifier	**LIME HYDRATED TYPE N**
Other means of identification	None.
Recommended use	ALL PROPER AND LEGAL PURPOSES
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name	Brenntag Pacific Inc.
Address	10747 Patterson Place Santa Fe Springs, CA 90670
Telephone	562-903-9626
E-mail	Not available.
Emergency phone number	800-424-9300 CHEMTREC

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
	Carcinogenicity	Category 1A
	Specific target organ toxicity, repeated exposure	Category 1
Environmental hazards	Not classified.	
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Causes severe skin burns and eye damage. Causes serious eye damage. May cause cancer. Causes damage to organs through prolonged or repeated exposure.

Precautionary statement

Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. Wash contaminated clothing before reuse.
Storage	Store locked up.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
CALCIUM HYDROXIDE (CA(OH)2)		1305-62-0	91
MAGNESIUM OXIDE (MGO)		1309-48-4	3
LIMESTONE		1317-65-3	2
QUARTZ (SIO2)		14808-60-7	1
Other components below reportable levels			3

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. First-aid measures

Inhalation
Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact
Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or poison control center immediately. Chemical burns must be treated by a physician. Wash contaminated clothing before reuse.

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.

Ingestion
Call a physician or poison control center immediately. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs.

Most important symptoms/effects, acute and delayed
Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Coughing. Prolonged exposure may cause chronic effects.

Indication of immediate medical attention and special treatment needed
Provide general supportive measures and treat symptomatically. Chemical burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim under observation. Symptoms may be delayed.

General information
IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media
Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media
Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical
During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions
Move containers from fire area if you can do so without risk.

Specific methods
Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards
No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up
Large Spills: Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.

Environmental precautions
Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep formation of airborne dusts to a minimum. Do not breathe dust. Do not get in eyes, on skin, or on clothing. When using, do not eat, drink or smoke. Provide adequate ventilation. Avoid prolonged exposure. Wear appropriate personal protective equipment. Should be handled in closed systems, if possible. Wash hands thoroughly after handling. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store locked up. Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
LIMESTONE (CAS 1317-65-3)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
MAGNESIUM OXIDE (MGO) (CAS 1309-48-4)	PEL	15 mg/m3	Total particulate.

US. OSHA Table Z-3 (29 CFR 1910.1000)

Components	Type	Value	Form
QUARTZ (SIO2) (CAS 14808-60-7)	TWA	0.3 mg/m3	Total dust.
		0.1 mg/m3	Respirable.
		2.4 mppcf	Respirable.

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)	TWA	5 mg/m3	
MAGNESIUM OXIDE (MGO) (CAS 1309-48-4)	TWA	10 mg/m3	Inhalable fraction.
QUARTZ (SIO2) (CAS 14808-60-7)	TWA	0.025 mg/m3	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)	TWA	5 mg/m3	
LIMESTONE (CAS 1317-65-3)	TWA	5 mg/m3	Respirable.
		10 mg/m3	Total
QUARTZ (SIO2) (CAS 14808-60-7)	TWA	0.05 mg/m3	Respirable dust.

Biological limit values

No biological exposure limits noted for the ingredient(s).

Exposure guidelines

Occupational exposure to nuisance dust (total and respirable) and respirable crystalline silica should be monitored and controlled.

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

The following are recommendations for Personnel Protective Equipment (PPE). The employer/user of this product must perform a Hazard Assessment of the workplace according to OSHA regulations 29 CFR 1910.132 to determine the appropriate PPE for use while performing any task involving potential exposure to this product.

Eye/face protection	Wear safety glasses with side shields (or goggles) and a face shield.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.
Respiratory protection	Use a particulate filter respirator for particulate concentrations exceeding the Occupational Exposure Limit.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Observe any medical surveillance requirements.

9. Physical and chemical properties

Appearance	
Physical state	Solid.
Form	Solid.
Color	WHITE,OFF WHITE TO LIGHT GREY POWDER
Odor	ODORLESS
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	1186.78 °F (641.55 °C) estimated
Initial boiling point and boiling range	6512 °F (3600 °C) estimated
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	1.00 lbs/gal
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
Specific gravity	0.12

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.

Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Contact with incompatible materials.
Incompatible materials	Phosphorus. Maleic anhydride. Nitroethane. Nitromethane. Nitroparaffins. Nitropropane.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Ingestion	Causes digestive tract burns.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Causes serious eye damage. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Coughing.

Information on toxicological effects

Acute toxicity	Not available.
Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	In 1997, IARC (the International Agency for Research on Cancer) concluded that crystalline silica inhaled from occupational sources can cause lung cancer in humans. However in making the overall evaluation, IARC noted that "carcinogenicity was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." (IARC Monographs on the evaluation of the carcinogenic risks of chemicals to humans, Silica, silicates dust and organic fibres, 1997, Vol. 68, IARC, Lyon, France.) In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. May cause cancer. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled.

IARC Monographs. Overall Evaluation of Carcinogenicity

QUARTZ (SIO2) (CAS 14808-60-7) 1 Carcinogenic to humans.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

US. National Toxicology Program (NTP) Report on Carcinogens

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Causes damage to organs through prolonged or repeated exposure. Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)			
Aquatic			
Fish	LC50	Zambezi barbel (Clarias gariepinus)	33.8844 mg/l, 96 hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Mobility in soil No data available.

Other adverse effects No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

DOT information on packaging may be different from that listed.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

Immediate Hazard - Yes
Delayed Hazard - Yes
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

QUARTZ (SIO2) (CAS 14808-60-7)

US. Massachusetts RTK - Substance List

CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)
LIMESTONE (CAS 1317-65-3)
MAGNESIUM OXIDE (MGO) (CAS 1309-48-4)
QUARTZ (SIO2) (CAS 14808-60-7)

US. New Jersey Worker and Community Right-to-Know Act

CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)
LIMESTONE (CAS 1317-65-3)
MAGNESIUM OXIDE (MGO) (CAS 1309-48-4)
QUARTZ (SIO2) (CAS 14808-60-7)

US. Pennsylvania Worker and Community Right-to-Know Law

CALCIUM HYDROXIDE (CA(OH)2) (CAS 1305-62-0)
LIMESTONE (CAS 1317-65-3)
MAGNESIUM OXIDE (MGO) (CAS 1309-48-4)
QUARTZ (SIO2) (CAS 14808-60-7)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

US - California Proposition 65 - CRT: Listed date/Carcinogenic substance

QUARTZ (SIO2) (CAS 14808-60-7) Listed: October 1, 1988

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 03-31-2015
Revision date 08-16-2016
Version # 02

HMIS® ratings	Health: 3* Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 3 Flammability: 0 Instability: 0
Disclaimer	While Brenntag believes the information contained herein to be accurate, Brenntag makes no representation or warranty, express or implied, regarding, and assumes no liability for, the accuracy or completeness of the information. The Buyer assumes all responsibility for handling, using and/or reselling the Product in accordance with applicable federal, state, and local law. This SDS shall not in any way limit or preclude the operation and effect of any of the provisions of Brenntag's terms and conditions of sale.
Revision information	This document has undergone significant changes and should be reviewed in its entirety.

Maximizing the Value of Flotation Chemicals Technology

SAFETY DATA SHEET

1. IDENTIFICATION

Product identifier used on the label

: **Flottec SIPX Collector**

Recommended use of the chemical and restrictions on use

: Collector used in mining industry

Chemical family : Xanthate

Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party:

Flottec, LLC
2505 Collingsworth Street, 2nd Floor
Houston, Texas 77026 U.S.A.
www.flottec.com

Information Telephone # : 1.713.425.7055

24 Hr. Emergency Tel # : Chemtrec 1.800.424.9300 (Within Continental U.S.); Chemtrec 1.703.527.3887 (Outside U.S.)

2. HAZARDS IDENTIFICATION

Classification of the chemical

Self-heating substances and mixtures (Category 1)
Combustible Dust
Acute toxicity, oral (Category 4)
Acute toxicity, dermal (Category 3)
Skin corrosion/irritation (Category 2)
Serious eye damage/eye irritation (Category 1)
Skin sensitizer (Category 1)
Specific target organ toxicity, single exposure, Narcotic effects (Category 3)

Label elements

Signal Word

Danger

Hazard statement(s)

H251: Self-heating; may catch fire
H29x : May form combustible dust concentrations in air
H311: Toxic in contact with skin
H318: Causes serious eye damage
H302: Harmful if swallowed
H315: Causes skin irritation
H317: May cause an allergic skin reaction
H336: May cause drowsiness or dizziness
H411: Toxic to aquatic life with long lasting effects

Precautionary statement(s)

P260: Do not breathe dusts, vapors, fumes and gas.
P262: Do not get in eyes, on skin, or on clothing.
P264: Wash face, hands and any exposed skin thoroughly after handling.
P270: Do not eat, drink or smoke when using this product.
P271: Use only outdoors or in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves, protective clothing and eye protection.
P301+P330+P312: IF SWALLOWED: Rinse mouth. Call a POISON CENTER or a doctor if you feel unwell.
P302+352: IF ON SKIN: Wash with soap and water.
P333+313: If skin irritation or a rash occurs: Get medical advice/attention.

P304+340+P312: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell.

P305+351+338: IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.

P310: Immediately call a doctor/physician.

P361 + P364: Remove/Take off immediately all contaminated clothing and wash before reuse.

P391: Collect spillage.

P403+P235+P233: Store in a well-ventilated place. Keep container tightly closed. Keep cool.

P405: Store locked up.

P407: Maintain air gap between stacks/pallets.

P413: Stock bulk masses at temperature not exceeding 32°C/90°F.

P420: Store away from other materials.

P501: Dispose of contents and container to a licensed chemical disposal agency in accordance with local, regional and national regulations.

Hazard pictogram(s)

Other hazards

Acute hazard to the aquatic environment (Category 2).

Long-term hazard to the aquatic environment (Category 2)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Common name	CAS #	Concentration / wt %
Sodium isopropyl xanthate	140-93-2	>85
Sodium hydroxide	1310-73-2	0-1
Sodium carbonate	497-19-8	0-3
Sodium sulphide	1313-82-2	0-1
Isopropyl alcohol	67-63-0	0-10

The exact concentrations of the above listed chemicals are being withheld as a trade secret.

4. FIRST-AID MEASURES

Description of first aid measures

Ingestion : DO NOT induce vomiting, unless recommended by medical personnel. If victim is conscious wash out mouth with water and give 1-2 glasses of water to drink. Never give anything by mouth if victim is unconscious or convulsing. If spontaneous vomiting occurs, keep head below hips level to prevent aspiration into the lungs. Seek medical attention or contact a Poison Centre immediately.

Inhalation : Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen by trained personnel. If a problem develops or persists, seek medical attention.

Skin Contact : Flush with water for at least 15 minutes. Remove contaminated clothing and wash before reuse. Avoid touching eyes with contaminated body parts. If a problem develops or persists, seek medical attention.

Eye Contact : IMMEDIATELY flush with plenty of water. Remove contact lenses. Flush with water for at least 15 minutes. Hold eyelids apart to rinse properly. If a problem develops or persists, seek medical attention.

Symptoms : May cause severe eye irritation or eye damage. May cause skin irritation. May cause an allergic reaction of the skin. High concentrations may cause central nervous system depression characterized by headache, dizziness, vertigo, nausea, drowsiness and fatigue.

Notes to the physician : Treat according to person's condition and specifics of exposure. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against

toxicity when considering emptying the stomach. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

: Dry chemicals, carbon dioxide (CO2). Flood the area with water.

Unsuitable extinguishing media

: Do not use direct water jet.

Special hazards arising from the substance or mixture

: Chemical of sodium alkyl xanthate in contact with water will emit carbon disulfide which is flammable. The dry powder or pellet form may also be flammable because of the presence of moisture in the product. May release irritating, toxic and/or corrosive during fire or when heated to decomposition. May form combustible dust concentrations in air.

Special protective equipment and precautions for firefighters

Protective equipment for fire-fighters

: Firefighters must wear self contained breathing apparatus with full face mask. Firefighting suit may not be efficient against chemicals.

Special fire-fighting procedures

: Water spray can be used to cool equipment exposed to heat and flame. Prevent run-off from fire control or dilution from entering streams, sewers or drinking water supply.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

: Do not touch spilled material. Make sure to wear personal protective equipment mentioned in this Safety Data Sheet.

Environmental precautions : Do not allow material to contaminate ground water system. For a large spillage, consult the Department of Environment or the relevant authorities.

Methods and material for containment and cleaning up

: Ventilate well the area. Avoid generating dusty conditions. Vacuum or sweep up and place in an appropriate waste disposal container. Finish cleaning by rinsing with water contaminated surface. Dispose via a licensed waste disposal contractor.

7. HANDLING AND STORAGE

Precautions for safe handling : Avoid excessive heat and moisture. Use only in well ventilated area. Avoid breathing dust and fume. Avoid generating dusty conditions. Avoid contact with skin, eyes and clothing. Wear eye protection, gloves and other protective clothing that are adapted to the task being performed and the risks involved. Use non-sparkling and antistatic tools. Do not eat, do not drink and do not smoke during use. Keep containers tightly closed when not used. May form combustible dust concentrations in air. Keep away from heat and open flame. After use, wash hands with soap and water. Wash contaminated clothing before reuse.

Conditions for safe storage : Heating and overexposure to moisture of solid Xanthate and heating or aging of xanthate solutions causes some decomposition to poisonous and flammable carbon disulfide. Storage tank should have certain design features for maximum safety, and the vapor space should be free of sources of ignition. Store tightly close and in properly labelled container. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Store away from oxidizing materials and incompatible materials (see section 10). Keep away from moisture. Keep away from direct sunlight and heat.

Storage temperature : 10 to 32°C (50 to 89.6 °F)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Immediately Dangerous to Life or Health

Hydrogen sulfide : 100 ppm.
Carbon disulfide : 500 ppm.
Sodium hydroxide : 10 mg/m3.
Isopropyl alcohol : 2000 ppm

Exposure limits

Isopropyl alcohol	:	STEL	400 ppm		ACGIH, BC, ON
			500 ppm	1230 mg/m^3	RSST
		TWA (8h)	200 ppm		ACGIH, BC, ON
			400 ppm	980 mg/m^3	OSHA
			400 ppm	983 mg/m^3	RSST
Sodium hydroxide	:	Ceiling		2 mg/m^3	ACGIH, BC, ON, RSST
		TWA (8h)		2 mg/m^3	OSHA
Hydrogen sulfide	:	Ceiling	10 ppm		BC
		STEL	5 ppm		ACGIH
			15 ppm		ON
			15 ppm	21 mg/m^3	RSST
		TWA (8h)		3 mg/m^3	OSHA
			1 ppm		ACGIH
			10 ppm		ON
			10 ppm	14 mg/m^3	RSST
Carbon disulfide	:	STEL	12 ppm		BC
			12 ppm	36 mg/m^3	RSST
			30 ppm		OSHA
		TWA (8h)		20 mg/m^3	OSHA
			1 ppm		ACGIH, ON
			4 ppm		BC
			4 ppm	12 mg/m^3	RSST

Exposure controls

Appropriate engineering controls : Provide sufficient mechanical ventilation (general and/or local exhaust) to keep the airborn concentrations of vapors, mists, aerosols or dust below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation.

Respiratory protection : A respirator is not required in a well-ventilated area. Respiratory protection equipment (PPE) must be selected, fitted, maintained and inspected in accordance with regulations and CSA Standard Z 94.4 and approved by NIOSH / MSHA. In case of insufficient ventilation or in confined or enclosed space and for an assigned protection factor (APF) up to 10 times the exposure limit: wear a half mask respirator with appropriate cartridges fitted with P100 filters. For an APF until maximum 100 times of exposure limit, wear a full face respirator mask with appropriate cartridges and P100 filters. For concentrations higher than the Threshold Limit Value, wear any self-contained breathing apparatus that has a full face piece and is operated in a pressure-demand or other positive-pressure mode.

Skin protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved. Wear normal work clothing covering arms and legs as required by employer code. Wear an apron or long-sleeve protective coverall suit.

Eye / face protection : Wear chemical splash goggles. If risk of contact with eyes or the face, wear a face shield.

Hands : Wear nitrile or neoprene gloves. Disposable nitrile gloves can also be used, but discard after single use. Gloves must only be worn on clean hands. Wash gloves with water before removing them. After using gloves, hands should be washed and dried thoroughly. Before using, user should confirm impermeability. Discard gloves that show tears, pinholes, or signs of wear.

Other protective equipment : Wear safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : Solid in pellets, flakes or powder
Color : Yellow-green
Odor : Disagreeable
Odor threshold : N/Av
pH : N/Av
Melting/Freezing point : N/Av
Boiling point/range : N/Ap
Solubility in water : Soluble 37 g/100 g @ 20°C (68 °F)
Evaporation rate (BuAc = 1) : N/Av
Vapor pressure : N/Av
Volatiles (% by weight) : N/Av

Flammability (solid, gas) : Self-heating substance
Flammability limits (% by vol.) : N/Ap
Flash point : N/Ap
Auto-ignition temperature : > 120°C (248°F)
Sensibility to electrostatic charge : No
Sensibility to sparks/friction : No
Vapor density (Air = 1) : N/Av
Relative density (Water = 1) : 1.35 kg/L @ 20°C (68°F)
Partition coefficient (n-octanol/water) : -1.82
Decomposition temperature : > 119 °C (246.2°F)
Viscosity : N/Av
Molecular mass : N/Ap

10. STABILITY AND REACTIVITY

Reactivity : This product should not be mixed with acids since evolution of toxic and flammable hydrogen sulfide gas could result. Chemical of sodium alkyl xanthate in contact with water will emit carbon disulfide which is flammable. The dry powder or pellet form may also be flammable because of the presence of moisture in the product.

Chemical stability : Stable under recommended storage conditions.

Possibility of hazardous reactions (including polymerizations)

: Hazardous polymerization will not occur under recommended storage.

Conditions to avoid : Avoid contact with incompatible materials. Avoid generating dusty conditions. Avoid exposure of the solid Xanthate to heat or moisture and heating or aging of xanthate solutions. Avoid excessive heat and moisture.

Incompatible materials : Strong oxidizing agents (such as nitric acid, perchloric acid, peroxides, chlorates and perchlorates), strong acids, strong bases, flammable liquids.

Hazardous decomposition products

: Hydrogen sulfide (H_2S), carbon disulfide (CS_2).

11. TOXICOLOGICAL INFORMATION

Toxicological data

Chemical name	LC_{50} (Inhalation, rat)	LD_{50} / mg/kg (Oral, rat)	LD_{50} / mg/kg (Dermal, rabbit)
Sodium isopropyl xanthate	N/Av	1250	<1000
Isopropyl alcohol	66.1 mg/l/4h	5045	12870
Sodium carbonate	1.15 mg/l/4h	2800	>2000
Sodium hydroxide	N/Av	>140	1350
Sodium sulphide	N/Av	208	<340
Carbon disulfide	10.35 mg/l/4h	>2000	N/Av
Hydrogen sulfide	444 mg/l/4h	N/Av	N/Av

Likely routes of exposure

Skin : Yes
Eye : Yes
Inhalation : Yes
Ingestion : Yes

Potential Health Effects:

Signs and symptoms of delayed, immediate and chronic effects

Skin : May cause redness and irritation of the skin. The mechanical friction can increase skin irritation. The chemical compounds of this group, Sodium Alkyl Xanthate, are highly irritating to the skin in rabbits (OECD 404).

Eye : May cause severe eye irritation or eye damage. The chemical compounds of this group, Sodium Alkyl Xanthate, are severely irritating to the eyes (rabbits, OECD 405).

Inhalation : Overexposure may cause nose, throat and respiratory tract irritation. High concentrations may cause central nervous system depression characterized by headache, dizziness, vertigo, nausea, drowsiness and fatigue.

Ingestion : Harmful if swallowed. Swallowing will causes digestive tract disturbances resulting in nausea, vomiting, cramps and diarrhea.

Sensitization to material : The chemical compounds of this group, Sodium Alkyl Xanthate, were reported as potential sensitizers (OECD TG 409). There are not respiratory sensitizers.

IRAC/NTP Classification : No ingredients listed

Carcinogenicity : Ingredients present at levels greater than or equal to 0.1% of this product are not listed as a carcinogen by IARC, ACGIH, NIOSH, NTP or OSHA.

Mutagenicity : Ingredients in this product present at levels greater than or equal to 0.1% are not known to cause mutagenic effect.

Reproductive Effects : Ingredients in this product present at levels greater than or equal to 0.1% are not known to cause effects on reproduction.

Specific target organ effects – single exposure

: Central nervous system.

Specific target organ effects – repeated exposure

: No target organ is listed.

Other information : The oral acute toxicity estimate (ATE) of the mixture was calculated to be greater than 300 mg/Kg but lower than 2000 mg/kg. This value is classified according to GHS: Acute toxicity, oral (Category 4). The skin acute toxicity estimates (ATE) of the mixture was calculated to be greater than 200 mg/kg but lower than 1000 mg/Kg. This value is classified according to GHS: Acute toxicity, dermal (Category 3).

12. ECOLOGICAL INFORMATION

Ecotoxicity :

Fish - Oncorhynchus mykiss - Rainbow trout	LC_{50}	10 mg/L; 96 h (Sodium isopropyl xanthate) OECD 203
Aquatic Invertebrate - Daphnia magna (static)	EC_{50}	3.7 mg/L; 24 h (Sodium isopropyl xanthate) OECD 202
Fish - Puntius gonionotus - Fresh water	LC_{50}	0.0027 mg/L; 96 h (sodium sulfide) OECD 203
Aquatic Invertebrate - Indian prawn - Penaeus indicus	EC_{50}	0.063 mg/L; 96 h (sodium sulfide)

Persistence : Contains an ingredient that may be persistent in aquatic environment.

Degradability : Sodium Alkyl Xanthate is readily chemically decomposes to Isopropyl Alcohol and carbon disulfide, especially in the presence of moisture/water. These compound are readily biodegradable, >60% degraded in 8 days (OECD Guideline 301A).

Bioaccumulation potential : Sodium Alkyl Xanthate has a partition factors Log Kow of <0, indicating that it should not accumulate in the food chain.

Mobility in soil : The estimated Koc value of 6 to 24 suggests that Sodium Alkyl Xanthates are expected to have very high mobility in soil.

Other adverse environmental effects

: This chemical does not deplete the ozone layer.

13. DISPOSAL CONSIDERATIONS

Handling for Disposal : Important! Prevent waste generation. Use in full. DO NOT puncture, cut, heat or burn container, even after use. DO NOT throw residual to sewer, streams, sewers or drinking water supply. Return empty container properly labeled to supplier or everywhere there is a recovery program. Dispose via a licensed waste disposal contractor. Observe all federal, state/provincial and municipal regulations. If necessary consult the Department of Environment or the relevant authorities.

14. TRANSPORTATION INFORMATION

Regulatory Information	UN Number	UN proper shipping name	Transport hazard class(es)	Packing Group	Label
DOT	UN 3342	XANTHATES (SODIUM ISOPROPYL XANTHATE)	4.2	III	Spontaneously Combustible
Additional Information		This material is not listed as a marine pollutant. Permit required for transportation with proper placards displayed on vehicle.			
TDG	UN 3342	XANTHATES (SODIUM ISOPROPYL XANTHATE)	4.2	III	Spontaneously Combustible
Additional Information		Emergency response guidebook 2012 - 135			
IMO/IMDG	UN 3342	XANTHATES (SODIUM ISOPROPYL XANTHATE)	4.2	III	Spontaneously Combustible
Additional Information		Emergency schedules (EmS-No) F-A, S-J			

IATA	UN 3342	XANTHATES (SODIUM ISOPROPYL XANTHATE)	4.2	III	Spontaneously Combustible
Additional Information	This material is FORBIDDEN on Passenger Aircraft. Transport only on Cargo Aircraft.				

15 - REGULATORY INFORMATION

US Federal Information:

- Toxic Substance Control Act (TSCA)
  This material is listed in the TSCA Inventory or otherwise comply with TSCA requirements.
- EPCRA Section 313 Toxic Chemicals:
  Sodium hydroxide (CAS no 1310-73-2).
  Isopropyl alcohol (CAS no. 67-63-0).
- CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):
  Sodium hydroxide (CAS no 1310-73-2).
- Clean Water Act (CWA) Priority Pollutants:
  No material is listed.
- Clean Water Act (CWA) 311 Hazardous Substances:
  Sodium hydroxide (CAS no 1310-73-2).
- Clean Air Act (CAA) 111:
  Isopropyl alcohol (CAS no. 67-63-0).
- California Proposition 65:
  No material is listed.

Canadian Information:

- Canada DSL and NDSL:
  This product is on the Domestic Substances List (DSL) under Sodium diethyldithiocarbamate(CAS no 148-18-5)..
- Canadian National Pollutant Release Inventory Substances (NPRI):
  Isopropyl alcohol (CAS no. 67-63-0).

WHMIS 1988:

Class B4 : Flammable Solid
Class D2B : Toxic material causing other toxic effects
Class E : Corrosive material

NFPA

16. OTHER INFORMATION

Other special considerations for handling : Provide adequate information, instruction and training for operators.

Prepared by: Flottec, LLC **Revised by:** C. Yuen

REASON FOR REVISION: Section 1 – updated Flottec address, Section 14 – Updated additional information.

DISCLAIMER

The above information is believed to be accurate and represents the best information currently available to us. However, we make no warrantee of merchantability or any other warrant, expressed or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular uses.

END OF DOCUMENT

1. CHEMICAL PRODUCT – COMPANY IDENTIFICATION.

GHS Product name:	Zinc Sulphate Monohydrate.
Common / Trade names.	Zinc Sulphate Monohydrate. Zinc Sulphate Maximum 360 / 361 / 362 / 363 / 365
Application.	Fertilizers, intermediates, laboratory chemicals, processing aid not otherwise listed, pharmaceutical substance, surface active agents, lubricants and lubricant additives, fillers, some grades of this substance are available for food/feedstuff additives,
Company Identification.	Zinc Nacional, S.A. Serafín Peña 938 Sur. Monterrey N.L. México. C.P. 64000 Phone: +52 (81) 8345-4078 Fax +52 (81) 8344-3446.
Emergency telephone.	Business Hours: +52 (81) 8345-4078. 24 Hours: +52 (81) 8376-5730.

2. HAZARDS IDENTIFICATION.

- **Classification of the substance:** GHS Classification.

Acute aquatic toxicity (Category 1) H400; Chronic aquatic toxicity (Category 1) H410
Acute Tox. 4, H302; Eye Damage 1, H318

- **GHS label elements:**

Pictogram	Signal Word	Hazard Statements	Precautionary Statements
	Danger	H302 H318 H400 H410	P273 P301 + P312 P351

* For the full meaning of the phrases H and P: see section 16

3. COMPOSITION AND INFORMATION ON INGREDIENTS.

Component	CE N°	CAS N°	% (w/w)
Zinc Sulphate, $ZnSO_4$	231-793-3	7446-19-7	97.4

4. FIRST-AID MEASURES.

Description of first aid measures.

- **Ingestion:** Have victim rinse mouth thoroughly with water. "Do not induce vomiting". Immediately give large amounts of water. If vomiting occurs, rinse mouth and repeat administration of water. Obtain medical advice. Never give anything by mouth to an unconscious or convulsing person.
- **Inhalation:** If symptoms are experienced, remove source of contamination or move victim to fresh air. In case of breathing difficulties administer oxygen. If symptoms persist, obtain medical advice immediately.
- **Contact with eyes:** In case of eye contact, keep eyelid open and flush with plenty of water for 15 minutes. If irritation should persist subsequently consult an ophthalmologist. Protect the eye that is not injured.
- **Contact with skin:** After contact with skin, wash immediately with: Water. Subsequently wash again with: Water and soap. Take off immediately all contaminated clothing. If irritation persists, seek medical attention.

5. FIRE-FIGHTING MEASURE

- **Suitable extinguishing media:** Water sprays jet, water mist, foam and carbon dioxide (CO_2).
- **Unsuitable extinguishing media:** Full water jet.
- **Special hazards.** In case of fire may be liberated sulphur dioxide (SO_2) and Sulphur trioxide (SO_3).
- **Combustion decomposition products:** Sulphur dioxide (SO_2) and sulphur trioxide (SO_3) are generated.
- **Advice for firefighters:** Heating of container(s) will cause pressure rise with risk of bursting and subsequent explosion gives of toxic and irritant fumes when heated or burning. The vapor may be invisible and is heavier than air. It spreads along the ground and may enter sewers and basements. Keep container(s) cool with water. Extinguish with water fog (spray). Do not use water jet to extinguish. Use water spray to knock down fire fumes if possible. Avoid unnecessary run-off of extinguishing media which may cause pollution.
- **Personal protective equipment:** Wear self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES.

- **Personal precautions:** Use personal protective equipment (see section 8).
- **Environmental precautions:** Stop leaks if possible. Contain spillage by any means available. Cover drains. Do not allow to enter into soil/subsoil. Do not empty into drains or the aquatic environment.
- **Methods and material for containment and cleaning up:** Sweep spilled substance into containers. Carefully collect remainder, and then remove to safe place. Dispose according to regulations (see section 13).

7. HANDLING AND STORAGE.

- **Precautions for safe handling.**
  - Avoid spilling, skin and eye contact.
  - Use mechanical ventilation in case of handing which causes formation of dust.
  - Avoid inhalation of dust.
- **Conditions for safe storage, including any incompatibilities:**
  - Keep in the original container.
  - Keep in a fresh, dry and vented place.
  - Store away of strong acids or alkaline substances.
  - Store away of oxidizing or reducing materials.
  - Keep the container free of leaks.
  - Store away from hot surfaces and risk flame places.

8. EXPOSURE CONTROL / PERSONAL PROTECTION.

- **Exposure limits.**

Component	Mexico	USA	Europe
Zinc Sulphate	NOM-010-STPS (Mexico, 4/2014). LMPE-PPT: 10 mg/m³ 8 hours (powder). LMPE-CT: 10 mg/m³ 15 min (smoke). LMPE-PPT: 2 mg/m³ 8 hours (smoke).	OSHA PEL (2/2013). TWA: 5 mg/m³ 8 hours (Respirable fraction). TWA: 15 mg/m³ 8 hours (Total dust).	TWA 10 mg / m³ 8 hours (Total dust). TWA 4 mg / m³ 8 hours (Respirable fraction).

- **Exposure Controls:** Local and general ventilation, to ensure that concentration does not exceed the limits for occupational exposure. Consider enclosing the process. Ensuring control of process conditions. Replacement air supply to supply air continuously removed. Provide showers and eyewash stations.

- **Individual protection**

Eye Protection: Safety goggles are recommended.

Hand protection: Natural rubber gloves are recommended. Wash hands and face before eating, drinking or smoking.

Respiratory Equipment: P2 filter respirator for inert particles. Use NIOSH approved particulate respirator if dust generation occurs.

Other protection: Wear appropriate clothing to prevent reasonably probable skin contact. Chemical resistant safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES.

- **Appearance:** Solid powder or granule.
- **Color:** White.
- **Odor:** Odorless.
- **Molecular weight (g./mol):** 179.47
- **Relative density (g./cm3):** 3.35 20°C
- **Melting point:** 100°C (212°F).
- **Boiling point:** 500°C (932 °F).
- **Ph:** 4,5 – 6,5.
- **Solubility in water:** 45 g. of Zinc Sulfate in 100 g. (100 ml) of water at 78°F
- **Flash Point:** Not applicable.

10. STABILITY AND REACTIVITY.

Reactivity: Stable.

Chemical stability: Stable under ordinary conditions and storage.

Possibility of hazardous reactions: Reacts with peroxides and other radical forming substances.

Conditions to avoid: High temperatures and moisture.

Incompatible materials: Oxidizers (strong). Acids.

Hazardous decomposition products: In case of fire, sulfur oxides (Sox) are produced.

11. TOXICOLOGICAL INFORMATION.

Information on toxicological effects.

- **Acute toxicity.** Oral: LD50 = 564 to 2949 mg/kg bw. (Rat). Dermal: LD50 > 2000 mg/kg bw. (Rat).
- **Serious eye damage/irritation.** Strong irritant
- **STOT-single exposure.** Not toxic.
- **Reproductive toxicity.** Not toxic for reproduction.
- **STOT-repeated exposure.** Not toxic.
- **Skin corrosion/irritation.** Not irritant.
- **Respiratory or skin sensitization.** No sensitizing.
- **Aspiration hazard.** Not available.
- **Carcinogenicity.** Not carcinogen.
- **Germ cell mutagenicity.** Not mutagenic.

12. ECOLOGICAL INFORMATION.

Toxicity.

- **Ecotoxicity.** Aquatic invertebrates. For pH <7: 1.13 mg Zn/l (based on 48 h. Ceriodaphnia dubia test) Algae. For pH >7-8.5: 3.73 mg Zn/l (based on 72 h. Selenastrum capricornutum test)
- **Bioaccumulation.** Not available.
- **Mobility in soil.** Not available.
- **Results of PBT and mPmB.** Not available.
- **Persistence / degradability.** Not available.
- **Other adverse effects.** Not available.

13. DISPOSAL INFORMATION.

Waste treatment methods.

SUBSTANCE DISPOSAL: Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling where feasible.

CONTAINER DISPOSAL: Empty containers may contain hazardous residues. Do not cut, puncture or weld on or near to the container. Labels should not be removed from containers until they have been cleaned. Contaminated containers must not be treated as household waste. Containers should be cleaned by appropriate methods.

14. TRANSPORT INFORMATION.

- **Latin America**

This material is not regulated.

- **USA**

No DOT regulated in domestic (USA ground) transportation in package sizes less than 1000 lbs (454 kg). The DOT transportation information below is for shipments with package sizes equal to or exceeding this value. IMDG Regulated Marine Pollutant.

DOT

Basic shipping requirements:

UN number	UN 3077
Proper shipping name	Environmentally Hazardous Substance, Solid, N.O.S. (Zinc Sulphate Monohydrate RQ = 1000lbs.)
Hazard class	9
Packing group	III
Special precautions	Read safety instructions, SDS and emergency procedures before handling.
Additional Information:	
Special provisions	8, 146, 335, A112, B54, IB8, IP3, N20; T1, TP33
Packaging exceptions	155
Packaging non bulk	213
Packaging bulk	240
Reportable quantity	1000

- **European Union:**

Type of transport	Classification	UN Number	Proper shipping name	Class	Group Packing	Label
Land: Road Railroad	ADR RID	UN 3077	Environmentally Hazardous Substance, Solid, N.O.S. (Zinc Sulphate Monohydrate)	9	III	
Sea	IMO / IMDG					
Air	IATA / DGR					

15. REGULATORY INFORMATION.

- **Mexico.**

This material is not regulated.

- **USA**

SARA 302: RQ=None, TPQ=None.
SARA 311/312: Yes (Acute).
SARA 313: Zn and Pb Compounds.
RCRA 261: No
TSCA: No.

TSCA 8(d): No
TSCA 12 (b): No
Prop. 65: Yes (Pb, Cd).
CDTA: No

Florida: Yes
Pennsylvania: Yes
Minnesota: No
Massachusetts: Yes
New Jersey: Yes
California: Yes

- **Canada:**

Clasificación WHMIS: Not controlled
Lista de Sustancias Domesticas (DSL): No

- **Unión Europea:**

EINECS: No.
ELINCS: No.
REACH: Yes (01-2119474684-27-0023).

16. OTHER INFORMATION.

Hazard statements

H302: Harmful if swallowed.
H318: Causes serious eye damage.
H400: Very toxic to aquatic life
H410: Very toxic to aquatic life with long lasting effects.

Precautionary statements

P351: Rinse cautiously with water for several minutes.
P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P273: Avoid release to the environment.

- **Hazardous Materials Identification System, (HMIS)**

Health: 2 **Fire:** 0 **Reactivity:** 0 **Personal Protection:** E

Personal Protection: E (recommended only for bulk powder) = Gloves + Mask + Glasses

Definitions Classifications.

0 = Minimum **1** = Slight **2** = Moderate **3** = Serious **4** = Severe

This information is based upon calculated data. The company holds no responsibility for damage suffered by the purchaser or other persons handling these goods if safety instructions are not observed. The company holds no responsibility for the wrong use of this material, even if safety instructions have been followed. The purchaser is solely responsible for the use of this material.

SAFETY DATA SHEET

According to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name: **HYPERFLOC™ AF 309**

Type of product: Mixture.

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Processing aid for industrial applications.

Uses advised against: None.

1.3. Details of the supplier of the safety data sheet

Company:
SNF Inc.
1 Chemical Plant Road
Riceboro, GA 31323
United States

Telephone: 912-884-3366

Telefax: 912-884-8770

E-mail address: regs@snf.com

1.4. Emergency telephone number

24-hour emergency number: 800-424-9300 CHEMTREC (CCN 20412), Outside U.S. 703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to paragraph (d) of 29 CFR 1910.1200:

Not classified.

2.2. Label elements

Labelling according to paragraph (f) of 29 CFR 1910.1200:

Hazard symbol(s): None.

Signal word: None.

Hazard statement(s): None.

Precautionary statement(s): None.

2.3. Other hazards

Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable, this product is a mixture.

3.2. Mixtures

Hazardous components
Contains no reportable hazardous substances.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
Move to fresh air. No hazards which require special first aid measures.

Skin contact:
Wash off with soap and plenty of water. Get medical attention if irritation develops and persists.

Eye contact:
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of persistent eye irritation, consult a physician.

Ingestion:
Rinse mouth with water. Do NOT induce vomiting. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed

Powder can cause localised skin irritation in folds of the skin or under tight clothing. Moderate eye irritation due to effects all powders have on conjunctivae.

4.3. Indication of any immediate medical attention and special treatment needed

None reasonably foreseeable.

Other information:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.
Warning! Aqueous solutions or powders that become wet render surfaces extremely slippery.

Unsuitable extinguishing media:
None known.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products:
Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Ammonia (NH3). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

5.3. Advice for firefighters

Protective measures:
In the event of fire, wear self-contained breathing apparatus.

Other information:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

Protective equipment:
Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Emergency procedures:
Keep people away from spill/leak. Prevent further leakage or spillage if safe to do so.

6.2. Environmental precautions

As with all chemical products, do not flush into surface water.

6.3. Methods and material for containment and cleaning up

Small spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Large spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Residues:
After cleaning, flush away traces with water.

6.4. Reference to other sections

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations;

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Aqueous solutions or powders that become wet render surfaces extremely slippery. Use personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

Keep in a dry place. Keep container closed when not in use.
Incompatible with strong bases and oxidizing agents.

7.3. Specific end use(s)

This information is not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:
None known.

8.2. Exposure controls

Appropriate engineering controls:

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Individual protection measures, such as personal protective equipment:

a) Eye/face protection:
Safety glasses with side-shields. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

b) Skin protection:
i) Hand protection: PVC or other plastic material gloves. The selected protective gloves have to satisfy the specifications of EU Directive 89/689/EEC and the standard EN 374 derived from it.
ii) Other: Workclothes protecting arms, legs and body. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

c) Respiratory protection:
No personal respiratory protective equipment normally required. Dust safety masks recommended where working powder concentration is more than 10 mg/m^3. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

d) Additional advice:
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product. Wash hands before breaks and at the end of workday.

Environmental exposure controls:

Do not allow uncontrolled discharge of product into the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

a) Appearance:	Granular solid, White.
b) Odour:	None.
c) Odour Threshold:	Not applicable.
d) pH:	5 - 9 @ 5 g/L (See Technical Bulletin or Product Specifications for a more precise value, if available)
e) Melting point/freezing point:	> 150°C
f) Initial boiling point and boiling range:	Not applicable.
g) Flash point:	Not applicable.
h) Evaporation rate:	Not applicable.
i) Flammability (solid, gas):	No data available.
j) Upper/lower flammability or explosive limits:	Not expected to create explosive atmospheres.
k) Vapour pressure:	Not applicable.
l) Vapour density:	Not applicable.
m) Relative density:	0.6 - 0.9 (See Technical Bulletin or Product Specifications for a more precise value, if available)
n) Solubility(ies):	Soluble in water.
o) Partition coefficient:	-2
p) Autoignition temperature:	Does not self-ignite (based on the chemical structure).
q) Decomposition temperature:	> 150°C
r) Viscosity:	See Technical Bulletin.
s) Explosive properties:	Kst = 0 Non-flammable to ignition sources of less than 2.5 kJ.
t) Oxidizing properties:	Not expected to be oxidising based on the chemical structure.

9.2. Other information

None.

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Oxidizing agents may cause exothermic reactions. Contact with strong bases liberates ammonia.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

Incompatible with strong bases and oxidizing agents.

10.6. Hazardous decomposition products

Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Ammonia (NH3). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Information on the product as supplied:

Acute oral toxicity:	LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 5000 mg/kg.
Acute inhalation toxicity:	The product is not expected to be toxic by inhalation.
Skin corrosion/irritation:	Not irritating.
Serious eye damage/eye irritation:	Not irritating.
Respiratory/skin sensitisation:	Not sensitizing.
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic.
Reproductive toxicity:	Not toxic for reproduction.
STOT - Single exposure:	No known effects.
STOT - Repeated exposure:	No known effect.

Aspiration hazard: No hazards resulting from the material as supplied.

SECTION 12: Ecological information

12.1. Toxicity

Information on the product as supplied:

Acute toxicity to fish:	LC50/Danio rerio/96 hours > 100 mg/L (OECD 203) LC50/Fathead minnow/96 hours > 100 mg/L (OECD 203)
Acute toxicity to invertebrates:	EC50/Daphnia magna/48 hours > 100 mg/L (OECD 202)
Acute toxicity to algae:	IC50/Scenedesmus subspicatus/72 hours > 100 mg/L (OECD 201)
Chronic toxicity to fish:	No data available.
Chronic toxicity to invertebrates:	No data available.
Toxicity to microorganisms:	No data available.
Effects on terrestrial organisms:	No known effects.
Sediment toxicity:	No data available.

12.2. Persistence and degradability

Information on the product as supplied:

Degradation:	Not readily biodegradable.
Hydrolysis:	Does not hydrolyse.
Photolysis:	No data available.

12.3. Bioaccumulative potential

Information on the product as supplied:

Not bioaccumulating.

Partition co-efficient (Log Pow):	-2
Bioconcentration factor (BCF):	~0

12.4. Mobility in soil

Information on the product as supplied:

None.

12.5. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste from residues/unused products:

Dispose in accordance with local and national regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Contaminated packaging:

Rinse empty containers with water and use the rinse-water to prepare the working solution. If recycling is not practicable, dispose of in compliance with local regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Recycling:

In accordance with local and national regulations.

SECTION 14: Transport information

Land transport (DOT)

Not classified.

Sea transport (IMDG)

Not classified.

Air transport (IATA)

Not classified.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Information on the product as supplied:

TSCA Chemical Substances Inventory:

All components of this product are either listed as active on the inventory or are exempt from listing.

US SARA Reporting Requirements:

SARA (Section 311/312) hazard class:
Not concerned.

SARA Title III Sections:

Section 302 (TPQ) - Reportable Quantity:
Not concerned.

Section 304 - Reportable Quantity:
Not concerned.

Section 313 (De minimis concentration):
Not concerned.

Clean Water Act

Section 311 Hazardous Substances (40 CFR 117.3) - Reportable Quantity:
Not concerned.

Clean Air Act

Section 112(r) Accidental release prevention requirements (40 CFR 68) - Reportable Quantity:
Not concerned.

CERCLA

Hazardous Substances List (40 CFR 302.4) - Reportable Quantity:
Not concerned.

RCRA status :

Not RCRA hazardous.

California Proposition 65 Information:

WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide

SECTION 16: Other information

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0

HMIS:

Health:	0
Flammability:	0
Physical Hazard:	0
PPE Code:	B

This data sheet contains changes from the previous version in section(s):

SECTION 8. Exposure controls/personal protection, SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Acronyms
STOT = Specific target organ toxicity

Training advice:

Do not handle until all safety precautions have been read and understood.

This SDS was prepared in accordance with the following:

U.S. Code of Federal Regulations 29 CFR 1910.1200

Version: 20.01.b

PRAC001

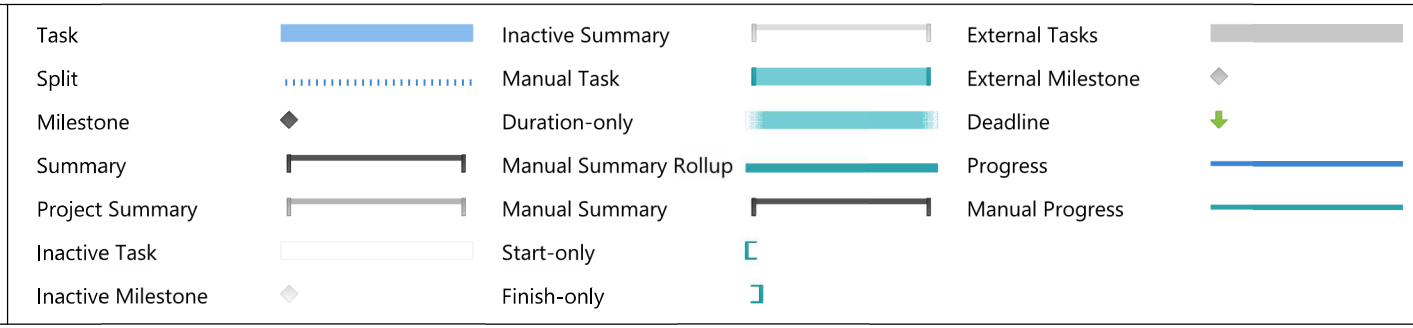
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered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

Appendix 3

Construction Schedule

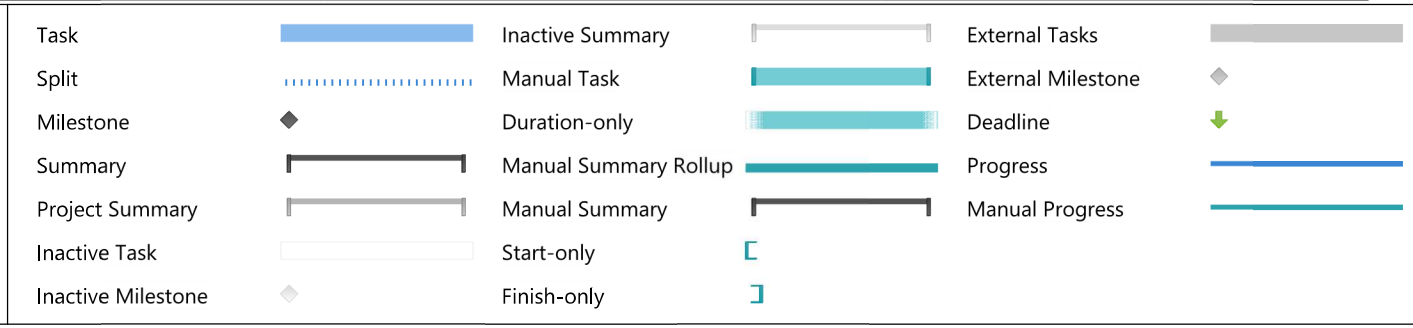
ID	Task Mode	Equipment Number	Task Name	Duration	Start	Finish
69		700-SLP-06	Reagent Process Equipment and Piping	45 days	Fri 5/14/21	Mon 7/5/21
70		700-SLP-08	Reagent Process Equipment and Piping	45 days	Fri 5/14/21	Mon 7/5/21
72		700-SLP-04	Reagent Process Equipment and Piping	45 days	Fri 5/14/21	Mon 7/5/21
74		700-AGA-22	Reagent Process Equipment and Piping	45 days	Fri 5/14/21	Mon 7/5/21
76		700-AGA-23	Reagent Process Equipment and Piping	45 days	Fri 5/14/21	Mon 7/5/21
95		700-SLP-01A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
96		700-SLP-01B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
97		700-PPM-22	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
98		700-TKO-01	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
99		700-PPM-01	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
100		700-PPM-02	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
101		700-SLP-02A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
102		700-SLP-02B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
103		700-PPM-23	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
104		700-TKO-02	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
105		700-PPM-03	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
106		700-SLP-03A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
107		700-SLP-03B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
108		700-PPM-24	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
109		700-TKO-03	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
110		700-PPM-04	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21

Project: Project1
Date: Thu 4/15/21



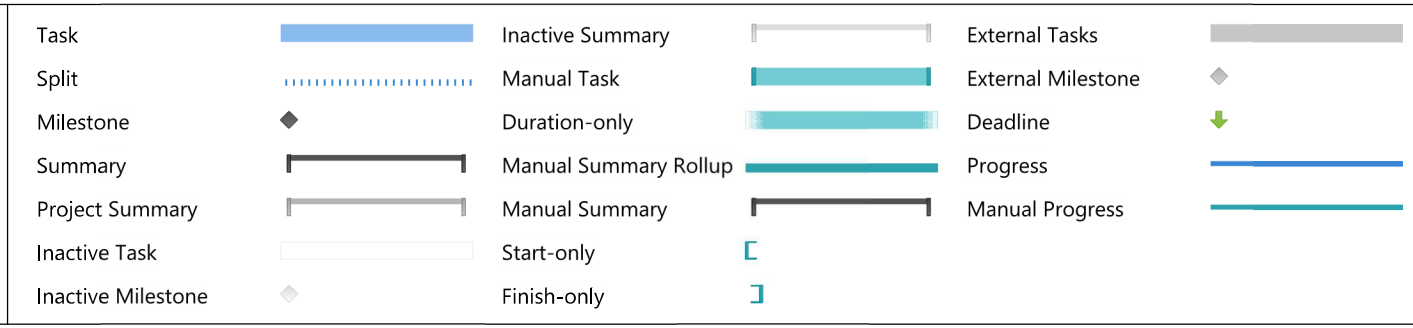
ID	Task Mode	Equipment Number	Task Name	Duration	Start	Finish
111		700-PPM-05	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
112		700-PPM-15	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
113		700-TKO-04	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
114		700-PPM-25	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
115		700-TKO-05	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
116		700-PPM-07	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
117		700-PPM-08	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
118		700-PPM-09	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
119		700-PPM-10	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
120		700-PPM-21	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
122		700-PPM-26	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
123		700-TKO-07	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
124		700-PPM-06	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
125		700-PPM-19	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
127		700-PPM-09	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
128		700-TKO-09	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
129		700-PPM-11	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
130		700-PPM-12	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
131		700-PPM-13	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
133		700-TKO-10	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
134		700-PPM-28	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
135		700-TKO-11	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
136		700-PPM-14	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21

Project: Project1
Date: Thu 4/15/21



ID	Task Mode	Equipment Number	Task Name	Duration	Start	Finish
137		700-PPM-18	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
138		700-TKO-24	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
139		700-AGI-22	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
141		700-PPM-33	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
142		700-TKO-25	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
143		700-PPM-34A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
144		700-PPM-34B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
145		700-PPS-05	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
146		700-PPM-20	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
147		700-DUC-01	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
149		700-PPM-16A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
150		700-PPM-16B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
151		700-PPM-16C	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
152		700-PPM-17A	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
153		700-PPM-17B	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
154		700-PPS-04	Reagent Process Equipment and Piping	45 days?	Fri 5/14/21	Mon 7/5/21
167		700 Foundation	700 Reagent Bld Foundation	20 days	Mon 4/19/21	Tue 5/11/21
168		700 Steel Erection	700 Reagent Bld. Erection	15 days	Tue 5/11/21	Tue 5/18/21
171		700 Sheeting	700 Reagent Bld. Sheeting	20 days	Wed 5/19/21	Thu 6/10/21

Project: Project1
Date: Thu 4/15/21



Appendix 4

QA/QC Documentation

CONCRETE TEST RESULTS

PROJECT:	Ouray Silver Mines	**PROJECT NO.:**	M20075MT
LOCATION:	Yankee Boy Basin		
CLIENT:		**FIELD TECHNICIAN:**	others

FIELD TEST RESULTS

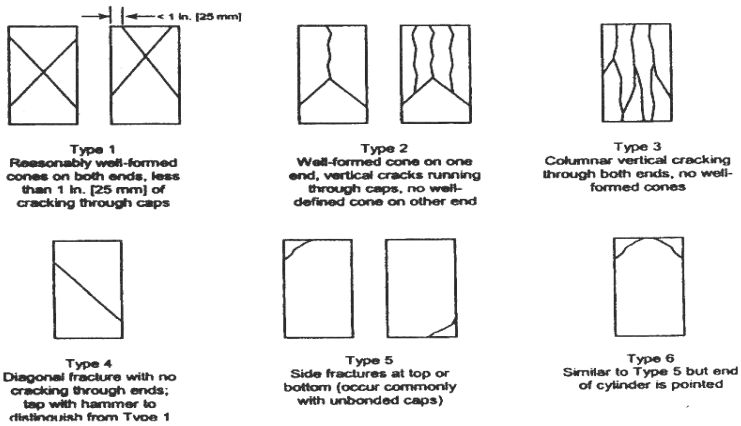
DATE PLACED:	2/1/2021	**TIME MIXED:**		**SLUMP (IN) :**	
TRUCK NO.:		**TIME ARRIVED:**		**AIR CONTENT (%) :**	
TICKET NO.:		**TIME PLACED:**		**UNIT WT. (PCF) :**	
NUMBER CYLS. MOLDED:		**TIME MOLDED:**		**CONC. TEMP. (F):**	
CURING:		**WATER ADDED (GALS):**		**AIR TEMP (F) :**	
CONCRETE SUPPLIER:					
LOCATION OF POUR:					

LABORATORY NO.: 5064

SAMPLE AGE:	7 Day	28 Day	28 Day	28 Day	56 Hold
CYLINDER DESIGNATION:	A	B	C	D	E
DATE TESTED:	2/8/21	3/1/21	3/1/21	3/1/21	3/29/21
TESTED BY:	AC	AC	AC	AC	
CYLINDER DIAMETER:	4.00	4.00	4.00	4.00	4.000
CYLINDER AREA:	12.57	12.57	12.57	12.57	12.57
CYLINDER UNIT WEIGHT:	140	140	140	139	140
TOTAL LOAD (POUNDS - FORCE):	42,700	65,190	62,980	64,760	
COMPRESSIVE STRENGTH (PSI):	3400	5190	5010	5150	pull
TYPE OF FRACTURE:	T5	T3	T5	T5	

REMARKS:

DESIRED STRENGTH:



Lambert and Associates

Project No.:	M20075MT
Date:	
Figure:	Page 1 of 1

CONCRETE TEST RESULTS

PROJECT:	Ouray Silver Mines	**PROJECT NO.:**	M20075MT
LOCATION:	Yankee Boy Basin		
CLIENT:	Brahma Group	**FIELD TECHNICIAN:**	Al Woods

FIELD TEST RESULTS

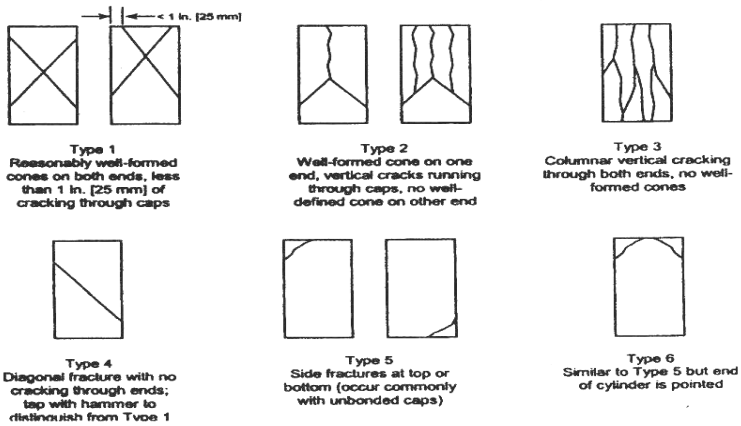
DATE PLACED:	12/8/2020	**TIME MIXED:**	9:06 AM	**SLUMP (IN) :**	3.5
TRUCK NO.:	56227	**TIME ARRIVED:**	11:30 AM	**AIR CONTENT (%) :**	5.9
TICKET NO.:	32035536	**TIME PLACED:**	11:40 AM	**UNIT WT. (PCF) :**	
NUMBER CYLS. MOLDED:	4	**TIME MOLDED:**	11:45 AM	**CONC. TEMP. (F):**	63
CURING:		**WATER ADDED (GALS):**		**AIR TEMP (F) :**	30
CONCRETE SUPPLIER:	United Companies				
LOCATION OF POUR:	Building footings				

LABORATORY NO.: 5054

SAMPLE AGE:	7 Day	28 Day	28 Day	56 Hold
CYLINDER DESIGNATION:	A	B	C	D
DATE TESTED:	12/12/20	1/5/20	1/5/20	2/2/20
TESTED BY:	AW	DH	DH	
CYLINDER DIAMETER:	4.00	4.00	4.00	4.00
CYLINDER AREA:	12.57	12.57	12.57	12.57
CYLINDER UNIT WEIGHT:	139	138	139	139
TOTAL LOAD (POUNDS - FORCE):	49,010	71,640	67,230	
COMPRESSIVE STRENGTH (PSI):	3900	5700	5350	pull
TYPE OF FRACTURE:	T5	T3	T3	

REMARKS:

DESIRED STRENGTH: 4500



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Project No.:	M20075MT
Date:	
Figure:	Page 1 of 1

BRAHMA GROUP, INC.

DAILY LOG

DATE February 1st 2021 DAY OF WEEK Monday SHIFT (DAY) / NIGHT

JOB NAME Quay Silver BGI JOB# 14-20-1094 CUSTOMER PO#

WORK PERFORMED TODAY

4 - 4hrs guys clearing pads for walk ways, uncovering wall get ready for concrete Pour 58cy of concrete on fire wall finish cut for construction joint. (Waste = x2 Yds) Set heater hose on wall up/down to spread heat / cover with concrete blankets.

CHANGE ORDER AGREEMENTS

KEY VERBAL AGREEMENTS

PROBLEMS/DELAYS

None

EQUIPMENT	QTY	VENDOR (IF RENTED) OR BGI
Ground Heater	24 hrs	
pump truck	8	

MATERIAL PURCHASED	VENDOR

JSA COMPLETED BY: Sergio Camacho

PERMITS COMPLETED BY:

WEATHER CONDITIONS

AM TEMP 30's PM TEMP 46°

WORK FORCE	HEADCOUNT
PROJECT MANAGER	
CONSTRUCTION MGR	
SUPERINTENDENT	1
~~GENERAL~~ FOREMAN	1
SAFETY	
PIPE COMBO WELDER	
STRUCTURAL WELDER	
MILLWRIGHT	
PIPEFITTER	
MECHANIC CRAFTSMAN	
EQUIPMENT OPERATOR (Pump truck)	1
CRAFT HELPER	3
FIRE/HOLE WATCH	
FIELD ADMINISTRATION	
ELECTRICAL	
OTHER	
TOTAL	

SUBCONTRACTOR	HEADCOUNT

BGI SIGNATURE _____ CUSTOMER SIGNATURE _____