SOIL

Sampling Point: DP 25

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture[3]	Remarks
0-20	7.5 YR 3/2	95					silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks: No gleying, no redox, no hydric indicator. Unable to obtain sample below 20" because of rocks.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches): _____

Water Table Present? Yes ○ No ◉ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches): _____

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: This are is a colluvium with a lot of channelling. Potential hydrology during spring from snow melt. Area is rocky and very porous however.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 26

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.975033 N | Long: -107.750509 W | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ◉

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ○	No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○	No ◉	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot Size)			
1. *Juncus arcticus*	40	Yes	FACW
2. *Bromus ciliatus*	20	Yes	FAC
3. *Elytrigia repens*	20	Yes	FAC
4.			
5.			
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 50 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: DP 26

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture[3]	Remarks
0-18	10 YR 2/1	95					gravely	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks: No redox or gleying

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches): _____

Water Table Present? Yes ○ No ◉ Depth (inches): _____

Saturation Present? Yes ○ No ◉ Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 27

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.975046 | Long: -107.750599 | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ◉

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ◉	No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉	No ○	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum Plot Size			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum Plot Size			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum Plot Size			
1. *Juncus arcticus*	50	Yes	FACW
2. *Elytrigia repens*	30	Yes	FAC
3. *Geum macrophyllum*	5		FACW
4. *Urtica dioica*	2		FAC
5.			
6.			
7.			
8.			
	87 = Total Cover		
Woody Vine Stratum Plot Size			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 10 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals:	(A) (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: DP 27

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture[3]	Remarks
0-11	7.5 YR 3/3	50	7.5 YR 5/8	50	C	M	gravely	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [x] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1) (except MLRA 1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [ ] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- [ ] 2 cm Muck (A10)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes (●) No ( )

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B6)
- [ ] Iron Deposits (B6)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- [ ] Salt Crust (B11)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Stunted or Stressed Plants (D1) (LRR A)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Raised Ant Mounds (D6) (LRR A)
- [ ] Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present?	Yes ( )	No ( )	Depth (inches):	
Water Table Present?	Yes ( )	No ( )	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes (●)	No ( )	Depth (inches):	10 inches

Wetland Hydrology Present? Yes (●) No ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 28

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.9742 N | Long: -107.750338 W | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ● (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ●

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ●	No ○	
Hydric Soil Present?	Yes ○	No ●	**Is the Sampled Area within a Wetland?** Yes ○ No ●
Wetland Hydrology Present?	Yes ○	No ●	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot Size)			
1. *Elymus repens*	40	Yes	FAC
2. *Bromus ciliatus*	20	Yes	FAC
3. *Urtica dioica*	20	Yes	FAC
4. *Juncus arcticus*	20	Yes	FACW
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 10 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ● No ○

Remarks:

SOIL

Sampling Point: DP 28

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-18	10 YR 2/1	90					gravely	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: Rock below 18. Very coarse gravel throughout sample. No water present, no hydric characteristics present

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? Yes ○ No ◉ Depth (inches):
(includes capillary fringe)

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 29

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.974726 N | Long: -107.750344 W | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ◉

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ◉	No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉	No ○	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1. *Salix geyeriana*	30	Yes	OBL
2. *Salix monticola*	30	Yes	OBL
3.			
4.			
5.			
	60 = Total Cover		
Herb Stratum (Plot Size)			
1. *Juncus arcticus*	20	Yes	FACW
2. *Carex utriculata*	20	Yes	OBL
3. *Cardamine cordifolia*	25	Yes	FACW
4. *Saxafraga odontoloma*	20	Yes	OBL
5.			
6.			
7.			
8.			
	85 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 5 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: DP 29

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-6	10YR 2/1	50	7.5 YR 6/8	50	C	M	gravely	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☒ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ◉ No ○

Remarks: Unable to go deeper than 6 inches due to rocks

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ○ Depth (inches):

Water Table Present? Yes ○ No ○ Depth (inches):

Saturation Present? Yes ◉ No ○ Depth (inches): 6

(includes capillary fringe)

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 30

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.975515 N | Long: -107.748678 W | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes ( ) No ( )

Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )
Hydric Soil Present?	Yes ( )	No (●)
Wetland Hydrology Present?	Yes ( )	No (●)

Is the Sampled Area within a Wetland? Yes ( ) No (●)

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at a 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1. *Salix geyeriana*	5	Yes	OBL
2. *Salix monticola*	2	Yes	OBL
3.			
4.			
5.			
	7 = Total Cover		
Herb Stratum (Plot Size)			
1. *Carex pellita*	60	Yes	OBL
2. *Juncus arcticus*	30	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 30 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

[X] Dominance Test is >50%

Prevalence Index is ≤3.0[1]

[ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

[ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: DP 30

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture[3]	Remarks
0-12	10 YR 2/1	95					Gravely	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: Dug 12 inches down, very rocky. No sign of hydrology or hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches):

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 31

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.975657 N | Long: -107.750851 W | Datum: NAD 83

Soil Map Unit Name: Moran very gravelly loam | NWI classification: PSSB

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ● (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ●

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ●	No ○	
Hydric Soil Present?	Yes ○	No ●	**Is the Sampled Area within a Wetland?** Yes ○ No ●
Wetland Hydrology Present?	Yes ○	No ●	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1. *Salix montcola*	10	Yes	OBL
2. *Salix geyeriana*	10	Yes	OBL
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot Size)			
1. *Achille millefolium*	30	Yes	FACU
2. *Taraxacum officale*	20	Yes	FACU
3. *Elymus repens*	30	Yes	FAC
4. *Trifolium repens*	20	Yes	FAC
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 35 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ● No ○

Remarks:

SOIL

Sampling Point: DP 31

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-15	7.5 YR 3/3	95						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ○ No ◉

Remarks: Very rocky no hydric characteristics

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches):

Water Table Present? Yes ○ No ◉ Depth (inches):

Saturation Present? Yes ○ No ◉ Depth (inches):
(includes capillary fringe)

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 32

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.975647 N | Long: -107.750868 W | Datum: NAD 83

Soil Map Unit Name: Moran very gravelly loam | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ◉

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ◉	No ○	**Is the Sampled Area within a Wetland?** Yes ◉ No ○
Wetland Hydrology Present?	Yes ◉	No ○	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1. *Salix geyeriana*	20	Yes	OBL
2. *Salix monticola*	30	Yes	OBL
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum (Plot Size)			
1. *Poa pratensis*	20	Yes	FAC
2. *Carex microptera*	20	Yes	FACU
3. *Deschampsia cespitosa*	30	Yes	FACW
4. *Troflium repens*	30	Yes	FAC
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 35 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: DP 32

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-10	7.5 YR 3/3	90					Sandy Soil	
10-12	7.5 YR 3/3	90						Oxidized rhizospheres present

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- [ ] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [x] Hydrogen Sulfide (A4)
- [ ] Depleted Below Dark Surface (A11)
- [ ] Thick Dark Surface (A12)
- [ ] Sandy Mucky Mineral (S1)
- [ ] Sandy Gleyed Matrix (S4)
- [ ] Sandy Redox (S5)
- [ ] Stripped Matrix (S6)
- [ ] Loamy Mucky Mineral (F1) (except MLRA 1)
- [ ] Loamy Gleyed Matrix (F2)
- [ ] Depleted Matrix (F3)
- [x] Redox Dark Surface (F6)
- [ ] Depleted Dark Surface (F7)
- [ ] Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- [ ] 2 cm Muck (A10)
- [ ] Red Parent Material (TF2)
- [ ] Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes (•) No ( )

Remarks: sandy soil, few hydric characteristics, minimum amounts of oxidized rhizospheres.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [x] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B6)
- [ ] Iron Deposits (B6)
- [ ] Surface Soil Cracks (B6)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- [ ] Salt Crust (B11)
- [ ] Aquatic Invertebrates (B13)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres along Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Stunted or Stressed Plants (D1) (LRR A)
- [ ] Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- [ ] Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- [ ] Drainage Patterns (B10)
- [ ] Dry-Season Water Table (C2)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] FAC-Neutral Test (D5)
- [ ] Raised Ant Mounds (D6) (LRR A)
- [ ] Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present?	Yes ( )	No ( )	Depth (inches):	
Water Table Present?	Yes ( )	No ( )	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes (•)	No ( )	Depth (inches):	12

Wetland Hydrology Present? Yes (•) No ( )

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 5/22/13

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 33

Investigator(s): WWE: LRR, MAJ | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): 0-5 %

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.974591 N | Long: -107.754788 W | Datum: NAD 83

Soil Map Unit Name: Dumps, Mine | NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )	
Hydric Soil Present?	Yes (●)	No ( )	**Is the Sampled Area within a Wetland?** Yes (●) No ( )
Wetland Hydrology Present?	Yes (●)	No ( )	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at a 10,600 feet above sea level, typically this area would not be assessable until July. The project area is located at a previously active mine site, soils and vegetation have been disturbed and a pond has been created. 2013 was below average snowpack.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum Plot Size			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum Plot Size			
1. *Salix monticola*	50	Yes	OBL
2.			
3.			
4.			
5.			
	50 = Total Cover		
Herb Stratum Plot Size			
1. *Calamagrostis canadensis*	90	Yes	FACW
2. *Draba albertina*	5		FAC
3.			
4.			
5.			
6.			
7.			
8.			
	95 = Total Cover		
Woody Vine Stratum Plot Size			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

[X] Dominance Test is >50%

Prevalence Index is ≤3.0[1]

[ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

[ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: DP 33

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-14	5/10B	30	Redox	20	C	RC	C	
0-14	2.5 Y 6/2	50						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ◉ No ○

Remarks: Gleying and mottling, oxidized root channels

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ○ Depth (inches): _____

Water Table Present? Yes ○ No ○ Depth (inches): _____

Saturation Present? Yes ◉ No ○ Depth (inches): 12

(includes capillary fringe)

Wetland Hydrology Present? Yes ◉ No ○

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 5/22/13

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 34

Investigator(s): WWE: LRR, MAJ | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): 0-5 %

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.97461 N | Long: -107.754825 W | Datum: NAD 83

Soil Map Unit Name: Moran very gravelly loam | NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes (●) No ( ) (If no, explain in Remarks.)

Are Vegetation [X] Soil [X] or Hydrology [X] significantly disturbed? Are "Normal Circumstances" present? Yes (●) No ( )

Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes (●)	No ( )	
Hydric Soil Present?	Yes ( )	No (●)	**Is the Sampled Area within a Wetland?** Yes ( ) No ( )
Wetland Hydrology Present?	Yes ( )	No (●)	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at a 10,600 feet above sea level, typically this area would not be assessable until July. The project area is located at a previously active mine site, soils and vegetation have been disturbed and a pond has been created. 2013 was below average snowpack.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Picea engelmanni*	10	Yes	FAC
2.			
3.			
4.			
	10 = Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot Size)			
1. *Deschampsia caespitosa*	80	Yes	FACW
2. *Draba albertina*	5		FAC
3.			
4.			
5.			
6.			
7.			
8.			
	85 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____ %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals:	(A) (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- [X] Dominance Test is >50%
- Prevalence Index is ≤3.0[1]
- [ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- [ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (●) No ( )

Remarks:

SOIL

Sampling Point: DP 34

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture[3]	Remarks
0-13	10 YR 4/4	80					SL	
13-15	1o YR 2/2	95						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ○ Depth (inches): _____

Water Table Present? Yes ○ No ○ Depth (inches): _____

Saturation Present? Yes ○ No ○ Depth (inches): _____

(includes capillary fringe)

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 35

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.9737 N | Long: -107.7512 W | Datum: WGS 84

Soil Map Unit Name: Moran very gravelly loam | NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ◉ (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ◉

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ◉	No ○	
Hydric Soil Present?	Yes ○	No ◉	**Is the Sampled Area within a Wetland?** Yes ○ No ◉
Wetland Hydrology Present?	Yes ○	No ◉	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at a 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

Tree Stratum (Plot Size)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot Size)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot Size)			
1. *Bromus inermis*	10	Yes	FAC
2. *Rumex densiflorus*	50	Yes	FACW
3. *Phleum pratense*	10	Yes	FAC
4. *Achillea lanulosa*	5		FACU
5. *Fragaria virginiana*	5		FACU
6.			
7.			
8.			
	80 = Total Cover		
Woody Vine Stratum (Plot Size)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 40 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ◉ No ○

Remarks:

SOIL

Sampling Point: DP 35

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2						silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[4]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks: Coarse gravel with silty loam soil. Unable to obtain sample deeper than 12" because of rocks. Found no hydric soil indicators, gleying, or redox. Hand removed many rocks and used pick axe to get to 12". Dug several other test soil pits in this location with the same result.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches): _____

Water Table Present? Yes ○ No ◉ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches): _____

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Waste rock and alluvial fan feature, very porous. No spring, seeps, or surface water runoff channels were identified across this slope.

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys and Coast Region

Project/Site: Revenue Mine | City/County: Camp Bird, Ouray | Sampling Date: 10/5/12

Applicant/Owner: Silver Star Resources | State: CO | Sampling Point: DP 36

Investigator(s): WWE: MAJ, LR | Section, Township, Range: Sec. 21 T43N R8W

Landform (hillslope, terrace, etc.): Valley | Local relief (concave, convex, none): None | Slope (%): < 2%

Subregion (LRR): E - RM Forests & Rangeland | Lat: 37.9737 N | Long: -107.7512 W | Datum: WGS 84

Soil Map Unit Name: Dumps, Mine | NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ○ No ● (If no, explain in Remarks.)

Are Vegetation ☒ Soil ☒ or Hydrology ☒ significantly disturbed? Are "Normal Circumstances" present? Yes ○ No ●

Are Vegetation ☐ Soil ☐ or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ●	No ○	
Hydric Soil Present?	Yes ○	No ●	**Is the Sampled Area within a Wetland?** Yes ○ No ●
Wetland Hydrology Present?	Yes ○	No ●	

Remarks: 2012 was an unusually dry year with a snow pack below average. The site is at a 10,600 feet above sea level. The project area is located at a mine that has been periodically active for over 100 years. Vegetation, soils, and hydrology have been significantly disturbed from permitted mining activities.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum Plot Size			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum Plot Size			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum Plot Size			
1. *Bromus inermis*	10	No	FAC
2. *Rumex densiflorus*	50	Yes	FACW
3. *Phleum pratense*	5	No	FAC
4. *Achillea lanulosa*	5	No	FACU
5. *Fragaria virginiana*	5	No	FACU
6. *Aconitum spp.*	5	No	FACW
7. *Polemonium spp.*	5	No	
8. *Veratrum tenuipelalum*	5	No	Not Listed
	90 = Total Cover		
Woody Vine Stratum Plot Size			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 40 %

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%

Prevalence Index is ≤3.0[1]

☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ● No ○

Remarks:

SOIL

Sampling Point: DP 36

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture[3]	Remarks
0-12	7.5 YR 3/2						silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.
[3]Soil Textures: Clay, Silty Clay, Sandy Clay, Loam, Sandy Clay Loam, Sandy Loam, Clay Loam, Silty Clay Loam, Silt Loam, Silt, Loamy Sand, Sand.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (except MLRA 1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils:[4]

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distrubed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ○ No ◉

Remarks: Coarse gravel with silty loam soil. Unable to obtain sample deeper than 12" because of rocks. Found no hydric soil indicators, gleying, or redox. Hand removed many rocks and used pick axe to get to 12". Dug several other test soil pits in this location with the same result.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B6)
- ☐ Iron Deposits (B6)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) (no MLRA 1,2,4 A&B
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) (LRR A)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Stained Leaves (B9) (MLRA 1,2, 4 A&B
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) (LRR A)
- ☐ Frost- Heave Hummucks (D7)

Field Observations:

Surface Water Present? Yes ○ No ◉ Depth (inches): _____

Water Table Present? Yes ○ No ◉ Depth (inches): _____

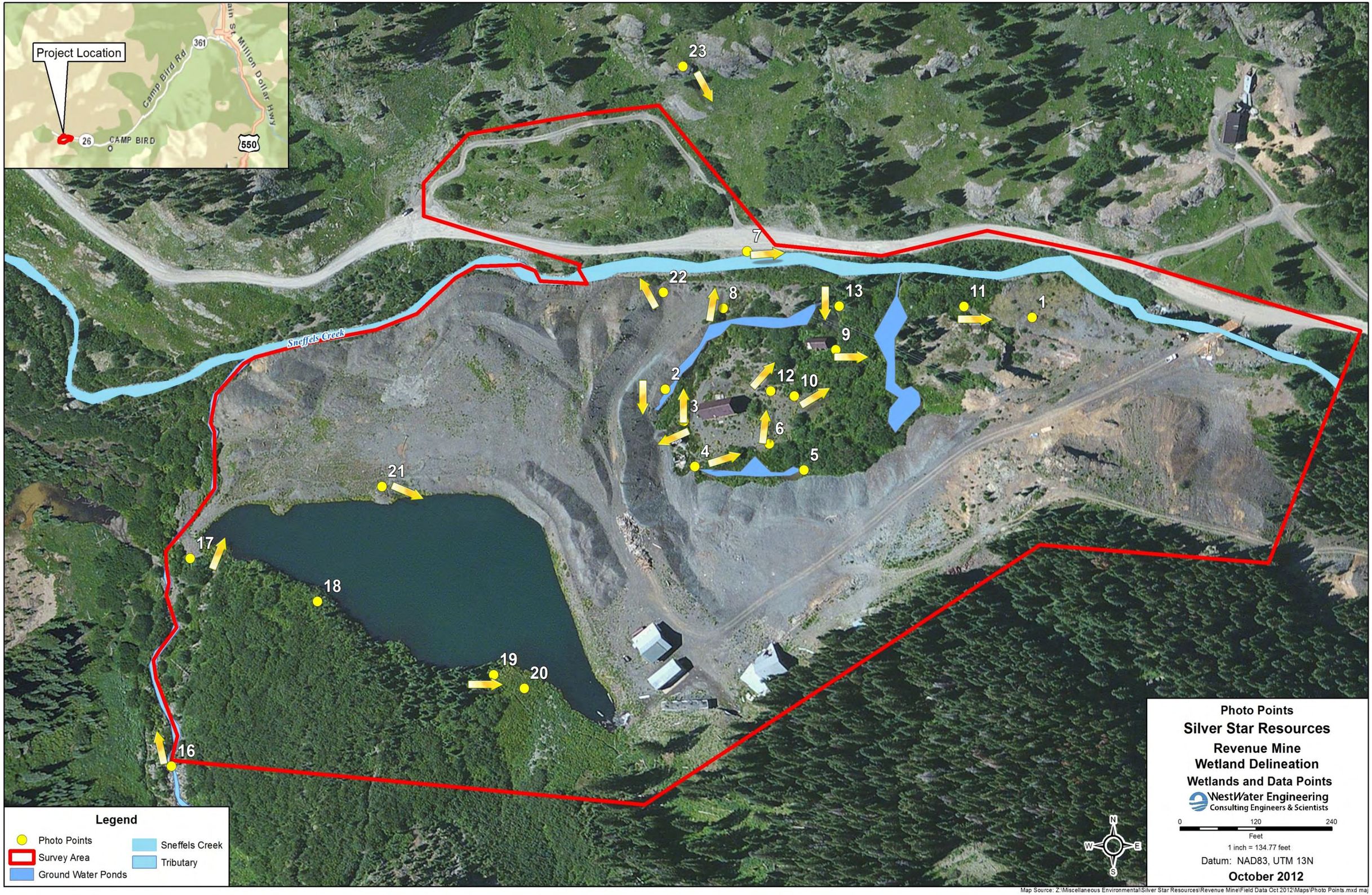
Saturation Present? (includes capillary fringe) Yes ○ No ◉ Depth (inches): _____

Wetland Hydrology Present? Yes ○ No ◉

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Waste rock and alluvial fan feature, very porous. No spring, seeps, or surface water runoff channels were identified across this slope.

APPENDIX D
Revenue Mine Photos
October 2012 and May 2013



Map Source: Z:\Miscellaneous Environmental\Silver Star Resources\Revenue Mine\Field Data Oct 2012\Maps\Photo Points.mxd maj

Revenue Mine Photos October 2012

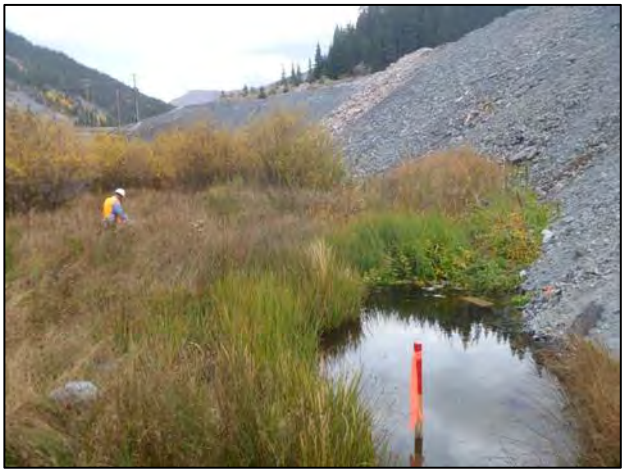
Point 1- Marmot Burrow near Non Wetland Area H.

Point 2- Looking south at Wetland B.

Point 3- Looking south east Wetland B.

Point 3- Looking north west at Wetland B.

Revenue Mine Photos October 2012



Point 4 -Looking north east at Wetland E.

Point 5- looking south at ground water pond adjacent wetland E.

Point 6- Looking north at Wetland E Flagging.

Point 7- Looking east at Sneffels Fringe Wetland 10 Flagging.

Revenue Mine Photos October 2012

Point 8- Looking north east at Wetland A.

Point 9- Looking north at Wetland E and Beaver Pond.

Point 10- Looking north east at Wetland E flagging.

Point 11- Looking east at Non Wetland Area H.

Revenue Mine Photos October 2012

Point 12- Looking south at Non Wetland Area F.

Point 13- Looking south at beaver pond in wetland E.

Point 16- Looking north west down tributary at fringe wetland.

Point 17-Looking north at Revenue Pond.

Revenue Mine Photos October 2012

Point 18- Pocket gopher diggings.

Point 18- Pocket gopher diggings.

Point 19- Looking east.

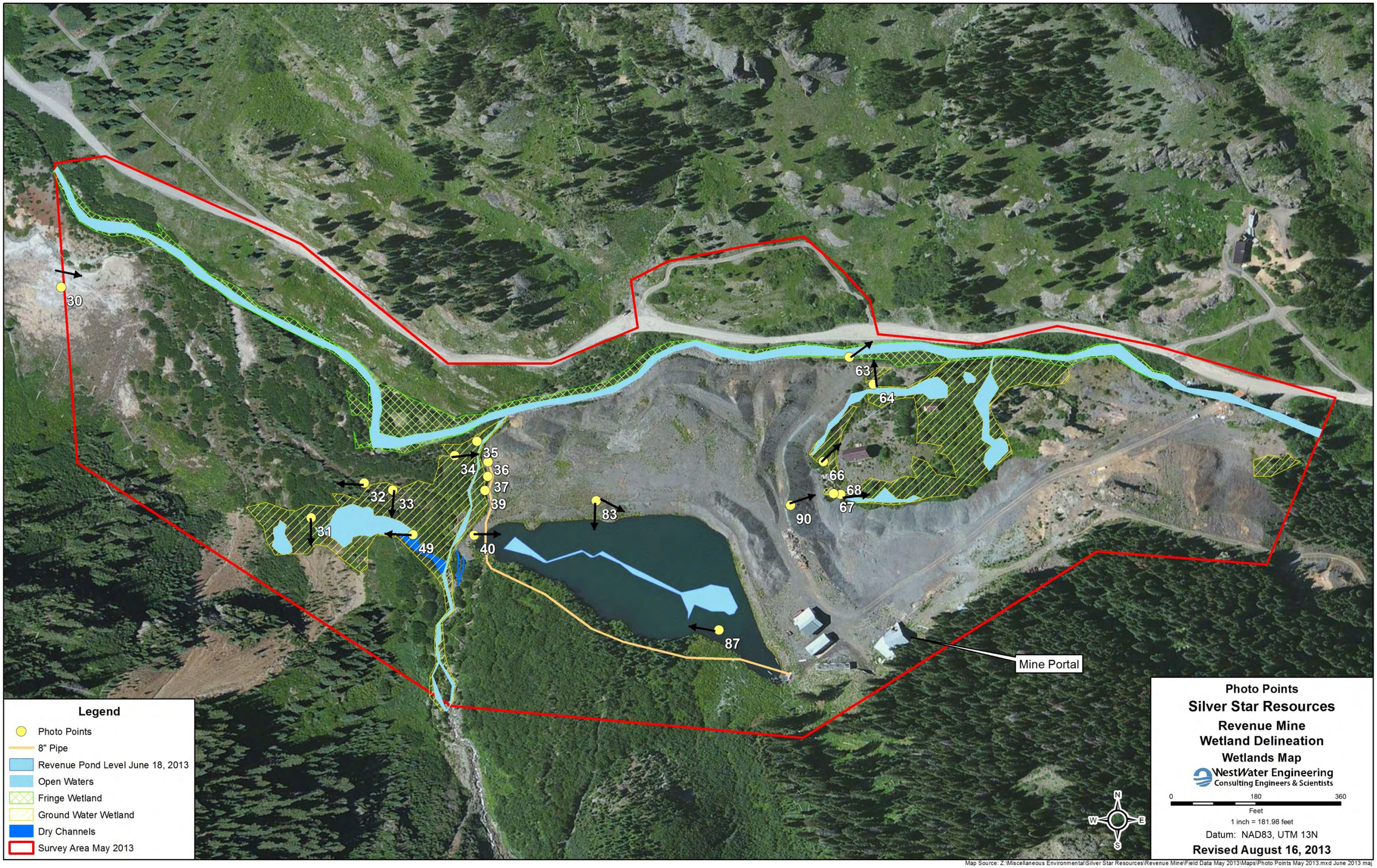
Point 20- Pocket gopher diggings.

Revenue Mine Photos October 2012

Point 21- Looking south east at Revenue Pond.

Point 22- Looking north west.

Point 23- Looking south west.



Map Source: Z:\Miscellaneous Environmental\Silver Star Resources\Revenue Mine\Field Data May 2013\Maps\Photo Points May 2013.mxd June 2013 maj

Revenue Mine Photos May 2013

Point 30 - Looking east at disturbed area.

Point 31- Looking south at Wetland L.

Point 32- Looking west.

Point 33 - Looking east at Wetland L.

Revenue Mine Photos May 2013

Point 34 -Looking east at Wetland L, fringe of Atlas Creek, and Revenue Mine discharge point in the background.

Point 35- Revenue Mine water collection discharge point.

Point 36- Looking at piping for Revenue Mine water collection discharge.

Point 37- Looking at piping for Revenue Mine water collection discharge.

Revenue Mine Photos May 2013

Point 39 - Looking at piping for Revenue Mine water collection discharge.

Point 40 - Looking east across drained Revenue Pond.

Point 49- Looking west at surfaced ground water pond in Wetland L.

Point 63 - Looking north east at Wetland F 10 and encroaching fill.

Revenue Mine Photos May 2013

Point 64 - Looking north at Wetland A and waste rock encroaching into the wetland.

Point 66 - Looking at Wetland B.

Point 67 – Waste rock encroaching into wetland D.

Point 68 - Looking east at waste rock encroaching into wetland E.

Revenue Mine Photos May 2013

Point 83 – Looking south east at Revenue Pond.

Point 83 -Looking south across Revenue Pond at piping.

Point 87 – Looking west across Revenue Pond.

Point 90 – Looking down at Wetland E and D and waste rock encroaching into Wetland D and E.

APPENDIX E
A Brief History of the Mine and the Pond Construction
Greg Lewicki

Write up by Greg Lewicki for Wetland delineation application regarding the Revenue Pond

A Brief History of the Mine and the Pond Construction

Star Mine Operations, LLC proposes to reopen the Revenue Mine located just over four miles southwest of Ouray, CO to mine silver, gold and sulfide minerals from vein deposits on patented mining claims owned by the applicant. Mining will be conducted entirely underground. Surface disturbance associated with the Revenue operation will include mining support facilities, processing support facilities, water ponds, and waste storage. The entirety of surface activities for the life of the mine will take place in the area immediately north of the Revenue portal, all of which is located within Ouray County, Colorado. All of the proposed disturbance area has been previously disturbed by past mining operations.

The Revenue Mine is situated along County Road 26 up Yankee Boy Basin, along Sneffels Creek southwest of Ouray, CO. This area of the San Juan Mountains is known for its precious metal deposits, and the area is littered with the remains of mining from the 19th and 20th centuries. Mining in this area started with the staking of the Virginius claim by William Feland in October of 1876. This area is located at an approximate elevation of 12,900 feet and approximately 7600 feet southwest of the Revenue portal. This area is well above the current Revenue portal area. The Virginius Shaft at that high altitude was begun around 1878 at the vein intersection and was extended downward to the 1, 2 and 3 levels. Each level was 100 feet below the previous level. A mill was constructed at this location and work continued downward to the 10 level in 1890. Hoisting and pumping costs continued to rise, so a decision was made to develop a lower access to the vein. This was the start of the Revenue Tunnel. The Tunnel was started at an elevation of 10,670 feet and was driven 7600 feet to intersect the Virginius Vein underground at an elevation of 10,750 feet. The Tunnel was purposely driven slightly uphill so water would freely drain from it. The connection was made in 1893. The inert waste rock from the driving of the tunnel was placed out of the Revenue portal area and is still there today. This waste rock is andesite and quartz and was blasted using conventional methods at that time.

The Virginius shaft was extended down to the 14 level and a raise was driven from the Revenue Tunnel upward approximately 600 feet to intersect with the Virginius workings. Once this was done, the

Virginius mill was moved to the Revenue portal area. The mill was located just south of the Revenue access road bridge across Sneffels Creek.

Picture 1 – Revenue Mill prior to 1912

As is seen in the photo, the mill was very substantial. It was located just south of the current access road to the portal where it crosses Sneffels Creek. As the waste rock was brought outside from the drilling and blasting of the Revenue tunnel, the waste rock was shaped to form a pond, now called the Revenue Pond, which was constructed in 1893-1894. When the Revenue Tunnel intersected the Virginius workings, all water now flowed through the Revenue tunnel to the surface at the Revenue Portal. The pond was needed since the mill required a steady reliable flow of water to operate. Since Sneffels Creek varied so much in flow, the pond provided a reliable source of water since the water emanating from the mine was always present. Also, the extremely steep natural terrain of the area never had any natural ponds within the vicinity that the mine could use. Water from the Revenue pond seeps into the waste rock and discharges at the Revenue Seep, located immediately northeast of the pond, near the large old

building in this lower flat area. The water was used here to water horses and provide water to the buildings. From the 1880's to the mill burning down in 1912, there were many more buildings in this lower area. Historically, there has not been any connection between the Revenue Pond and the Atlas drainage. All water seeped out of the pond into the seep discussed previously. The waste rock is permeable and this allows the seepage. Minor maintenance to the Revenue pond berm was completed on October 18, 2012, eliminating the discharge into the Atlas drainage. All water from the pond now flows through the seep and there is no surface discharge, which has been the case for over 120 years. This has been substantiated by John Trujillo, current mine manager who worked with Sunshine Mining Company and Ranchers Exploration during their efforts to develop the property.

In addition, there is no flow of the Atlas drainage that enters the Revenue Pond. The Atlas drainage does skirt near the Pond but has never entered the Pond, to the best knowledge of John Trujillo, who has been involved with activities on site since 1979. Maintenance to the pond berm has eliminated any possibility of flow entering the pond from the Atlas drainage. As shown in the mine plans, this pond is planned to be removed and used to store waste rock and tailings from the mine operation.

See pictures below of the waste rock placed to create the Revenue Pond.

Picture 2 – Revenue Pond dam during recent inspection.

Picture 3 – Revenue Pond with waste rock on north side, acting as a dam to hold back the water.

Picture 4 – Uniform slope of waste rock forming the Revenue Pond, with the portal buildings in the background.

After the Revenue Mill burned down in 1912, mining activity ceased until 1922-23, when a small amount of ore was mined. Rehabilitation work occurred in 1936-38, but no production was recorded. Additional rehab work was done from 1943 to 1948 but again, little production was recorded. In 1964, Federal Resources did further rehab work and extended a drift northwest from the Virginius #1 shaft into the Monogahela workings area and the shaft was reconditioned down to the 210 level. A small amount of mining was done in this area at that time. No changes were made to the Revenue Pond.

No further activity took place until 1979, when Ranchers Exploration and Development Corporation acquired the lease and rehabilitated the #1 shaft to the 700 level. No changes were made to the Revenue Pond.

Sunshine Mining Company acquired the lease in 1995 and permitted the mine under the current rules but abandoned the mine in 1997. An NPDES permit was also issued to Sunshine as part of the permit process for the mine water discharging from the Revenue Portal. Wet tests were conducted and the company was allowed to abandon this permit with no further action since the water quality was very good. The required reclamation was also done, but it was minimal since no new disturbance was made for that permit and all disturbances on the site occurred prior to the rules initiated in 1977.

In summary, the following statements apply to the Revenue Pond:

1. There was never a pond at this location prior to the mine building it in 1894.

2. The entire inflow into the pond comes from the mine water which emanates from the portal, as was seen in the site visit on October 1, 2012. There is no surface water flow into the pond. This is also substantiated by flow measurements of the water coming from the mine and the water in the Revenue Seep, which are basically the same for as long as measurements have been taken.

3. The Atlas drainage flow does not enter into the pond and has not done so in the past.

4. NWI mapping reports this pond as an impounded/diked feature, indicating this is a manmade structure. Also, the geology of these steep mountain valleys shows that it is extremely rare for natural lakes to develop in these areas. Very high altitude glacial lakes are common, but this area does not fit that condition. Also, it is evident that the waste rock was used to construct the dam around the entire perimeter of the pond except the south side, which goes uphill on the mountain.

5. The mine water is to be diverted into a new pond system which is to be built on site as part of the new DRMS mining and reclamation permit. The pond will be drained and used for a waste storage area. As of October 29, 2012, the mine water will be diverted away from the Revenue Pond and the pond will be dry, proving the non-jurisdictional nature of the pond. Water will ultimately be routed to the new pond system which is to be built as part of the new DRMS mining and reclamation permit. The mine water is presently being diverted to Sneffels Creek in order to facilitate the proposed reuse of the area currently occupied by the mine water pond.

APPENDIX F
NRCS Soil Survey Map

Soil Map—Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
(Revenue Mine August 2013)
8/12/2013
Page 1 of 3
104
129
114
112
Swamp's Creek
130
129
Web Soil Survey
National Cooperative Soil Survey
Natural Resources
Conservation Service
Map Scale: 1:4,900 if printed on A landscape (11" x 8.5") sheet.
Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

Map Unit Legend

Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties (CO674)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	Borolls-Rock outcrop complex, 40 to 90 percent slopes	0.7	0.6%
112	Cryorthents-Rock outcrop complex, 50 to 120 percent slopes, extremely stony	63.4	53.8%
114	Dumps, mine	16.3	13.8%
129	Moran very gravelly loam, 30 to 65 percent slopes, extremely stony	25.3	21.4%
130	Moran-Telluride-Rock outcrop complex, 5 to 40 percent slopes, extremely stony	12.3	10.4%
Totals for Area of Interest		**117.9**	**100.0%**

Soil Map—Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
(Revenue Mine August 2013)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 8, 2011—Sep 22, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties

112—Cryorthents-Rock outcrop complex, 50 to 120 percent slopes, extremely stony

Map Unit Setting

Elevation: 8,600 to 12,000 feet
Mean annual precipitation: 24 to 37 inches
Mean annual air temperature: 30 to 41 degrees F
Frost-free period: 40 to 70 days

Map Unit Composition

Cryorthents and similar soils: 50 percent
Rock outcrop: 40 percent

Description of Cryorthents

Setting

Landform: Mountain slopes, ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop, interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Slope alluvium derived from tuff and/or colluvium derived from tuff

Properties and qualities

Slope: 50 to 120 percent
Depth to restrictive feature: 10 to 39 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8e
Hydrologic Soil Group: D

Typical profile

0 to 4 inches: Extremely stony silt loam
4 to 12 inches: Extremely cobbly loam
12 to 22 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Landform: Ridges, mountain slopes

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Free face, interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 50 to 120 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Typical profile

0 to 60 inches: Unweathered bedrock

Data Source Information

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties

114—Dumps, mine

Map Unit Composition

Dumps, mine: 100 percent

Description of Dumps, Mine

Interpretive groups

Farmland classification: Not prime farmland

Land capability (nonirrigated): 8s

Typical profile

0 to 60 inches: Variable

Data Source Information

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties

129—Moran very gravelly loam, 30 to 65 percent slopes, extremely stony

Map Unit Setting

Elevation: 10,400 to 12,900 feet
Mean annual precipitation: 31 to 42 inches
Mean annual air temperature: 28 to 35 degrees F
Frost-free period: 30 to 55 days

Map Unit Composition

Moran and similar soils: 85 percent

Description of Moran

Setting

Landform: Mesas, mountain slopes, basin floors
Landform position (two-dimensional): Summit, backslope, toeslope
Landform position (three-dimensional): Mountainflank, interfluve, base slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear, concave
Parent material: Slope alluvium derived from andesite and/or colluvium derived from andesite over till derived from mixed

Properties and qualities

Slope: 30 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Alpine Slopes (R048AY304CO)
Other vegetative classification: ALPINE SLOPES (048AY304CO)

Typical profile

0 to 10 inches: Very gravelly loam
10 to 25 inches: Very gravelly loam
25 to 45 inches: Very gravelly loam

45 to 60 inches: Extremely cobbly loam

Data Source Information

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties

130—Moran-Telluride-Rock outcrop complex, 5 to 40 percent slopes, extremely stony

Map Unit Setting

Elevation: 11,500 to 13,300 feet
Mean annual precipitation: 36 to 46 inches
Mean annual air temperature: 27 to 30 degrees F
Frost-free period: 25 to 40 days

Map Unit Composition

Moran and similar soils: 40 percent
Telluride and similar soils: 25 percent
Rock outcrop: 20 percent

Description of Moran

Setting

Landform: Mesas, basin floors, mountain slopes
Landform position (two-dimensional): Summit, toeslope, backslope
Landform position (three-dimensional): Mountainflank, interfluve, base slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave, linear
Parent material: Slope alluvium derived from andesite and/or colluvium derived from andesite over till derived from mixed

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.9 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Alpine Slopes (R048AY304CO)
Other vegetative classification: ALPINE SLOPES (048AY304CO)

Typical profile

0 to 10 inches: Very gravelly loam
10 to 25 inches: Very gravelly loam
25 to 45 inches: Very gravelly loam
45 to 60 inches: Extremely cobbly loam

Description of Telluride

Setting

Landform: Ridges, basin floors, mountain slopes
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Mountaintop, interfluve, base slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, concave
Parent material: Slope alluvium derived from andesite and/or colluvium derived from andesite over residuum weathered from andesite and/or till derived from andesite

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Shallow Alpine (R048AY308CO)

Typical profile

0 to 10 inches: Very cobbly loam
10 to 14 inches: Very gravelly loam
14 to 18 inches: Extremely channery loam
18 to 28 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Landform: Ridges, mountain slopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop, interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s

Hydrologic Soil Group: D

Typical profile

0 to 60 inches: Unweathered bedrock

Data Source Information

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

Hydric Soil List - All Components

This table lists the map unit components and their hydric status in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2). Definitions for the codes are as follows:

1. All Histels except for Folistels, and Histosols except for Folists.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
3. Soils that are frequently ponded for long or very long duration during the growing season.
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;
4. Map unit components that are frequently flooded for long duration or very long duration during the growing season that:
   A. Based on the range of characteristics for the soil series, will at least in part meet one or more Field Indicators of Hydric Soils in the United States, or
   B. Show evidence that the soil meets the definition of a hydric soil;

Hydric Condition: Food Security Act information regarding the ability to grow a commodity crop without removing woody vegetation or manipulating hydrology.

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. Doc. 2012-4733 Filed 2-28-12. February, 28, 2012. Hydric soils of the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, editors. Version 7.0, 2010. Field indicators of hydric soils in the United States.

Report—Hydric Soil List - All Components

Hydric Soil List - All Components–CO674-Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties					
Map symbol and map unit name	**Component/Local Phase**	**Comp. pct.**	**Landform**	**Hydric status**	**Hydric criteria met (code)**
104: Borolls-Rock outcrop complex, 40 to 90 percent slopes	Borolls	60	Mountain slopes	No	—
	Rock outcrop	20	Mountain slopes	No	—
112: Cryorthents-Rock outcrop complex, 50 to 120 percent slopes, extremely stony	Cryorthents	50	Mountain slopes,ridges	No	—
	Rock outcrop	40	Ridges,mountain slopes	No	—
114: Dumps, mine	Dumps, mine	100	—	Unranked	—
129: Moran very gravelly loam, 30 to 65 percent slopes, extremely stony	Moran	85	Mesas,mountain slopes,basin floors	No	—
130: Moran-Telluride-Rock outcrop complex, 5 to 40 percent slopes, extremely stony	Moran	40	Mesas,basin floors,mountain slopes	No	—
	Telluride	25	Ridges,basin floors,mountain slopes	No	—
	Rock outcrop	20	Ridges,mountain slopes	No	—

Data Source Information

Soil Survey Area: Ouray Area, Colorado, Parts of Gunnison, Hinsdale, Ouray, San Juan, and San Miguel Counties
Survey Area Data: Version 4, May 3, 2011

APPENDIX G
USFWS National Wetland Inventory Map

U.S. Fish and Wildlife Service

National Wetlands Inventory

Revenue Mine

Aug 12, 2013

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

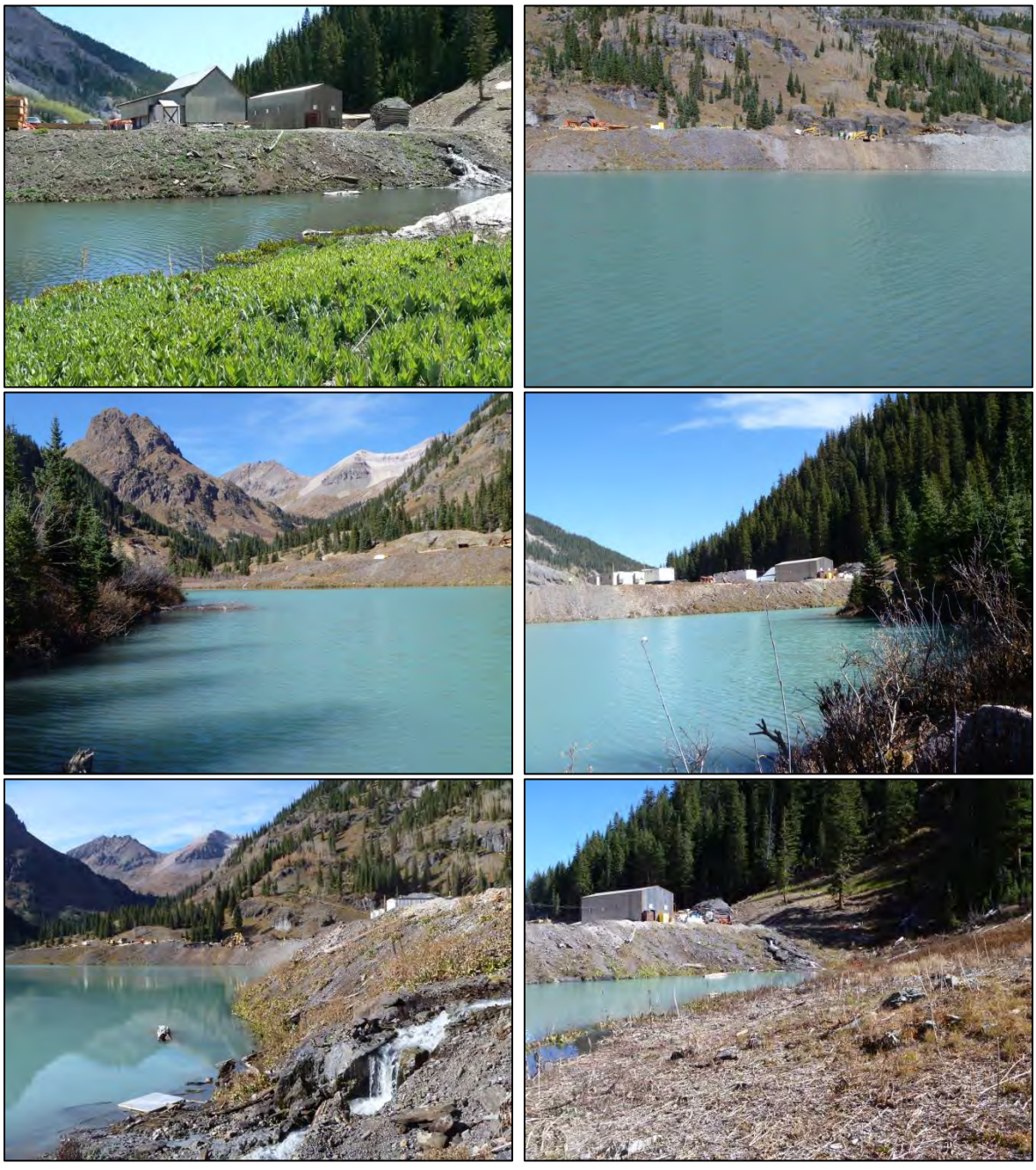
PSSB	Palustrine/Scrub/Shrub Wetland/Saturated
PABGh	Palustrine/Aquatic Bed/Intermittently Exposed/Dike/Impounded
PEMB	Palustrine/Emergent Wetland/Saturated

User Remarks:

APPENDIX H
Revenue Pond Photos
October 2012, May 2013, and June 2013

Revenue Pond Photos
October 2012, May 2013, and June 2013

October 2012



Revenue Pond Photos
October 2012, May 2013, and June 2013

October 2012

May 2013

Revenue Pond Photos
October 2012, May 2013, and June 2013

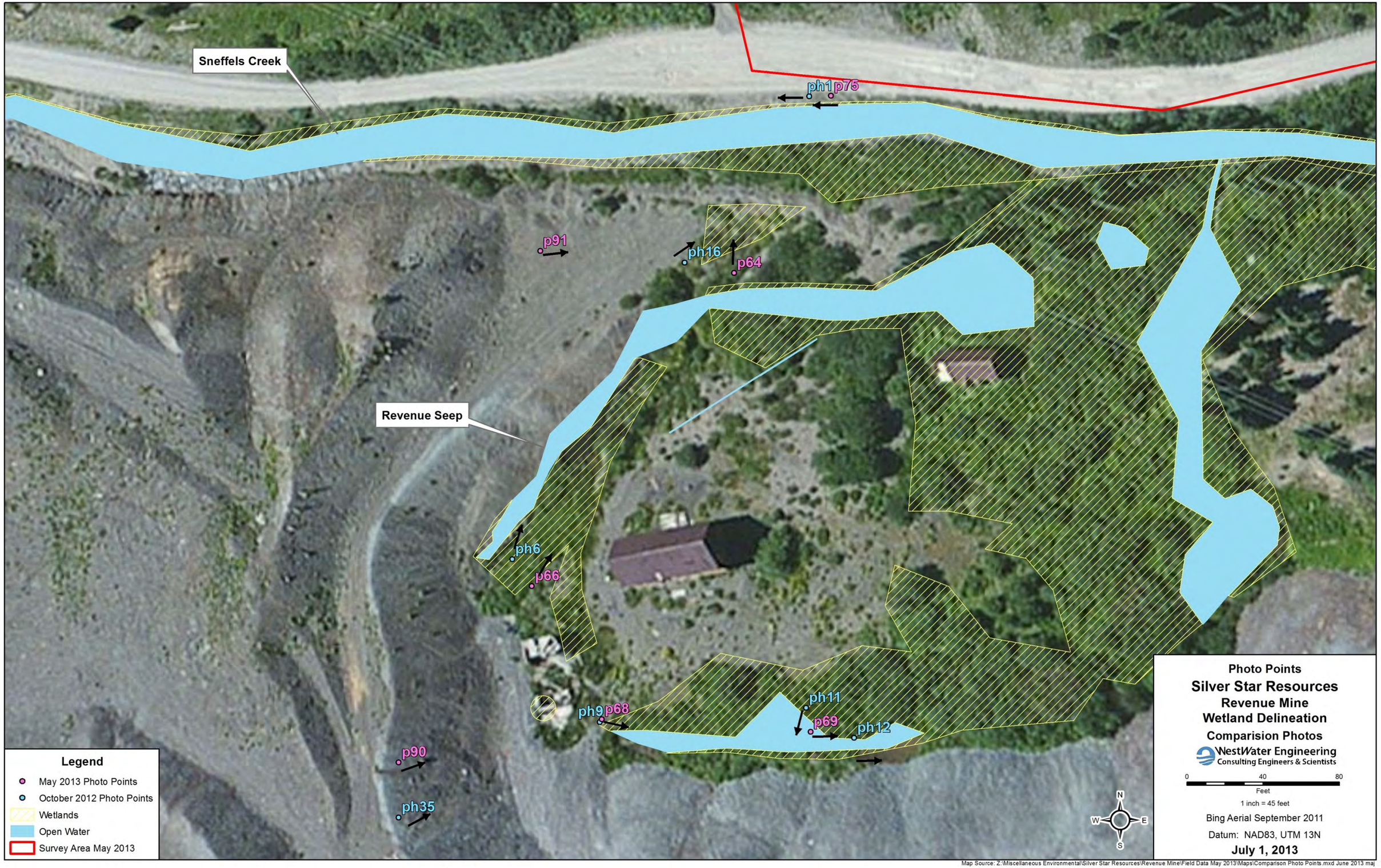
May 2013

Revenue Pond Photos
October 2012, May 2013, and June 2013

May 2013

June 2013

APPENDIX I
Photo Comparision
Wetland A, B, E, and F10
October 2012 and May 2013



Map Source: Z:\Miscellaneous Environmental\Silver Star Resources\Revenue Mine\Field Data May 2013\Maps\Comparison Photo Points.mxd June 2013 maj

Photo Comparision
Wetland A, B, E, and F10
October 2012 and May 2013

Oct 2012 Photo Point 9 Looking East

May 2013 Point 68 Looking East

Oct 2012 Photo Point 12 Looking East

May 2013 Point 69 Looking East

Oct 2012 Photo Point 16 Looking North East

May 2013 Point 64 Looking North

Photo Comparision
Wetland A, B, E, and F10
October 2012 and May 2013

May 2012

Oct 2012 Photo Point 35 Looking North East

May 2013 Photo Point 90 Looking North East

Oct 2012 Photo Point 6 Looking North

May 2013 Photo Point 66 Looking North

Photo Comparision
Wetland A, B, E, and F10
October 2012 and May 2013

Oct 2012 Photo Point 1 Looking West

May 2013 Photo Point 75 Looking West

May 2013 Photo Point 91 Looking East

May 2013 Photo Point 91 Looking East

APPENDIX J
Revenue Pond Berm and Dry Channel Photos
May 2012 and June 2013


p12
p3
p4
p2
p10
p11
p5
p6
p9
p7
p8
Atlas Creek
Legend
Photo Points June 2013
Dry Channels
Wetlands
Open Water
Survey Area May 2013
N
W
E
S
Photo Points
Silver Star Resources
Revenue Mine
Wetland Delineation
Berm and Dry Channel Photos
WestWater Engineering
Consulting Engineers & Scientists
0
40
80
Feet
1 inch = 40 feet
Bing Aerial September 2011
Datum: NAD83, UTM 13N
July 1, 2013

Revenue Pond Berm and Dry Channel Photos

May 2012 Berm

May 2012 Revenue Pond and berm.

May 2012. This is the area where berm maintenance was done last fall. The dry channels end here at this portion of the berm and there is no defined channel at this point.

May 2012 Revenue Pond spilling into Atlas Creek.

June 2013. P 2 Looking south at both dry channels where they meet the berm maintenance area.

June 2013. P3 Looking south at both dry channels where they meet the berm maintenance area.

Revenue Pond Berm and Dry Channel Photos

June 2013. P 4 looking SE at berm maintenance.

June 2013. P 5 Looking South upslope in the dry channel.

June 2013. P 6 Looking South at the end of OHWM and elevated area, Atlas Creek just beyond.

June 2013. P 7 Large vegetated channel with no OHWM

June 2013. P8 Higher elevation area east of Atlas Creek, just beyond this upraised area the two dry channels form.

June 2013. P 9 Vegetated channel.

Revenue Pond Berm and Dry Channel Photos

June 2013. P 10 Looking South at one of the dry channels.

June 2013. P 11 Looking west at berm maintenance.

June 2013. P 12 Looking east at the berm maintenance.

Updated Appendix 6

2015 Tailings & Waste Rock Management Plan

TAILINGS AND WASTE ROCK MANAGEMENT PLAN - REVENUE MINE

Prepared for:
MINE OPERATION

JULY 2015

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The author, Greg Lewicki, earned a degree in Mining Engineering from Pennsylvania State University in 1977. He has worked in the mining industry since that time and has been involved in all aspects of gravel mine feasibility studies, mine operation, reclamation and mine permits in Colorado since 1980. He has worked on numerous backfilling operations, dams, ponds, slope restoration and other related projects. He received his Professional Engineer (PE) license in 1983 and is Senior Engineer of Greg Lewicki and Associates based in Parker, Colorado.

The tailings embankment construction must be certified by a registered P.E. qualified and experienced in this work in Colorado. For this reason, the requirements set forth in this document must be completed in order to do this certification.

Table of Contents

1. Purpose

The purpose of this report is to provide a guidance manual for the removal, handling, and permanent placement of tailings and waste rock for the Revenue mine operation. It is important that proper procedures be followed in various steps in the process:

a) accepting tailings from the mill based on moisture content and pH
b) mixing waste rock with tailings in proper portions for compaction
c) procedures for attaining proper compaction of the tailings and waste rock
d) measuring and documenting compaction of the tailings and waste rock dealing with frozen conditions on site and temporary tailings storage
e) dealing with the avalanche path in the Revenue waste pile
f) permanent pile configuration, including slopes, benches, drainage ditches and diversions
g) topsoiling and revegetation of the permanent embankment

2. Tailings Acceptance from the Mill

Wet tailings are produced in the flotation cells and are delivered to the 12000 gallon tailings tank in the underground mill. From this point, the tailings slurry will have approximately 30% solids which will be pumped to the new thickener located outside the filter building. This tank will dewater the slurry to approximately 40-50% solids. This slurry will be pumped to the 18000 gallon tailings tank in the filter building, which will then pump the slurry to the filter presses, located on the 2nd floor of the filter building. These presses will dewater the slurry to the acceptable moisture content for compaction, which is expected to be in a range of 13% to 18% moisture, or 82-87% solids.

It is expected that tailings production could be in a range of 2000-5000 tons per month. All tailings are very fine, since the material has been crushed and then ground in a ball mill underground. A representative size breakdown of the tails is shown in Appendix A, which is a sample of tails while the mill was under test operation in 2015 but is representative of the tailings to be produced over time.

According to the DRMS Permit, the tailings produced from the mill must be classified as inert to be placed in the permanent embankments. Testing over years has shown that a certain small percentage of iron sulfide in the tailings is acceptable since it refuses to oxidize in any test. However, large percentages of iron sulfide or other metal sulfides will mean that the tailings may not be classified as inert, which will be difficult to deal with. Obviously, the mill has a major incentive to get as much metal sulfide out of the flotation cells as possible since this material is sold. Based on SPLP leach tests of tails in 2015, the tailings are classifies as inert. If there are significant deviations from these tailings, this must be evaluated through a new SPLP test.

Rules:

a- *Tailings can only be accepted by the surface crew in charge of removing and placing the tails in the embankment when the tails are between 13.0% to 18.5% moisture and a pH between 7.5 and 10.5. These tests must be performed in the concrete floor of the filter bays, where the tails drop from the filter presses. They*

cannot be performed after the material has been removed from the filter bays. They also should not be performed before the material enters the filter bays unless it is 100% guaranteed that no wash downs or any other process could add moisture after the tests are made earlier in the mill process. Tails pH will be tested using an Orion Star A321 portable meter and electrode at the same time the moisture reading is taken. Trial compaction tests at higher moisture levels can be performed on site and if these tests attain the 94% compaction required, a higher moisture will then be allowed and this document can be modified.

b- *If the material is within the limits described in Item a above, the material can be removed from the filter bays and placed in either the Revenue Pile or the Atlas Pile.*

c- *Moisture tests should be performed at the frequency of 5 or more tests per 12 hour shift or once per 100 tons until such time as consistency warrants less frequent testing. If the average of these tests is within the moisture limit, the material in the filter bays is acceptable to be removed to the piles. If this average is above these limits, see Item d below.*

d- *This item already assumes that a true maximum moisture limit has been found from trial compaction tests on site. If the material is* ***not*** *within these moisture limits, the following procedures will be followed: (1) if the material is within 1.5% of the moisture limit, and if known material of acceptable moisture exists on the piles and is available to mix with this slightly higher moisture material, then it can be removed and blended at the piles. The Troxler density tests will also record moisture to determine if the proper compaction can be achieved. (2) if the material is within 1.5% of the moisture limit, and the time of year may allow drying of the material on the surface of the pile area, the material can be loaded out from the filter bays and allowed to dry in the sun in a shallow lift. This should not be done with any large volume of material since there is such limited room on site and there is no guarantee that the material will dry out in the limited warm season. (3) if the material is more than 1.5% above the maximum moisture limit, it must be placed in the concreted apron area and the slurry pump must pump this material to either of two places: the thickener or the 18000 gallon tailings*

tank in the filter building. Very wet material cannot be accepted for compaction in the piles. Required compaction in the two piles must be achieved at all times. We cannot risk lack of compaction of the tailings which could result in a failure of the tailings embankment.

e- *Average moisture content testing procedure using the provided protocol supplement is required (TMP001). Moisture testing is to be performed by trained tails management personnel using the ICT MPKit-406 Soil Moisture Instant Reading Kit. This information is provided in Appendix C.*

f- *Tests sheets are provided at the end of this manual which should be filled out for every test and kept on site at the back of the bound Manual.*

g- *If, for any reason, mill personnel believe that there is a significant change in chemistry or the size consist of the tails, the mine management and the engineer that certifies the tailings embankment must be notified to determine if any further action or testing is required. This is important since the tailings must be inert.*

h- *SPLP tests of the tailings are to be done every 6 months or sooner if there is reason to believe that the tailings have changed in chemistry or size consist. These tests should be performed by the Surface Mine Manager or other qualified personnel.*

i- *Tailings from the mill must not be overloaded in such a way that spillage occurs. Any spillage of tails must be removed and taken to the proper waste pile area.*

3. Mixing Waste Rock with Tailings for Proper Compaction

Waste rock is any rock produced in the mine that is not processed in the mill. This material is generally blasted rock less than 12 inches in size down to silt and clay size material. The amount of this material produced will vary depending upon the activities taking place in the mine. Ramping or blasting development tunnels and raises outside the veins produce waste rock. There will be other periods of time when no waste rock is produced. Since the waste rock may have a larger percentage of large rock, it is important

to mix this material with tailings at a percentage ratio to attain proper compaction. No voids can be present in the compacted mixture that will result in a non-cohesive material or will provide voids for water conduits.

Rules:

a- *Waste rock shall be mixed with tailings at a ratio range of 0-15% waste rock to tailings. If waste rock is being produced at a given time in higher ratios to the tailings, it should be stockpiled temporarily so that it can be mixed at the proper ratio over time. It is acceptable to compact tailings with no waste rock.*

b- *Any wood, plastic, metal or other non-rock material should be removed from the rock prior to mixing and placement.*

c- *The waste rock should be thoroughly mixed with tailings prior to compaction with the site equipment.*

d- *Compaction of the tailings/waste rock mixture must be attained (covered later in this guidance manual).*

4. Procedures for Attaining Proper Compaction of Tailings and Waste Rock

The tailings and waste rock mixture must attain a compaction of 94% maximum dry density according to ASTM Standard D698 to attain proper compaction. Compaction test equipment must be on hand at all times to test the material after compaction. There are many types of equipment and methods to attain required compaction. Vibratory rollers or sheeps-foot compactors are very good in this type of material. Front end loaders will also normally get acceptable compaction as long as they are able to negotiate all areas of the pile during construction. A small manual operated vibratory compactor may be used for small areas that larger equipment cannot reach.

Lift thickness plays an important role in attaining good compaction. The smaller the lift thickness, the better chance of achieving proper compaction. Experimentation with the equipment, lift thicknesses and the amount of passes that the equipment makes will determine what will be the most efficient method to attain the compaction. Higher lift thicknesses must avoid problems in creating a zone below the surface that is not compacted properly while the surface shows good compaction.

Rules:

a- *The compacted tailings and waste rock shall be tested for proper compaction at a minimum rate of one test per 100 tons until such time as procedures and methodology have been worked out. Once consistent equipment procedures are developed and tests show stable performance, testing can be reduced. The waste rock should be thoroughly mixed with tailings prior to compaction with the site equipment.*

b- *Frequency of the compaction testing of the tailings/waste rock mixture must be increased if there is reason to believe that some unusual condition exists, such as very high moisture content from rain or snow, etc.*

c- *Lift thicknesses should not be greater than 12 inches followed by compaction using surface equipment. Compaction testing will then follow and this will show if a greater lift thickness is possible. Frequency of testing is discussed in Item 5.*

d- *No compaction of tailings and waste rock can take place if the air temperature is below 30 degrees F. Tailings from the mill that are produced under these conditions are to be handled as described in Section 6. Proper compaction cannot take place in frozen conditions and the material must be temporarily stockpiled until conditions allow proper compaction.*

5. Measuring and Documenting Proper Compaction of Tailings and Waste Rock

Since compaction testing will occur on an ongoing basis, it is required that a nuclear density Gauge be kept on site and utilized by a designated qualified person at the mine. The machine selected for this process is a Troxler 3440 Gauge which has been widely accepted by the civil engineering community as an excellent on site device that can accurately record compaction quickly. The tailings and waste rock mixture must attain a compaction of 94% maximum dry density according to ASTM Standard D698.

Rules:

a- *When conditions allow good compaction, (more than 30 degrees F), once a 12 inch thick lift is compacted over an area of approximately 3000 square feet, a nuclear Gauge compaction test is required. The Operation Manual for the Troxler Gauge is included in Appendix B. This Gauge will be calibrated on site to report the % dry density of the material, which will then be compared to the 94% required for good compaction. This Gauge has radioactive material (cesium and americium) which require a special license for the purchase and operation of the instrument. The Gauge will also report the % moisture of the test material. The*

Gauge cylinder penetrates 12 inches into the ground and this level should be consistently attained for every sample. If, during the penetration, the Gauge hits or rock before the 12 inch depth is attained, the Gauge should be pulled out and moved over until the 12 inch depth is reached.

b- *If the Gauge reports a lower compaction than 94%, the moisture should be checked to see if it in the range of 13% to 18%. If it is below 13%, it should be watered slightly. If it is too high, the material in this lift should be dozed and allowed to dry. In either case, the material can be respread in the 12 inch lift and re-tested for compaction and moisture. If the moisture is in the proper range but the 94% is not achieved, this means that compaction has not been properly done and the surface equipment should be brought back to re-compact that lift.*

c- *Frequency of the compaction testing of the tailings/waste rock mixture must be increased if there is reason to believe that some unusual condition exists, such as very high a moisture content from rain or snow, etc.*

d- *For each compaction test, entries should be made in the forms included in Appendix C. These forms will document the % dry density achieved, the moisture and the location of the test as well as the date. Completed forms should be kept at the back of the on-site manual.*

e- *Once consistent procedures have been developed and compaction has been achieved using the procedures above with little variability, site personnel can request a lowering of the frequency of the compaction testing to the professional engineer that will provide the as-built report to the DRMS every year regarding the proper construction of the tailings and waste rock embankment.*

6. Dealing with Frozen Conditions on Site and Temporary Tailings/Waste Rock Storage

As stated above, proper compaction cannot be safely achieved if the air temperature is lower than 30 degrees F. This will basically apply to many months throughout the winter and some days in the fall and spring. Since these conditions will be frequently encountered, all tailings and waste rock must be taken to a temporary storage area for compaction during warmer weather. Since the avalanche path at the Revenue Pile area prevents its safe use in winter months, the material should be stockpiled at the Atlas Pile, unless some area of the Revenue Pile can be identified that is out of the known avalanche path zone. The Atlas Pile can only be reached by the new bridge across County Road 26 immediately uphill of the Revenue Pile area. Atlas Creek cannot be crossed to reach the Atlas Pile.

Rules:

a- *In winter conditions, when air temperatures are less than 30 degrees F, all tailings and waste rock should be taken to a temporary stockpile area either out of the avalanche path at the Revenue Pile or to the Atlas Pile. In unusual cold conditions in spring and fall, when there is a high probability that temperatures will increase to allow proper compaction, and if there is no threat of avalanche, material can be temporarily stockpiled at the Revenue Pile. This material should be spread, compacted and tested as soon as temperatures increase.*

b- *As temperatures rise in spring, there will be a large amount of stockpiled material that will require compaction. Material stockpiled over the winter must be carefully reworked to ensure that no compaction is attempted on material that has frozen deep into the temporary stockpile.*

c- *Before activities commence in late spring at the Revenue Pile, mine personnel must confirm that potential for avalanches has been addressed and that personnel can enter the area of the Revenue Pile.*

7. Permanent Pile Configuration and Construction

The Revenue Pile and the Atlas Pile have very specific design criteria regarding the area of the pile, slopes, benches, base perimeter, water handling ditches, etc.

Rules:

a- *Prior to expanding the area of any of the two piles (including the any virgin ground areas), the perimeter of the base extent of the pile should be surveyed and clearly marked for the construction.*

b- *Prior to stripping topsoil from the Atlas Pile, the collection ditches and Sediment Pond must be constructed according to the plans in Appendix D. Diversion ditches must also be installed at both piles to ensure that water from the mountain above the piles is diverted around the piles. These diversion ditches can be installed at the edge of where the tailings meets the hillside. The diversions can be moved upward as the pile grows in size and elevation. The diversion ditch plans are also included in Appendix D.*

c- *All virgin areas should be grubbed of vegetation and then all topsoil must be salvaged to the extent practical. Topsoil thicknesses are expected to be approximately 6 inches in the upper areas of the Revenue Pile and possibly over 1 foot at the Atlas Pile. Topsoil can be direct placed on lower areas of the pile as they are completed or stockpiled. Visual color can be used to determine what is topsoil (darker material with less than 20% rock can be considered topsoil). Grubbed vegetation can be mulched and added to the topsoil placed back on the finished pile areas or disposed of in some other way. It <u>cannot</u> be placed in the embankment to be constructed.*

d- *Prior to storing any tails or waste rock at the Atlas Pile, the base area should be compacted using the surface equipment.*

e- *The design of both piles are based on installing horizontal lifts of no more than 12 inches, moving uphill to create a 3H:1V slope and every 30 feet vertically, a bench of 10 feet width is placed to slightly tilt to the inside edge, where water will collect and run away from the outside slope of the pile. The plans for these benches, slopes and ditches are shown in Appendix D.*

f- As each pile is constructed, it will be important to create a slight slope to the outside edge of all lift areas (except the 10 feet wide benches) so that no trapping of water and snowmelt builds up and seeps through the piles. There should be no puddles or anything that can trap water in the embankment. The benches will drain to the sides and carry water from the pile to the Sediment Ponds below each Pile.

g- Surveying should confirm locations of benches and slopes as the piles expand.

8. Topsoiling and Revegetation of the Permanent Embankments

As the final graded slopes of The Revenue Pile and the Atlas Pile are created, topsoiling must occur followed by seeding. Both piles have very specific design criteria regarding the area of the pile, slopes, benches, base perimeter, height, water handling ditches, etc.

Rules:

a- *Prior to topsoiling, the slopes and benches to be topsoiled should be graded and checked for slope accuracy and bench locations and width, etc. If this is acceptable, topsoiling can occur and should occur in the fall, if possible. There is a shortage of topsoil within the site so some material will have to be imported to complete the full extent of the Piles. It is expected that topsoil will become available from sites in Ouray and Montrose Counties and will be imported to the mine site.*

b- *Topsoil should be placed in 12 inch lifts and should <u>not</u> be compacted. Some vegetation mixed with the soil is acceptable.*

c- *The area of topsoiling is dependent upon what topsoil is available, and the amount of area done at each year is at the discretion of the surface mine manager, however, it is best to topsoil as much regraded area as possible, once the regrading is complete. The topsoil does not need to be smooth; it is actually better if it is slightly rough, which gives the seed good places to get trapped and take root.*

d- *Once topsoiling of an area is completed, seeding should take place in late September for this altitude. Seeding should be done by either broadcast seeding or hydroseeding. Fertilizer can be applied to the area as well using broadcast methods or can be part of the mixture in the hydroseeding tank brought to the site by the contractor. A tackifier will also be used by the hydroseeding contractor if this method is used.*

e- The seed mix to be used is specified in the permit in Table E-3 and is enclosed below:

Table E-3 - Reclamation Seed Mix:

Species	*Portion of Mix (%)*	*Seeding Rate (PLS lbs/acre)*
Letterman Needlegrass	*15*	*3.3*
Nodding Bromegrass	*20*	*4.0*
Slender Wheatgrass	*20*	*4.4*
Arizona Fescue	*20*	*1.8*
Muttongrass	*24.9*	*0.5*
Silver Sagebrush	*0.03*	*0.4*
Louisiana Sage	*0.01*	*0.2*
Western Yarrow	*0.01*	*0.2*
Silvery Lupine	*0.05*	*0.8*
Total	***100***	***15.6***

The rates above are for dill seeding. Seed application rates will be doubled when using broadcast methods.

Certified weed free hay or straw mulch will be applied after seeding at the rate of 2,000 lbs per acre. This mulch will be applied manually given the restricted access to this site and the undulating surface created by pocking.

f- In the summer following seeding, an evaluation of the success of the seeding will be made by the engineer certifying the embankment and some adjustments to the seed mix may be made.

Appendices

Appendix A – CTL Thompson Test Results

Appendix B – Troxler Nuclear Gauge Manual and Procedures

Appendix C – Moisture Meter Manual and Procedures

Appendix D – Revenue and Atlas Pile Design Details

Appendix E – Test Record Sheets of - Mill Tailings Test Sheets of pH and Moisture and - Compaction Density/Moisture Tests at Piles

Appendix A – CTL Thompson Test Results

CTL | THOMPSON

February 11, 2015

Fortune Revenue Silver Mines
1900 Main Street
Ouray, Colorado 81427

Attention: Clint Fletcher

Subject: Laboratory Test Results
Mill Tailings
Project No. DN47,709.000-300

This letter transmits the results of laboratory tests performed on a sample delivered to our office on January 27, 2015. The test results transmitted at this time are those requested by Shawna Clubb when the sample was submitted.

The sample was tested in accordance with American Society for Testing and Materials (ASTM) standards and American Association of State Highways and Transportation (AASHTO). Test results are presented in Table 1 and 1A and Figs. 1 and 2.

Table 1

Sieve Size	Percent Passing by Weight
No. 16	100
No. 30	20
No. 50	98
No. 100	91
No. 200	77

Maximum Density (PCF)	115.5
Optimum Moisture (%)	15.5
Liquid Limits	25
Plasticity Index	8

Should you have any questions regarding these test results, please call.

Very truly yours,

CTL | THOMPSON, INC.

C. Paul Moore
Soils Laboratory Supervisor

Reviewed by:

Alan J. Lisowy, P.E.
Associate Engineer

PM:AJL/bg
(2 copies)

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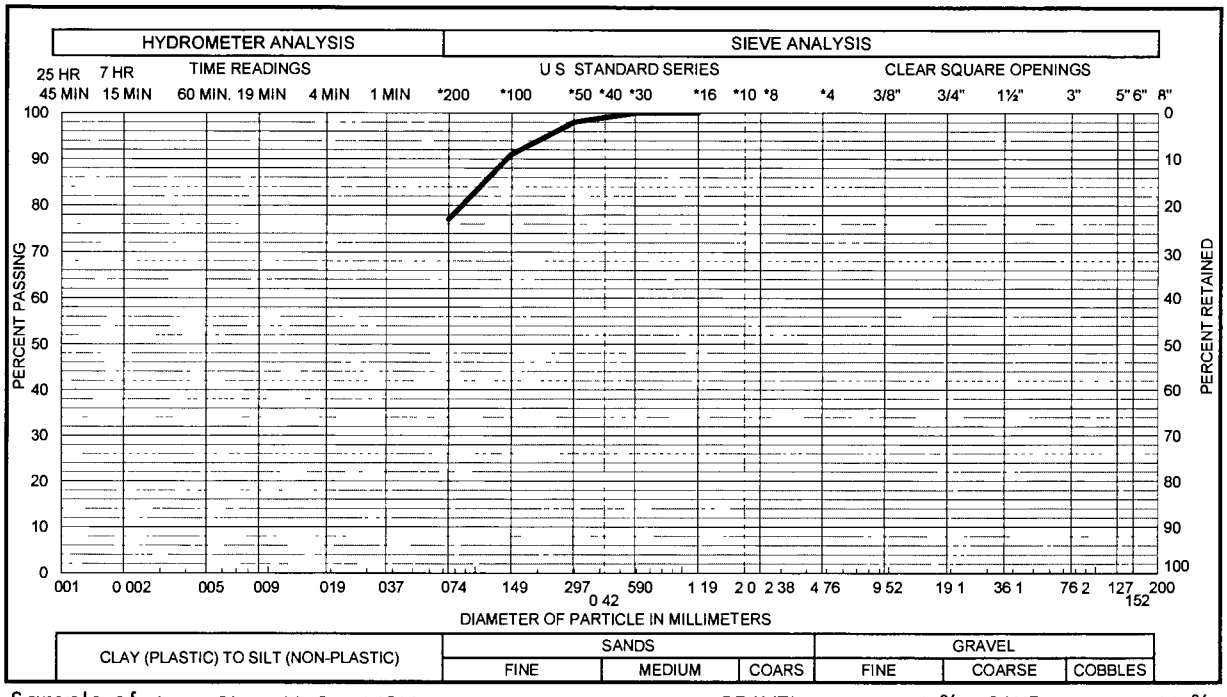
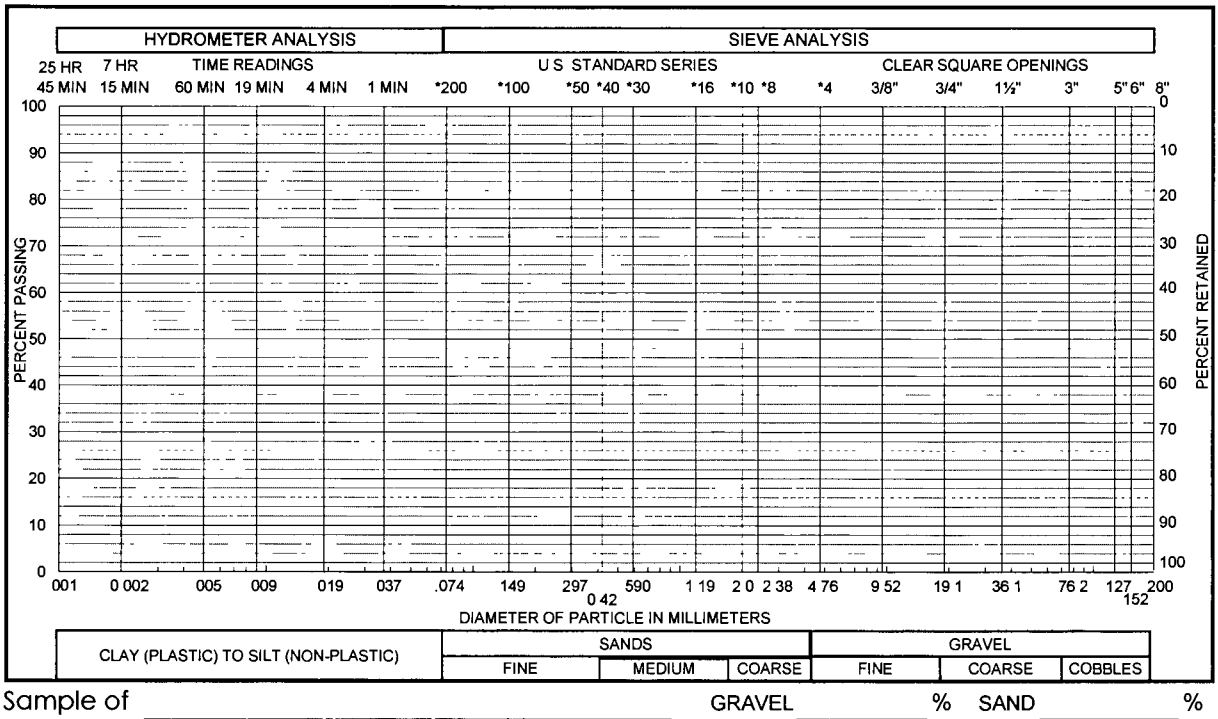


Sample of Lean Clay with Sand (CL)
From Fortune Revenue Silver Mine

GRAVEL	0 %	SAND	23 %
SILT & CLAY	77 %	LIQUID LIMIT	25 %
PLASTICITY INDEX			8 %

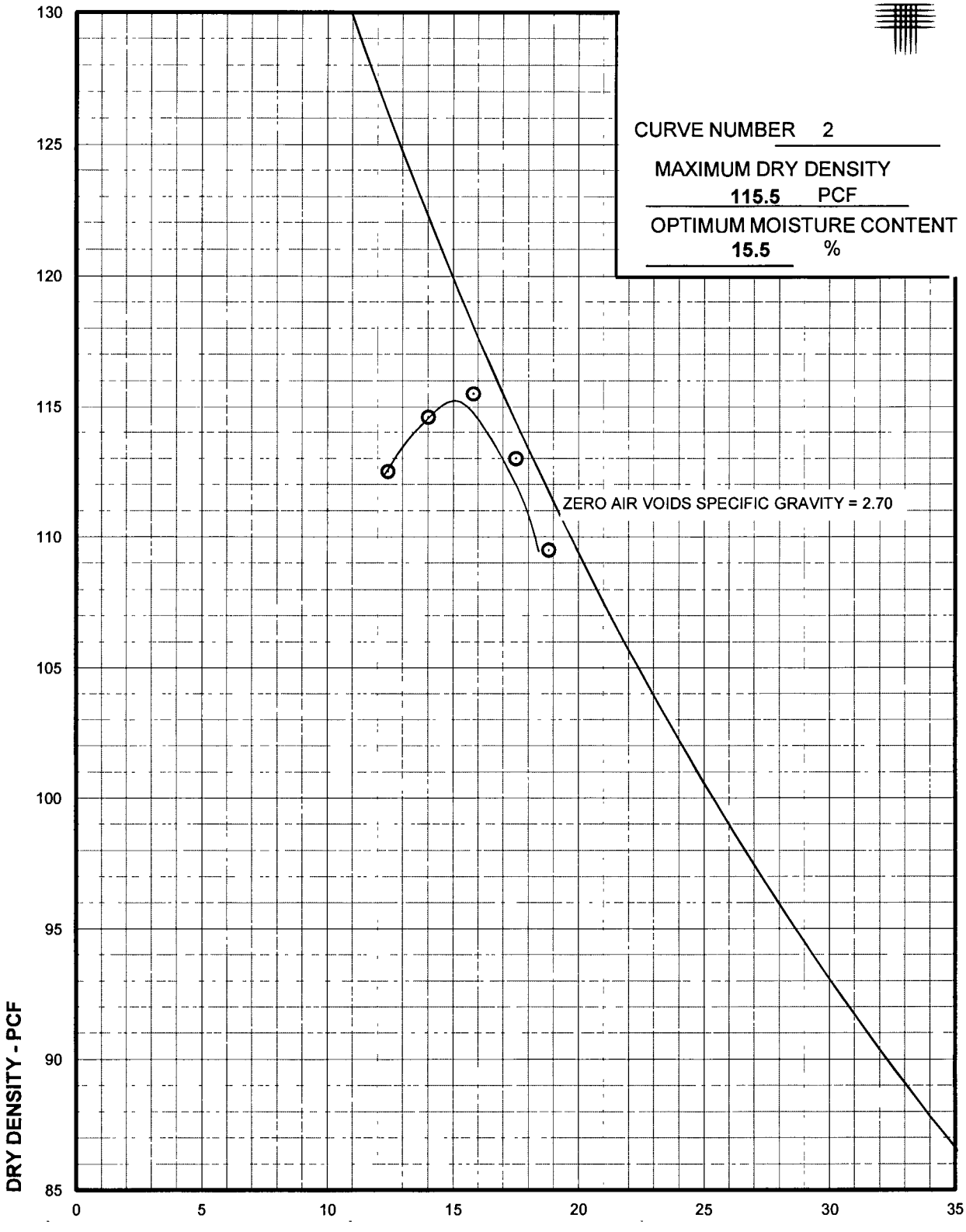


Sample of
From

GRAVEL	%	SAND	%
SILT & CLAY	%	LIQUID LIMIT	%
PLASTICITY INDEX			%

Gradation Test Results FIG. 1

FORTUNE REVENUE SILVER MINE
PROJECT NO DN47,709
S:\PROJECTS\47700\DN47709 000\300\3 Letters\L1\DN47709-Gradation



Sample Description Clay, silty, gray

Location

Compaction Test Procedure ASTM D 698
METHOD "A"

LIQUID LIMIT	25	%
PLASTICITY INDEX	8	%
GRAVEL	-	%
SAND	-	%
SILT AND CLAY	77	%

FORTUNE REVENUE SILVER MINE
PROJECT NO DN47,709
C:\Users\bgarcia\Documents\DN47709-Proctor1

Compaction Test Results

Fig. 2

CTL | THOMPSON

July 16, 2015

Fortune Revenue Silver Mines
1900 Main Street
Ouray, Colorado 81427

Attention: Clint Fletcher

Subject: Laboratory Test Results
Mill Tailings
Project No. DN47,709.000-300

This letter transmits the results of laboratory tests performed on a sample delivered to our office on January 27, 2015. The test results transmitted at this time are those requested by Greg Lewicki when the sample was submitted.

The testing consisted of two direct shear tests (one test run with the sample flooded and one test run with the sample not flooded) and one consolidated-undrained triaxial test (CU) with pore pressure measurement. For all tests the samples were remolded to 95 percent of 115.5 pcf at a moisture content of 15.5 percent. The sample was tested in general accordance with American Society for Testing and Materials (ASTM) standards. Test results are presented in the attached Figures 1 through 3.

Should you have any questions regarding these test results, please call.

Very truly yours,

CTL | THOMPSON, INC.

Alan J. Lisowy, P.E.
Associate Engineer

AJL/bg
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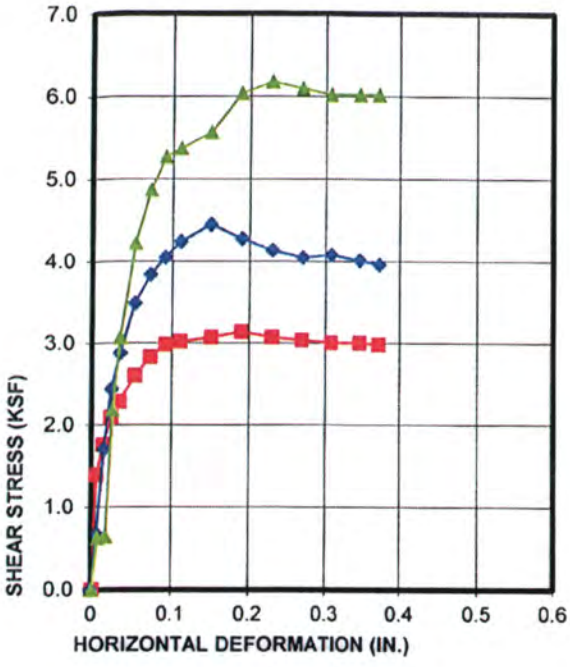
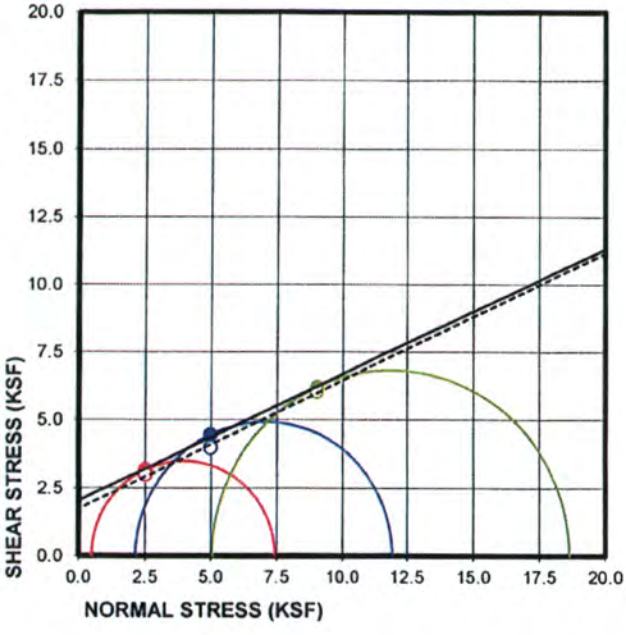


Sample No.	Boring No.	Depth (FT)	Moisture Content (%) Before	Moisture Content (%) After	Dry Density (PCF)
1 ■	mill tailings	0.00	15.4	19.8	109.9
2 ◆	mill tailings	0.00	15.4	18.3	109.8
3 ▲	mill tailings	0.00	15.4	17.0	109.8

LL, %: 28 PI, %: 8 -200: 77 Clay Content, %

Thickness (in): 1.0 Diameter (in): 1.935

Shearing Rate (in/min): 0.0063



Sample No.	Normal Stress (KSF)	Peak Shear Stress (KSF) ●	Large Displacement Shear Stress (KSF) ○	Large Displacement Displacement (IN.) ○
1 ■	2.5	3.14	2.98	0.37
2 ◆	5	4.45	3.96	0.37
3 ▲	9	6.17	6.02	0.37

Peak ϕ (DEG): 25

Large Displacement. ϕ (DEG): 25

Peak C (PSF): 2040

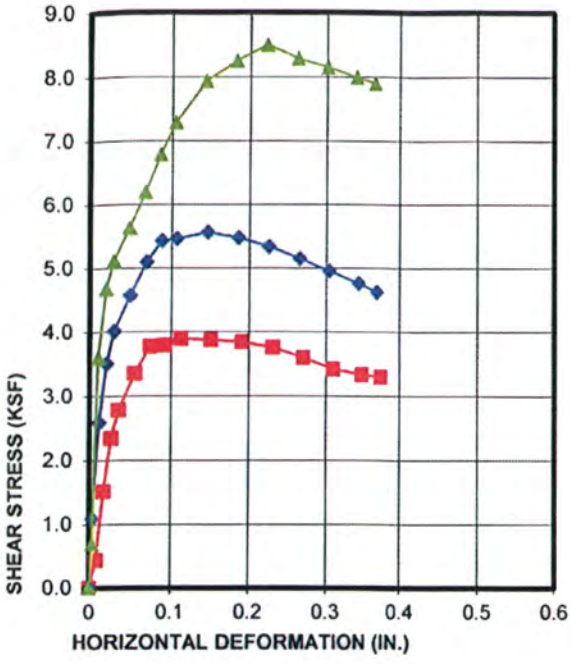
Large Displacement C (PSF): 1730

Sample Description: Mill Tailings - Sand Clay (CL)

Sample Type: Remolded to 95% of 115.5 at 15.5% moisture content

Remarks: Test was conducted on a flooded sample.

Direct Shear Test Results

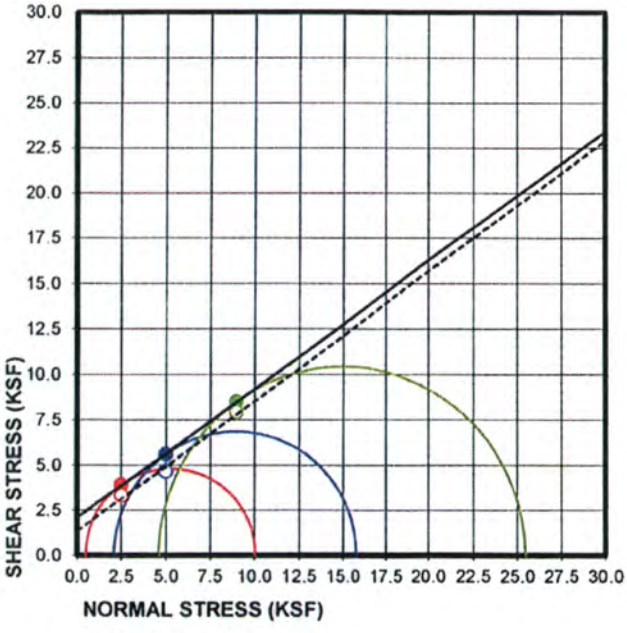


Sample No.	Boring No.	Depth (FT)	Moisture Content (%) Before	After	Dry Density (PCF)
1 ■	mill tailings	0.00	15.4	14.4	109.9
2 ◆	mill tailings	0.00	15.4	14.3	109.8
3 ▲	mill tailings	0.00	15.4	14.1	109.8

LL, %: 28 PI, %: 8 -200: 77 Clay Content, %: 0.0

Thickness (in): 1.0 Diameter (in): 1.935

Shearing Rate (in/min): 0.0063



Sample No.	Normal Stress (KSF)	Peak Shear Stress (KSF) ●	Large Displacement Shear Stress (KSF) ○	Large Displacement Displacement (IN.) ○
1 ■	2.5	3.89	3.3	0.37
2 ◆	5	5.56	4.62	0.37
3 ▲	9	8.5	7.9	0.37

Peak ϕ (DEG): 35

Large Displacement. ϕ (DEG): 36

Peak C (PSF): 2080

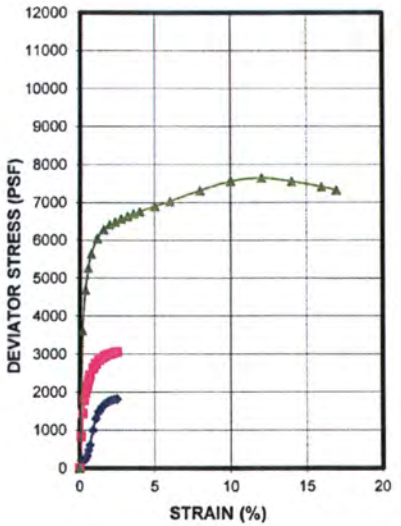
Large Displacement C (PSF): 1320

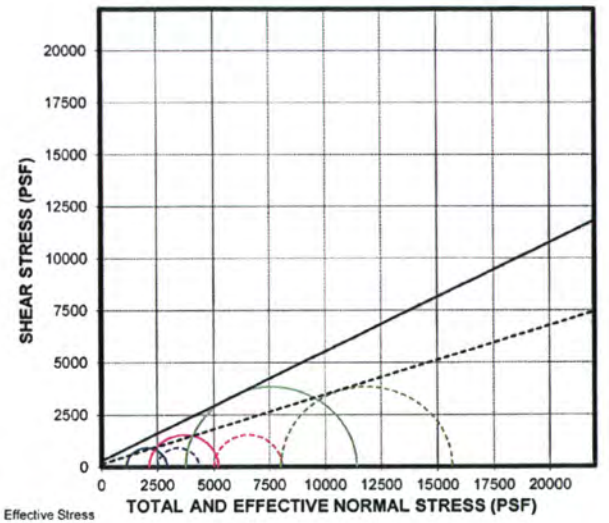
Sample Description: Mill Tailings - Sandy Clay (CL)

Sample Type: Remolded to 95% of 115.5 at 15.5% moisture content.

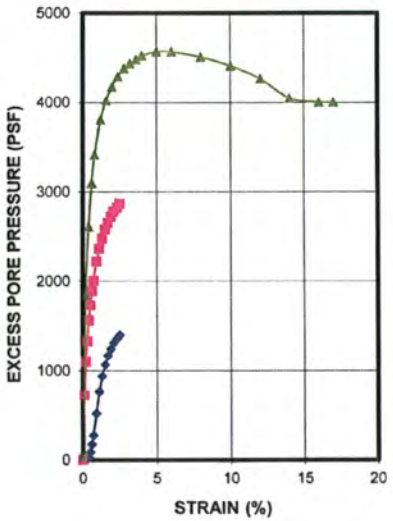
Remarks: Test was conducted with sample flooded.

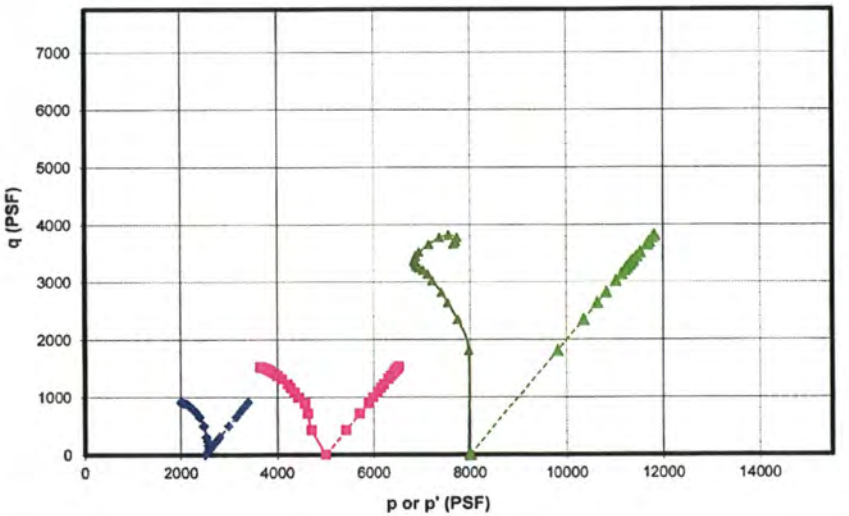
Direct Shear Test Results





Effective Stress
Total Stress





TYPE OF SPECIMEN

Sample Description:

Mill Tailings - Remolded to 95% of 115.5 at 15.5% moisture content.

Soil Classification: Sandy Clay (CL)

LL, %: 25 PI, %: 8 -200, %: 77 Clay Content,%

Test No.	1	2	3
Symbol	◆	■	▲
Boring Hole No.	0	0	0
Depth (ft.)	0	0	0
Initial Water Content, (%)	15.4	15.4	15.4
After Test Water Content (%)	17.5	17.5	17.5
Dry Density (pcf)	109.9	109.9	109.9
Specimen Diameter (in.)	3.000	3.000	3.000
Initial Height (in.)	6.00	6.00	6.00
Consolidation Pressure (psf)	2491.2	4996.8	8006.4

At Maximum Deviator Stress

Eff. Major Princ. Stress, $\overline{\sigma_1}$ (psf)	2910	5184	11381
Eff. Min. Princ. Stress, $\overline{\sigma_3}$ (psf)	1094	2131	3744
Excess Pore Pressure, Δu (psf)	1397	2866	4262
Tot. Major Prin. Stress, σ_1 (psf)	4307	8050	15643
Tot. Min. Prin. Stress, σ_3 (psf)	2491	4997	8006
Strain at Max. Deviator Stress(%)	2.5	2.5	12.0

Effective Stress Friction Angle, $\overline{\phi}$ (°):	30
Effective Stress Cohesion, $\overline{C}$ (psf)	300
Total Stress Friction Angle, ϕ (°):	19
Total Stress Cohesion, C (psf)	150

Remarks:

CU Triaxial Test Results

No. DN47,709-300

Fig. 3

Appendix B – Troxler Nuclear Gauge Manual and Procedures

The operation of the Gauge will be discussed by the Tailings management Team at the Mine and the Engineer.

TROXLER®
The Leader in Construction Testing Equipment

Troxler Electronic Laboratories, Inc. - Troxler International, Ltd.
3008 Cornwallis Road, P.O. Box 12057, Research Triangle Park, NC 27709 - USA
Telephone: 1.919.549.8661 Telefax: 1.919.549.0761 Web: troxlerlabs.com

Application Brief
TROXLER MODEL 3440

Roadreader™
Nuclear Moisture Density Gauge

September 2007

Introduction

The Troxler Model 3440 Roadreader™ nuclear moisture/density gauge offers two test modes for measuring the density of soil, aggregate, concrete and asphalt materials. The direct transmission mode allows the source to be lowered below the surface in order to test a larger area of material and improve gauge precision. In backscatter mode the source is positioned near the surface of the test material and the top four inches of material are penetrated by gamma rays. Moisture content of the material is also tested in a manor similar to the backscatter mode. The Model 3440 provides many special functions and features in order to achieve the highest level of operator convenience. This gauge prompts the user through the steps of accessing and enabling all functions. This application brief will describe the operation, application and features of the Model 3440 Roadreader™ Surface Moisture / Density Gauge.

Measurement Technology

Surface nuclear gauges use the interaction of gamma radiation with matter to measure density through direct transmission or backscatter. In the direct transmission position the source rod extends through the base of the gauge into a predrilled hole up to 30 cm *(12 in.)* deep in the material being tested. The gamma rays are transmitted from the density source, through the test material and are counted by detectors located within the gauge. The average density between the source and detectors is then determined. The backscatter mode is a rapid and nondestructive means of testing materials that are approximately 10 cm *(4 in.)* in depth. The gamma source and the detectors remain inside the gauge, which rests on the surface of the test material. Gamma rays from the density source enter the test material. Those that are scattered back toward the detectors are counted, determining the density count for the material. This means of testing is usually used on asphalt and concrete. The photons counted is in direct relation to the density of the material; the higher the counts the lower the density, and the lower the counts the higher the density. Calibration constants, acquired in the factory during calibration on blocks of known density or moisture content, are used by the gauge to convert the counts obtained in the field test to a density or moisture measurement.

Moisture content is also measured in a nondestructive test mode. Moisture is determined through the detection of thermalized neutrons ("fast" neutrons which have been slowed by the hydrogen present in the material, normally in the form of water). As the moisture level of the test material increases, neutrons are thermalized at a greater rate so the moisture count increases.

Gauge Operation

The Troxler Model 3440 gauge can measure the moisture content, density and percent compaction of soils, soil-stone aggregates, concrete, asphalt treated bases, asphalt surfacing and other materials that are similar in density and / or moisture content. This gauge offers two modes of operation: soil and asphalt. The direct transmission and backscatter testing positions can be used with each mode.

Soil Mode is designed for measurements of soils, stone or other materials where both density and moisture content are desired. Direct transmission testing typically offers better precision and control of depth of measurement and is the preferred method. The Model 3440 gauge provides the Dry Density, Wet Density, Moisture, Percent Moisture and Percent Proctor when testing in the soil mode.

Surface preparation for soil testing is critical to gauge performance and test results. The scraper plate accessory provided can be used to prepare rough surfaces by moving it back and forth across the test area. Small voids, cracks, or holes can be filled with sand or native fines. This is most critical when testing in the backscatter position.

Asphalt Mode is used on full depth, greater than 100 mm (*4inch*) asphalt. Typically, the source rod is in the backscatter position, slightly above the asphalt, but direct transmission can be used if a hole can be drilled in the asphalt. The Model 3440 gauge provides the Wet Density, Percent Marshall and Percent Voidless values when testing in the asphalt mode.

When performing density tests on coarse asphalt surfaces, or on open graded mixes, the surface voids may be filled with soft sand, cement powder or native fines. However, the asphalt surface should remain bare so that the gauge base makes contact with the surface. It is also important that the gauge sit flat on the asphalt surface and does not "rock".

Offsets

The Roadreader™ Model 3440 gives the user the ability to input offsets to gauge readings to correct for non-standard conditions. In soil mode, the user may apply a correction factor to adjust for the presence of chemically bound hydrogen or neutron absorbers that may affect the moisture count. For example, mica is a mineral that usually contains considerable molecular hydrogen and will cause the readings to indicate a higher moisture content than is actually present. In soil and asphalt mode a density correction factor may be used to correct for material composition or for material density outside of the calibration range. A trench offset may be used in either soil or asphalt mode when testing in a trench or near a large vertical object. Special Calibration is a function that allows the operator to temporarily "re-calibrate" the gauge for measuring materials that do not fall within the range of a normal calibration. These functions are simple to access from the gauge's offset and special function menus, which walk the operator through the processes step by step.

Keypad

The Model 3440 gauge keypad is designed so the operator can easily access any of the gauge's many options. The control panel consists of 22 keys with the numeric keys also representing a second function, accessed by pressing the shift key. The result is a keypad with 32 direct options available. Full access to gauge functions is provided while limiting the menus to be viewed or keys to be pressed. A "beep" verifies that the keystroke was received by the

gauge. Above the keypad is a four line by sixteen character Liquid Crystal Display screen allowing for descriptive menus.

Data Storage

The Model 3440 gauge can store up to 450 test readings for later recall or downloading to a printer or computer. Measurements are stored under specific project numbers and station numbers. In addition to the measurement information, project number and station number, the gauge is capable of storing additional numeric notes. The gauge can also prompt for the information commonly required on U. S. Federal Highway Administration (FHWA) projects when the *Special Rdwy* option is enabled on the *Special* function menu. These prompts are specific to Soil, Stone or Asphalt and include categories such as: FHWA number, lane direction, distance from centerline, lift number, test type, etc.

Batteries and Power Consumption

The Model 3440 gauge runs on a rechargeable NiCad battery. Under normal conditions a fully charged battery will remain operational for approximately 8 weeks. When the "BATTERY LOW" warning appears, there are a few hours remaining before the battery must be recharged. A full charge (16 hours) is recommended at that time, but a 30-minute recharge will provide several hours of use if necessary. Two adapters are included as standard accessories with this gauge: a 115 / 230 VAC (50 / 60 Hz) and a 12 VDC charger. Alkaline batteries (D size) can be used temporarily in the event that recharging is not an option. A separate battery case is supplied for this purpose.

Additional Features

A number of other features are offered by the Model 3440 gauge to provide ease of operation and to ensure that the gauge is performing properly. When in the automatic depth mode, the gauge automatically reads the depth strip on the index rod. The gauge determines the source depth; therefore the operator no longer is required to program in the depth of each test. This gauge also offers a calculator mode which, when enabled, allows the keypad to be used as a four function calculator. The "Auto Station" function will automatically increment the station number of each test by one after an initial station number is entered. The Model 3440 gauge can measure the density of thin layer asphalt or concrete provided the overlay thickness and the underlying material density is entered into the gauge. This feature, called the nomograph mode, is not as accurate as a true thin layer gauge but can produce satisfactory results under many conditions. The first 18 month limited warranty in the industry is offered with the Troxler Model 3440 Roadreader™ nuclear moisture/density gauge. In addition to those options listed here, many more are included on the Model 3440 to assist the operator in the everyday testing of soils and asphalt.

Correct gauge operation is promoted by a number of features. A STAT (statistical stability) test may be performed by the operator to validate the normal operation of the gauge. After a STAT test, a Drift test can check the long term drift of the gauge if a problem is suspected. Standard count comparison, validation and storage is also done by the Model 3440. The last 4 standard counts are stored in the gauge's memory and the average is compared to the new standard count to verify that it is within the specified limits. A precision option is offered in order to achieve a desired degree of precision under certain conditions. Special Calibration can be enabled to temporarily recalibrate the gauge constants for use in measuring particular materials that do not fall within the range of a normal calibration.

Summary

The Troxler Roadreader™ nuclear moisture / density gauge is used by many contractors, engineers, and highway departments for compaction control of soil, aggregate, concrete and full depth asphalt. The ASTM standard numbers D 6938, D 2950, and C 1040 are met or exceeded by this gauge. Two test modes are available for density determination: direct transmission and backscatter. The operator selects the mode depending on the material type and thickness of the layer being tested. The Model 3440 provides 30 special functions, storage of up to 450 test records, an 18 month warranty and many more options that make it simple to operate and a necessity for all technicians.

Measurement Precision

Model 3440 Nuclear Moisture/Density Gauge

Direct Transmission(*6"* / 150mm)	**15 sec.**	**1 min.**	**4 min.**
Precision at *125 pcf*	*+/-0.42*	*+/-0.21*	*+/-0.11 pcf*
2000kg/m³	+/-6.8	+/-3.4	+/-1.7 kg/m³
Composition error at *125pcf*	*+/-1.25*	*+/-1.25*	*+/-1.25pcf*
2000kg/m³	+/-20	+/-20	+/-20kg/m³
Surface error *(0.05", 100% Void) pcf*	*-1.1*	*-1.1*	*-1.1pcf*
(1.25mm, 100%Void) kg/m³	-17	-17	-17kg/m³
Backscatter (98%) (*4"* / 100mm)			
Precision at *125 pcf*	*+/-1.00*	*+/-0.50*	*+/-0.25pcf*
2000kg/m³	+/-16	+/-8	+/-4kg/m³
Composition error at *125 pcf*	*+/-2.5*	*+/-2.5*	*+/-2.5pcf*
2000kg/m³	+/-40	+/-40	+/-40kg/m³
Surface error *(0.05", 100% Void) pcf*	*-4.7*	*-4.7*	*-4.7pcf*
(1.25mm, 100%Void) kg/m³	-75	-75	-75kg/m³
Moisture			
Precision at *15 pcf*	*+/-0.64*	*+/-0.32*	*+/-0.16pcf*
250kg/m³	+/-10.3	+/-5.1	+/-2.5kg/m³
Surface error *(0.05", 100% Void) pcf*	*-1.12*	*-1.12*	*-1.12pcf*
(1.25mm, 100%Void) kg/m³	-18	-18	-18kg/m³
Depth of measurement at *15 pcf = 8.5"*			
250 kg/m³ = 212.5 mm			

Appendix C – Moisture Meter Manual and Procedures

Moisture Meter not yet selected.

Appendix D – Revenue and Atlas Pile Design Details

MILL FACILITIES

0' 50' 100'

LEGEND

- SLURRY
- WATER
- DRAINAGE DIRECTION
- TAILINGS DIRECTION
- SUMP

RETAINING WALL
CRUSHER SLAB
101 000 E
THICKENER
FILTER BUILDING
UNDERGROUND STORAGE
Brow
MILL TUNNEL
MINE WATER TO MINE WATER POND
Brow
MINE PORTAL
CRUSHING ACCESS DECLINE
COFFER DAM WATER PUMPED TO PROCESS WATER TANK
99,000 N
CRUSHING GALLERY
JAW CRUSHER
CONE CRUSHER
CONVEYORS
5/8" SCREEN
PUMP
FINE ORE CONVEYOR
FINE ORE BIN
EMERGENCY OVERFLOW FROM SURGE TANK TO MINE TUNNEL DITCH
MINOR PORTION OF WATER TO PUMP IN CRUSHER GALLERY
SUMP
GRIZZLY
COFFER DAM
METAL WATER SURGE TANK
COARSE ORE BIN TUNNEL
WATER FROM SELECTED MINE FLOWS IN 6" HDPE PIPE GRAVITY FLOW TO COFFER DAM
MAJOR PORTION OF FLOW FROM METAL SURGE TANK IS PUMPED TO YELLOW ROSE BASIN
101 000 E

MILL TUNNEL

0' 20' 40'

TO THICKENER
VEHICLE ACCESS
FILTER PRESS BANK 1
FILTER PRESS BANK 2
TAILS SLURRY TANK
PROCESS WATER TANK
Brow
CONCENTRATES IN SUPER SACS
FILTRATE FEED TANKS (2) WATER TO PROCESS WATER TANK
GRATED DRAIN CATCHES SURFACE WATER AND RUNS TO SUMP BOX
12,000 GAL. TANK TAILS SLURRY
SLOPE
SUMP
SUMP
1% GRADE
Zn CLEANER FLOTATION CELLS
Pb CLEANER FLOTATION CELLS
WATER FROM CRUSHER GALLERY & COFFER DAM
Zn ROUGHER FLOTATION CELLS
Pb ROUGHER FLOTATION CELLS
SUMP
Zn CONDITIONING TANK
HYDROCYCLONE AND KNELSON CONCENTRATOR
Pb CONDITIONING TANK
BALL MILL
SUMP
99,000 N
FINE ORE BIN STORAGE (300 TONS)
SLOPE
ELECTRICAL EQUIPMENT ROOM SLABE SEALED OFF FROM SURFACE WATER
101 000 E

FILTER BUILDING AND THICKENER

0' 10' 20'

CROSS SECTION DETAIL OF CONCRETE APRON

FILTER BUILDING
6" MIN. DEPTH
EPOXIED CONCRETE CURB AND FLOOR
CHEMICAL STORAGE AREA
6" THICK REINFORCED CONCRETE APRON

101 000 E
26 FT. DIA. THICKENER
PUMPS
CONCRETE CONTAINMENT
SUMP AT LOW POINT PUMPED OUT TO S&W LINE
PUMP
SUMP
SLURRY FLOW TO THICKENER FROM 10,000 GAL. TANK IN MILL
THICKENER OVERFLOW WATER TO PROCESS WATER TANK
THICKENER UNDERFLOW SLURRY TO TAILS TANK
S&W FLOW FROM APRON SUMP
APRON SUMP
SEE APRON CROSS SECTION DETAIL ABOVE
CONCRETE CURB
FRESH AIR INTAKE FAN
GARAGE DOOR
FILTER BUILDING APRON DRAINS TO SUMP
CONCRETE CURB
GARAGE DOOR
CONCRETE CURB AT DOOR
CHEMICAL STORAGE AREA: BAGS, TOTES, & DRUMS
FLOOR SUMP w/PUMP
GARAGE DOOR
DRY CHEMICAL STORAGE AREA
GARAGE DOOR
TAILS SLURRY TANK
TANK ROOM
EPOXIED FLOOR AND CURB IN ENTIRE BAY
FILTER PRESSES
TAILINGS BAY 2
TAILINGS BAY 1
MECHANICAL
PROCESS WATER TANK
EPOXIED FLOOR
WATER FROM FILTER PRESSES
SAMPLE PREP
LUBRICANT STORAGE AREA
CONCRETE CURB w/EPOXY
MILL PORTAL TOWARDS MILL TUNNEL
MILL ACCESS DOOR
WATER IN TO 12,000 GAL. TANK IN MILL
CISTERN FOR POTABLE WATER
OUT FROM 12,000 GAL. SLURRY TANK
OUT FROM COFFER DAM
101 000 E

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Map 1 - Mill Layout
Ouray Silver Mine
Ouray Silver Mines, Inc.

DRMS Permit Number: ----		MSHA ID: ----
Mine Entry Location: Latitude: ----		Longitude: ----
State: Colorado	County: Ouray	Nearest Town: Ouray
Section: ----	Township: ----	Range: ---- PM: ----
Major Watershed: Uncompaghre River		
Map Scale: See Each Viewport		
Map Georeferencing Information:	Datum: NAD27	Projection: Colorado State Plane South
Survey Source: ----	Survey Date: ----	
Imagery Source: ----	Imagery Date: ----	
Drawn by: Ben Langenfeld		Date: 09/30/15
Checked by: Greg Lewicki		Date: 10/15/15
Approved by: Greg Lewicki		Date: 10/15/15
File Name: D:\Dropbox\Revenue Mine\AutoCAD\Underground water system 151103.dwg		

N

Greg Lewicki And Associates
11541 Warrington Court
Parker, CO USA 80138
Phone (303)-346-5196
E-Mail - info@lewicki.biz

COLORADO REGISTERED GREGORY C. LEWICKI 20335 PROFESSIONAL ENGINEER

Greg Lewicki 11/9/15

ATLAS WASTE PILE

REVENUE WASTE PILE

County Road 26

SNEFFELS CREEK

Div #1 discharge into Sneffels is elevated

DIV #1

DIV #1B

COLL #1

COLL #2

COLL #3

COLL #4

DISTURBANCE LIMIT

10' BENCH

SEDIMENT POND 1

WETLANDS - DO NOT DISTURB

COUNTY ROAD 26

WETLANDS

MINE WATER POND

SEDIMENT POND 2

AVALANCHE PATH

WETLANDS - DO NOT DISTURB

DIV #2

DIV #3

AVALANCHE BERM

NATURAL DRAINAGE

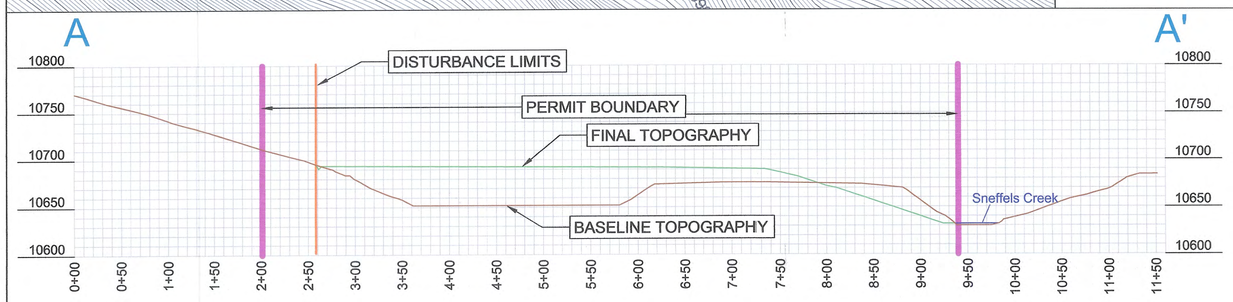
NATURAL DRAINAGE

MINE WORKINGS

0' 50' 100'

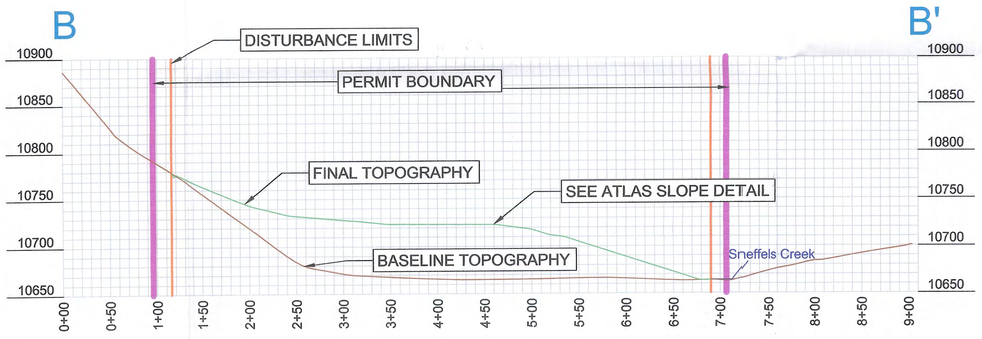
0' 50' 100'

A



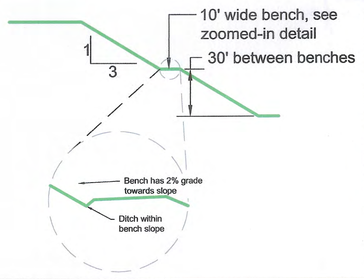
A'

B

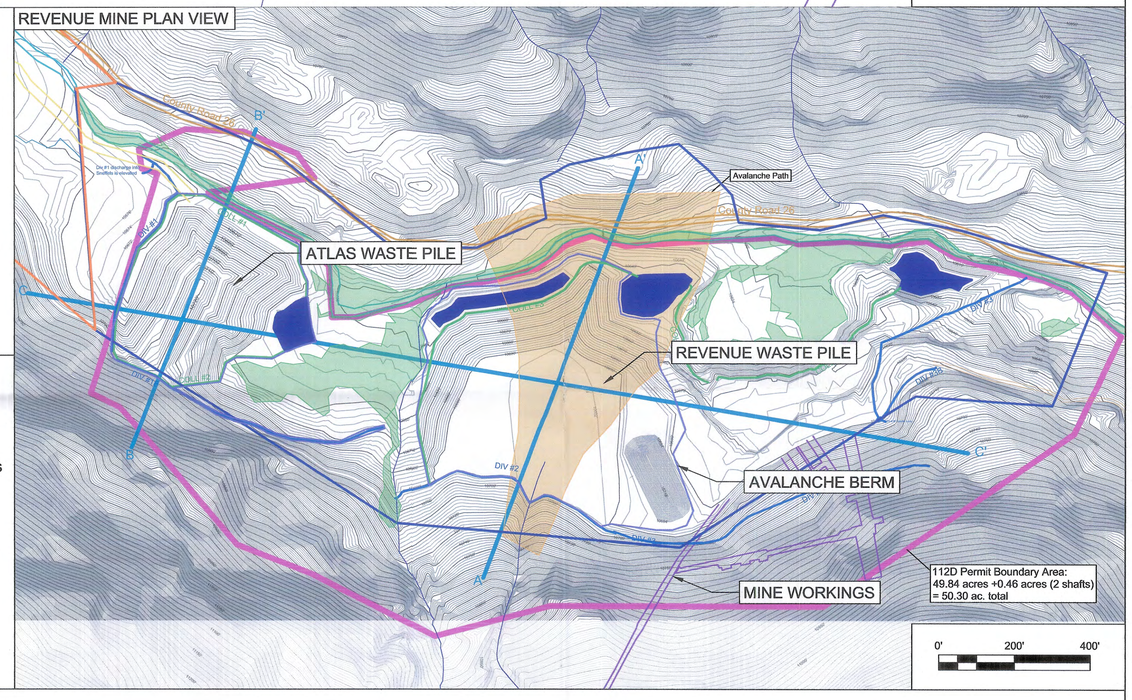


B'

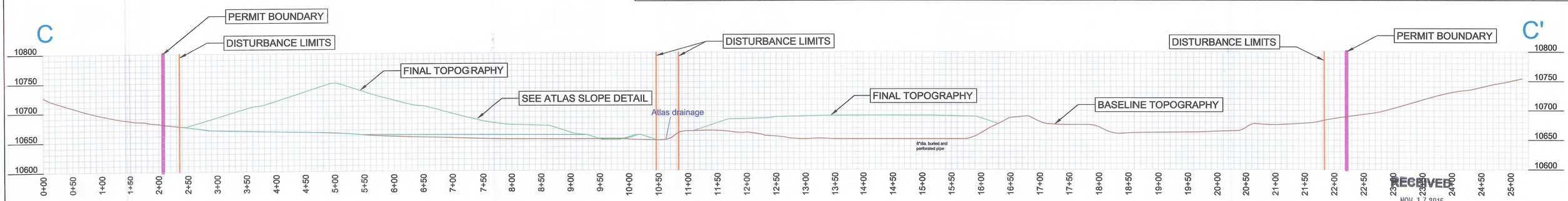
ATLAS SLOPE DETAIL



REVENUE MINE PLAN VIEW



C



C'

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M2012-032

SCALE AS SHOWN

NOTES: All dimensions in feet

Greg Lewicki 11/9/15

COLORADO REGISTERED GREGORY C. LEWICKI 20335 PROFESSIONAL ENGINEER

REVISIONS	BY	DATE

DES: BL
DRN: BL
CHK:
APPD:

DATE 07/24/15

SCALE: SEE EACH VIEW

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Parker, CO USA 80138
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E-Mail - info@lewicki.biz

Tailings Schematics
Revenue Mine
Fortune Revenue Silver Mines, Inc.

Appendix E – Test Record Sheets of - Mill Tailings Test Sheets of pH and Moisture and - Compaction Density/Moisture Tests at Piles

Tailings Test Sheets at Filter Bays			Revenue Mine	pH: 7.5 to 10.5	Moisture: 12-18%
Date of test	pH	Moisture %	Accepted?	Initials of Tester	Comments
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
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			◯ Y or ◯ N		
			◯ Y or ◯ N		

Tailings Test Sheets atRevenue and artlas Piles				Revenue Mine	
				Moisture: 12-18%	Compaction: 94% of Max Dry Density
Date of test	Moisture %	Compaction % of Max Dry Density	Accepted?	Initials of Tester	Comments
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
			◯ Y or ◯ N		
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			◯ Y or ◯ N		

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MINING & SAFETY

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: IMPORTANT: TRANSMIT YOUR SHIPPING DATA AND PRINT A MANIFEST:
At the end of each shipping day, you should perform the FedEx Ground End of Day Close procedure to transmit your shipping data to FedEx. To do so, click on the Ground End of Day Close Button. If required, print the pickup manifest that appears. A printed manifest is required to be tendered along with your packages if they are being picked up by FedEx Ground. If you are dropping your packages off at a FedEx drop off location, the manifest is not required.

Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide and applicable tariff, available upon request. FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery, misdelivery, or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim. Limitations, including limitations on our liability, can be found in the current FedEx Service Guide and applicable tariff apply. In no event shall FedEx Ground be liable for any special, incidental, or consequential damages, including, without limitation, loss of profit, loss to the intrinsic value of the package, loss of sale, interest income or attorney's fees. Recovery cannot exceed actual documented loss. Items of extraordinary value are subject to separate limitations of liability set forth in the Service Guide and tariff. Written claims must be filed within strict time limits, see current FedEx Service Guide.

Updated Appendix 8

Safety Data Sheets

SAFETY DATA SHEET

CUPRIC SULPHATE (B)

Section 1. Identification

Product identifier : CUPRIC SULPHATE (B)

Product code : Q04613

Relevant identified uses of the substance or mixture

Identified uses
Industrial applications

Supplier's details : QUADRA CHEMICALS LTD.
3901 F.X Tessier
Vaudreuil-Dorion, QC
CANADA J7V 5V5
1-800-665-6553

Emergency telephone number (with hours of operation) : **TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK IN CANADA - CALL 1-888-922-3330**

Section 2. Hazard identification

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Harmful if swallowed.
Causes serious eye irritation.

Precautionary statements

Prevention : Wear eye or face protection. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Ingredient name	% (w/w)	CAS number
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	98 - 100	7758-99-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Section 4. First-aid measures

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
sulfur oxides
metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

Small spill : Move containers from spill area. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust dispersal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	-

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls/personal protection

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Physical state : Solid. [Crystals or powder.]

Color : Blue.

Odor : Odourless.

Odor threshold : Not available.

pH : Not available.

Melting point : Not available.

Boiling point : Not available.

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 2.284

Density : 2.284 g/cm³ [20°C (68°F)]

Solubility : Soluble in the following materials: cold water and methanol.

Dispersibility properties : Not available.

Section 9. Physical and chemical properties

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : >110°C (>230°F)

Viscosity : Not available.

Volatility : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : metals

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	LD50 Oral	Rat	960 mg/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	960.2 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	Acute EC50 182 ppb Fresh water Acute LC50 0.032 ppm Fresh water	Daphnia - Daphnia magna Fish - Oncorhynchus mykiss	48 hours 96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	TDG Classification
UN number	3077
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Sulfuric acid copper(2+) salt (1:1), hydrate (1:5))
Transport hazard class(es)	9 
Packing group	III
Additional information	Not available.

Section 14. Transport information

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

Section 16. Other information

History

Date of issue/Date of revision : 6 November 2019

Prepared by : Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations
HPR = Hazardous Products Regulations

Procedure used to derive the classification

Classification	Justification
ACUTE TOXICITY (oral) - Category 4 EYE IRRITATION - Category 2A	Calculation method Calculation method

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Quadra

SAFETY DATA SHEET

DANAFLOAT™ 067

Section 1. Identification

Product identifier as used on the label : DANAFLOAT™ 067

Product code : Q10795

Other means of identification : Not available.

Product type : Liquid.

Recommended use of the chemical and restrictions on use

Identified uses
Flotation agent

Supplier's details : Quadra Chemicals Inc.
21 Waterway Ave., Suite 200
The Woodlands, TX
United States (US) 77380
1-800-665-6553

Emergency telephone number (with hours of operation) : **Transportation Emergency - 24Hrs/Day - In US - Call 1-800-633-8253**

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (dermal) - Category 3
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Toxic in contact with skin.
Harmful if swallowed.
Causes severe skin burns and eye damage.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF ON SKIN: Take off immediately all contaminated clothing and wash it before reuse. Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Section 2. Hazards identification

Immediately call a POISON CENTER or physician.

Storage : Store locked up.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Keep container tightly closed. Do not breathe vapor or spray. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

Hazards not otherwise classified : Causes respiratory tract burns. Causes digestive tract burns.

Ingredients of unknown toxicity : Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 57.9%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

Ingredient name	%	CAS number
ammonium O,O-bis(methylphenyl) dithiophosphate	49 - 51	58373-83-4
mix-cresol	0 - 7	1319-77-3
ammonia	0 - 1	1336-21-6

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in

Section 4. First aid measures

recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory system.

Skin contact : Causes severe burns. Toxic in contact with skin.

Ingestion : May cause burns to mouth, throat and stomach. Harmful if swallowed. Corrosive to the digestive tract. Causes burns.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
sulfur oxides
phosphorus oxides

Section 5. Fire-fighting measures

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Do not store below the following temperature: 0°C (32°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
ammonium O,O-bis(methylphenyl) dithiophosphate Cresol	None. **OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 5 ppm 8 hours. TWA: 22 mg/m³ 8 hours. **OSHA PEL (United States, 5/2018).** **Absorbed through skin.** TWA: 5 ppm 8 hours. TWA: 22 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2018).** **Absorbed through skin.** TWA: 20 mg/m³ 8 hours. Form: Inhalable fraction and vapor

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Reddish brown.

Odor : Tar-like.

Odor threshold : Not available.

pH : 9 to 10.5

Melting point : -5 to -1°C (23 to 30.2°F)

Boiling point : 99°C (210.2°F)

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : Not available.

Density : 1.11 to 1.15 g/cm³ [20°C (68°F)]

Solubility : Not available.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : acids

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Cresol	LD50 Dermal LD50 Oral	Rabbit Rat	200 mg/kg 1454 mg/kg	- -

Irritation/Corrosion

Not available.

Sensitization

Section 11. Toxicological information

Not available.

Mutagenicity

Not available.

Carcinogenicity

No components known to Quadra, present at or above the cut-off value/concentration limit (≥0.1%), are listed as carcinogens by IARC, OSHA or NTP.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory system.

Skin contact : Causes severe burns. Toxic in contact with skin.

Ingestion : May cause burns to mouth, throat and stomach. Harmful if swallowed. Corrosive to the digestive tract. Causes burns.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Section 11. Toxicological information

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral Dermal	937 mg/kg 567.4 mg/kg

Section 12. Ecological information

Ecotoxicity

Product/ingredient name	Result	Species	Exposure
Cresol	Acute EC50 5 to 10 ppm Marine water	Algae - Macrocystis pyrifera - Young	4 days
	Acute EC50 7000 µg/l Fresh water	Crustaceans - Gammarus fasciatus	48 hours
	Acute LC50 10000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Cresol	2.33	17 to 20	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains

Section 13. Disposal considerations

and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Cresol	1319-77-3	Listed	U052

Section 14. Transport information

DOT Classification

UN number : UN2927

UN proper shipping name : Toxic liquid, corrosive, organic, n.o.s. (mix-cresol, ammonium O,O-bis(methylphenyl) dithiophosphate)

Transport hazard class(es) : 6.1 (8)

Packing group : II

Environmental hazards : No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Additional information : **Reportable quantity** 1443 lbs / 655.12 kg [153.15 gal / 579.75 L]. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

United States inventory (TSCA 8b) : All components are listed or exempted.

State regulations

Massachusetts : The following components are listed: CRESOL

New York : The following components are listed: Cresol(s)

New Jersey : The following components are listed: CRESOLS (mixed isomers); CRESYLIC ACID

Pennsylvania : The following components are listed: PHENOL, METHYL-

California Prop. 65

None of the components are listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Health	/	3
Flammability		0
Physical hazards		0

Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (dermal) - Category 3	Calculation method
SKIN CORROSION - Category 1	Calculation method
SERIOUS EYE DAMAGE - Category 1	Calculation method

History

Date of issue/Date of revision : 6/4/2020

Date of previous issue : No previous validation

Version : 1

Prepared by Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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: **FLOQUAT™ FL 2949**

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:

Other information:
None.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.
Warning! Spills produce extremely slippery surfaces.

Unsuitable extinguishing media:
None known.

5.2. Special hazards arising from the substance or mixture

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

5.3. Advice for firefighters

Protective measures:
Wear self-contained breathing apparatus and protective suit.

Other information:
Spills produce extremely slippery surfaces. Will not burn until water is evaporated.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:
Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.

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

Do not contaminate water.

6.3. Methods and material for containment and cleaning up

Small spills:
Do not flush with water.Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.

Large spills:
Do not flush with water.Dam up. Soak up with inert absorbent material. Clean up promptly by scoop or vacuum.

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:	Liquid, Colorless to amber.
b) Odour:	Slight / Characteristic
c) Odour Threshold:	Not applicable.
d) pH:	4 - 7 (See Technical Bulletin or Product Specifications for precise value)
e) Melting point/freezing point:	< 5°C
f) Initial boiling point and boiling range:	> 100°C
g) Flash point:	Does not flash.
h) Evaporation rate:	No data available.
i) Flammability (solid, gas):	Not applicable.
j) Upper/lower flammability or explosive limits:	Not expected to create explosive atmospheres.
k) Vapour pressure:	2.3 kPa @ 20°C
l) Vapour density:	0.804 g/litre @ 20°C
m) Relative density:	1.0 - 1.2 (See Technical Bulletin or Product Specifications for precise value)
n) Solubility(ies):	Completely miscible.
o) Partition coefficient:	< 0
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:	Not expected to be explosive based on the chemical structure.
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

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 = 10 - 100 mg/L

Acute toxicity to invertebrates: EC50/Daphnia magna/48 hours = 10 - 100 mg/L

Acute toxicity to algae: Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogenous distribution which invalidates the test.

Chronic toxicity to fish: No data available.

Chronic toxicity to invertebrates: No data available.

Toxicity to microorganisms: No data available.

Effects on terrestrial organisms: Exposure to soil is unlikely.

Sediment toxicity: Exposure to sediment is unlikely.

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:

The product is not expected to bioaccumulate.

Partition co-efficient (Log Pow): < 0

Bioconcentration factor (BCF): ~0

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, Epichlorohydrin, 1,3-Dichloro-2-propanol (1,3-DCP), 3-Monochloropropane-1,2-diol (3-MCPD)

SECTION 16: Other information

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0

SAFETY DATA SHEET

SECTION 1	IDENTIFICATION

Product

Name: Hydrated Lime

Other Names: Hydrate; High-Calcium Hydrated Lime

Recommended Uses: Water Treatment; pH adjustment; FGT; Construction

Company Identification:

US Operations:

Lhoist North America, Inc.
5600 Clearfork Main St, Ste. 300
Fort Worth, TX 76109
817-732-8164

Canadian Operations:

Lhoist North America of Canada, Inc.
20303-102B Ave.
Langley, BC V1M 3H1
604-888-4333

Emergency Phone Number:

Chemtrec 1-800-424-9300

SECTION 2	HAZARDS(S) IDENTIFICATION

Classification

Eye Damage – Category 1

Carcinogen – Category 1

Skin Irritation – Category 2

Specific Target Organ Toxicity Single Exposure – Category 3 (Respiratory System)

Specific Target Organ Toxicity Repeat Exposure – Category 1 (Respiratory System)

Labeling:

Pictograms:

Signal Word(s): Danger

Hazard Statements: Causes serious eye damage.

Causes skin irritation.

May cause respiratory irritation.

Causes damage to lungs through prolonged or repeated exposure when inhaled.

May cause cancer through inhalation.

Precautionary Statements:

Wear protective gloves and eye protection. Wash exposed skin thoroughly after handling. Do not breathe dust. Use only outdoors or in a well-ventilated area. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product.

If on skin: wash exposed skin with plenty of water. If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Seek medical attention immediately. If inhaled: Remove person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

If exposed or concerned: Get medical advice

Dispose of contents or containers in accordance with applicable regulations.

Other Hazards: None.

SECTION 3	COMPOSITION/ INFORMATION ON INGREDIENTS

Chemical Name: Calcium hydroxide

Common names and synonyms: Hydrate; High-Calcium Hydrated Lime

Chemical Identity	CAS #	Concentration, % Wt.
Calcium Hydroxide	1305-62-0	> 90%
Magnesium Oxide	1309-48-4	< 3%
Crystalline Silica	14808-60-7	< 2%

SECTION 4	FIRST AID MEASURES

Eye Contact: Contact can cause severe irritation or burning of eyes, including permanent damage. Immediately flush eyes with generous amounts of water for as long as needed. This may take several minutes. Pull back the eyelid to ensure that all lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Inhalation: This product can cause severe irritation of the respiratory system. Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Skin Contact: Contact can cause severe irritation or burning of skin, especially in the presence of moisture. Wash exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: This product can cause severe irritation or burning of gastrointestinal tract if swallowed. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed: Irritation of skin, eyes, gastrointestinal tract or respiratory tract. Long-term exposure by inhalation may cause permanent damage. This product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

Note to Physician: Provide general supportive measures and treat symptomatically.

SECTION 5	FIREFIGHTING MEASURES

Extinguishing Media

Appropriate Extinguishing Media: Use dry chemical fire extinguisher

Inappropriate Extinguishing Media: Do not use halogenated compounds.

Firefighting

Fire Hazards: Hydrated Lime is not combustible or flammable. Hydrated Lime is not considered to be an explosive hazard, although reaction with incompatible materials may rupture containers.

Hazardous Combustion Products: None

Special Protective Equipment and Fire Fighting Instructions: Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).

SECTION 6	ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use proper protective equipment.

Environmental Precautions: For large spills, as much as possible, avoid the generation of dusts. Prevent release to sewers or waterways.

Methods and Materials for Containment and Cleaning Up:

Small Spills: Use dry methods to collect spilled materials. Avoid generating dust. Do not clean up with compressed air. Store collected materials in dry, sealed plastic or metal containers. Residue on surfaces may be washed with water or dilute vinegar.

Large Spills: Use dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or metal containers.

SECTION 7	HANDLING AND STORAGE

Precautions for Safe Handling: Keep in tightly closed containers. Protect containers from physical damage. Avoid direct skin contact with the material.

Conditions for Safe Storage, Including any Incompatibilities: Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials (see Section 10 below). Keep away from moisture. Do not store or ship in aluminum containers.

SECTION 8	EXPOSURE CONTROLS/ PERSONAL PROTECTION

Control Parameters:

Component	CAS #	Exposure Limits
Calcium Hydroxide	1305-62-0	OSHA PEL: 15 mg/m3 (total) 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m3
Magnesium Oxide	1309-48-4	OSHA PEL: 15 mg/m3 ACGIH TLV: 10 mg/m3
Crystalline Silica	14808-60-7	OSHA PEL: 0.050 mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)

Appropriate Engineering Controls: Provide ventilation adequate to maintain PELs.

Personal Protection

Respiratory Protection: Use NIOSH approved respirators if airborne concentration exceeds PEL.

Eye Protection: Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.

Skin Protection: If there is a risk of skin contact, wear appropriate clothing and gloves to prevent contact.

Other: Eye wash fountain and emergency showers are recommended.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State:	Solid
Color:	White
Odor:	Odorless
Odor Threshold:	N/ A
pH:	12.44 @ 25° C when made into a saturated solution
Melting Point:	N/ AF
Initial Boiling Point:	N/ A
Freezing Point:	N/ A
Flash Point:	N/ A
Evaporation Rate:	N/ A

Flammability (solid, gas): Non-flammable

Explosion Limits:	N/ A
Vapor Pressure:	N/ A
Vapor Density:	N/ A
Relative Density:	0.4 – 0.7 g/ cm^3 (apparent)
Solubility(ies):	Solubility is 1.6 g/L at 25° C

Partition coefficient: Relatively insoluble

Auto-ignition Temperature: N/ A

Decomposition Temperature: 580º C / 1076º F

Viscosity: N/A

SECTION 10	STABILITY AND REACTIVITY

Reactivity:

Chemical Stability: Hydrated Lime is chemically stable.

Possibility of Hazardous Reactions: See reactivity above

Conditions to Avoid: Do not allow Hydrated Lime to come into contact with incompatible materials.

Incompatible Materials: Hydrated Lime should not be mixed or stored with the following materials, due to the potential for violent reaction and release of heat:

Acids (unless in a controlled process)
Reactive Fluoridated Compounds
Reactive Brominated Compounds
Reactive Powdered Metals
Organic Acid Anhydrides
Nitro-Organic Compounds
Reactive Phosphorous Compounds
Interhalogenated Compounds

Hazardous Decomposition Products: None

SECTION 11	TOXICOLOGICAL INFORMATION

Health Effects: see First Aid discussion in Section 4

Routes of Exposure: see First Aid discussion in Section 4

Symptoms Related to Exposure: see First Aid discussion in Section 4

Carcinogen Listing: Hydrated Lime is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled.

SECTION 12	ECOLOGICAL INFORMATION

Ecotoxicity: Because of the high pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems in high concentrations.

Persistence and Degradability: Reacts with atmospheric CO_2 over time to form calcium carbonate

Bioaccumulation Potential: This material shows no bioaccumulation effect or food chain concentration toxicity.

Mobility in Soil: Minimal mobility in soil. Reacts with clay portion of soil to form calcium silicates and calcium aluminates

Other Adverse Effects: This material is alkaline and if released into water or moist soil will cause an increase in pH

SECTION 13	DISPOSAL CONSIDERATIONS

Disposal Recommendations: Dispose of in accordance with all applicable federal, state, and local environmental regulations.

Regulatory Disposal Information: If this product as supplied, and unmixed, becomes a waste, it will not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act.

SECTION 14	TRANSPORT INFORMATION

UN Number: Not Regulated

UN Proper Shipping Name: Not Regulated

Transport Hazard Class(es): Not Regulated

Packing Group: Not Regulated

Marine Pollutant (y/n): This material is alkaline and if released into water or moist soil will cause an increase in pH.

Special Precautions: None

SECTION 15	REGULATORY INFORMATION

National Chemical Inventory Listings:

All chemical ingredients are listed on the USEPA TSCA Inventory List.

US Regulations:

RCRA Hazardous Waste Number: not listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261): not classified
CERCLA Hazardous Substance (40 CFR 302.4) unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b) (4); CWA, Sec. 307(a), CAA, Sec. 112
CERCLA Reportable Quantity (RQ) not listed.
SARA 311/312 Codes: not listed.
SARA Toxic Chemical (40 CFR 372.65): not listed.
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ): not listed

Specific State Regulations: ⚠WARNING: This product can expose you to chemicals, including crystalline silica, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov
These naturally occurring impurities may also be regulated by other States.

Canadian DSL: Listed

Canadian NPRI: None of the components are listed

CEPA Toxic Substances: None of the components are listed

SECTION 16	OTHER INFORMATION

Prepared By: Lhoist North America Technical Services

Date Prepared: January 27, 2020

Revision: 2020-1

Abbreviations:

N/A	Not Available or Not Applicable
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ACGIH	ACGIH American Conference of Governmental Industrial Hygienists
TWA	Time Weighted Average
PEL	Permissible Exposure Limit
TLV	Threshold Limit Value
REL	Recommended Exposure Limit

Lhoist North America provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must consult their own technical and legal advisors and/ or exercise their own judgment in determining its appropriateness for a particular purpose. Lhoist North America makes no representations or warranties, either express or implied, including without limitation and warranties of merchantability or fitness for a particular purpose with respect to the Information set forth herein or the product(s) to which the information refers. Accordingly, Lhoist North America will not be responsible or liable for any claims, losses or damages resulting from the use of or reliance upon or failure to use this information.

Quadra

SAFETY DATA SHEET

POLYFROTH® W20

Section 1. Identification

Product identifier as used on the label : POLYFROTH® W20

Product code : Q10575

Other means of identification : Not available.

Product type : Liquid.

Recommended use of the chemical and restrictions on use

Identified uses
Industrial applications.

Supplier's details : Quadra Chemicals Inc.
21 Waterway Ave., Suite 200
The Woodlands, TX
United States (US) 77380
1-800-665-6553

Emergency telephone number (with hours of operation) : **Transportation Emergency - 24Hrs/Day - In US - Call 1-800-633-8253**

Section 2. Hazards identification

OSHA/HCS status : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Other means of identification : Not available.

Ingredient name	%	CAS number
[(methylethylene)bis(oxy)]dipropanol	98 - 100	24800-44-0

Section 3. Composition/information on ingredients

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8).

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store between the following temperatures: 15 to 30°C (59 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
[(methylethylene)bis(oxy)]dipropanol	None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Clear.]

Color : Colorless.

Odor : Not available.

Odor threshold : Not available.

pH : 8.5 to 9.5 [Conc. (% w/w): 50%]

Melting point : -45°C (-49°F)

Boiling point : 269.5 to 270.5°C (517.1 to 518.9°F)

Flash point : Closed cup: 145°C (293°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 0.013 kPa (0.0999 mm Hg) [room temperature]

Section 9. Physical and chemical properties

Vapor density : 6.6 [Air = 1]

Relative density : Not available.

Density :

Solubility : Easily soluble in the following materials: cold water.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 232°C (449.6°F)

Decomposition temperature : Not available.

Viscosity : Kinematic (room temperature): 0.773 cm^2/s (77.3 cSt)
Kinematic (40°C (104°F)): 0.234 cm^2/s (23.4 cSt)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : oxidizing materials
acids
alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
[(methylethylene)bis(oxy)] dipropanol	LD50 Oral	Rat	3 g/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

No components known to Quadra, present at or above the cut-off value/concentration limit (≥0.1%), are listed as carcinogens by IARC, OSHA or NTP.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Section 11. Toxicological information

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	3000.6 mg/kg

Section 12. Ecological information

Ecotoxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
[(methylethylene)bis(oxy)] dipropanol	-0.379	<5.7	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

DOT Classification

UN number : Not regulated.

UN proper shipping name : -

Transport hazard class(es) : -

Packing group : -

Environmental hazards : No.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Additional information : Not available.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

United States inventory (TSCA 8b) : All components are listed or exempted.

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

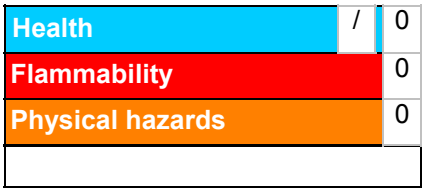
Pennsylvania : None of the components are listed.

California Prop. 65

None of the components are listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Not classified.	

History

Date of issue/Date of revision : 12/11/2019

Date of previous issue : No previous validation

Version : 1

Prepared by Regulatory Affairs

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

CHARLES TENNANT & Company/Compagnie
CHARLES TENNANT & CO/CIE,
div of CHARLES TENNANT & CO (CANADA) LTD
34 CLAYSON RD., TORONTO, ONTARIO
M9M 2G8
(416)741-9264
CACD

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURERS	SUPPLIED BY: CHARLES TENNANT & COMPANY 34 CLAYSON ROAD WESTON, ONTARIO M9M 2G8 (416) 741 9264
PRODUCT NAME	SODIUM ISOPROPYL XANTHATE
CHEMICAL NAME:	SEE SECTION 3 "HAZARDOUS INGREDIENTS " . SODIUM ISOPROPYL XANTHATE.
CHEMICAL FAMILY:	SALTS OF CARBONIC ACID DITHIO ESTERS.
CHEMICAL FORMULA:	(CH3)2CHOCSSNa.
MOLECULAR WEIGHT:	NOT APPLICABLE.
MATERIAL USE:	ORE PROCESSING.
24 HOUR EMERGENCY PHONE NUMBER:	CANUTEC (613) 996-6666.

SECTION 02: HAZARDS IDENTIFICATION

HAZARD CLASSIFICATION	SELF-HEATING SUBSTANCES AND MIXTURES — CATEGORY 1 . ACUTE TOXICITY (ORAL) — CATEGORY 4. ACUTE TOXICITY (DERMAL) — CATEGORY 4. SKIN IRRITATION — CATEGORY 2. EYE IRRITATION — CATEGORY 2A.
SIGNAL WORD	DANGER.
HAZARD STATEMENT	H250 CATCHES FIRE SPONTANEOUSLY IF EXPOSED TO AIR. H302+H312 HARMFUL IF SWALLOWED OR IN CONTACT WITH SKIN. H315 CAUSES SKIN IRRITATION.
PRECAUTIONARY STATEMENT PREVENTION	P235+P410 KEEP COOL. PROTECT FROM SUNLIGHT. P264 WASH SKIN AREA THOROUGHLY AFTER HANDLING. P270 DO NOT EAT, DRINK OR SMOKE WHEN USING THIS PRODUCT. P280 WEAR PROTECTIVE GLOVES/PROTECTIVE CLOTHING/EYE PROTECTION/FACE PROTECTION.
RESPONSE	P301+P310 IF SWALLOWED: IMMEDIATELY CALL A POISON CENTER OR DOCTOR/PHYSICIAN. P330 RINSE MOUTH. P302+P352 IF ON SKIN: WASH WITH PLENTY OF SOAP AND WATER. P332+P313 IF SKIN IRRITATION OCCURS: GET MEDICAL ADVICE/ATTENTION. P363 WASH CONTAMINATED CLOTHING BEFORE REUSE. P362+P364 TAKE OFF CONTAMINATED CLOTHING AND WASH BEFORE REUSE. P305+P351+P338 IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES, IF PRESENT AND EASY TO DO. CONTINUE RINSING.
STORAGE	P407 MAINTAIN AIR GAP BETWEEN STACKS/PALLETS. P420 STORE SEPARATELY.
DISPOSAL	P501 DISPOSE OF CONTENTS AND CONTAINER IN ACCORDANCE WITH LOCAL REGULATORY REQUIREMENTS. .
OTHER HAZARDS	NONE.

SECTION 03: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS #	WT. %
ISOPROPANOL	67-63-0	0.5-1.0
SODIUM ISOPROPYL XANTHATE	140-93-2	>84
SODIUM HYDROXIDE	1310-73-2	1.5
SODIUM SULFIDE	1313-8-2	1

SECTION 04: FIRST AID MEASURES

SKIN:	REMOVE ALL CONTAMINATED CLOTHING. WASH SKIN AREAS WITH SOAP AND WATER UNTIL CHEMICAL IS REMOVED. LAUNDER CLOTHES BEFORE RE-USE.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 04: FIRST AID MEASURES

EYE:	FLUSH CONTINUOUSLY WITH WATER FOR 15 MINUTES. FORCIBLY HOLD EYELIDS APART TO ENSURE IRRIGATION OF ALL EYE TISSUE. IF IRRITATION PERSISTS GET MEDICAL ATTENTION.
INHALATION:	REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION, OR CARDIOPULMONARY RESUSCITATION (CPR) IF REQUIRED. IF BREATHING IS DIFFICULT, GIVE OXYGEN. KEEP WARM AND QUIET, AND OBTAIN MEDICAL ATTENTION.
INGESTION:	IF CONSCIOUS:. GIVE A MINIMUM OF 500 mL WATER. INDUCE VOMITING. HAVE VICTIM RINSE MOUTH THOROUGHLY WITH WATER. IF VOMITING OCCURS NATURALLY, HAVE VICTIM LEAN FORWARD TO REDUCE RISK OF ASPIRATION. DO NOT GIVE AN UNCONSCIOUS PERSON ANYTHING BY MOUTH. SEEK IMMEDIATE MEDICAL ATTENTION.
NOTES TO PHYSICIAN:	THERE IS NO SPECIFIC ANTIDOTE. TREATMENT OF EXPOSURE SHOULD BE DIRECTED AT THE CONTROL OF SYMPTOMS AND THE CLINICAL CONDITION OF THE PATIENT.
GENERAL ADVICE:	CONSULT A PHYSICIAN AND/OR THE NEAREST POISON CONTROL CENTRE FOR ALL BUT MINOR INSTANCES OF INHALATION OR SKIN CONTACT. AVOID HIGH LEVELS OF DUST, USE DUST MASK OR RESPIRATOR WHEN NECESSARY. PRECAUTIONS SHOULD ALWAYS BE TAKEN TO AVOID SKIN/EYE CONTACT WITH ANY CHEMICAL SUBSTANCE.

SECTION 05: FIRE FIGHTING MEASURES

MEANS OF EXTINCTION:	CARBON DIOXIDE. DRY CHEMICAL. WATER.
HAZARDOUS COMBUSTION PRODUCTS:	
FLAMMABLE LIMITS IN AIR	VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) ARE EXTREMELY FLAMMABLE.
IF YES, UNDER WHICH CONDITIONS?.	SOLID XANTHATE WHEN EXPOSED TO HEAT AND/OR MOISTURE CAUSES DECOMPOSITION, AND VAPOURS ARE VERY FLAMMABLE AND SPONTANEOUS COMBUSTION CAN RESULT.
T.D.G. FLAMMABLE CLASS:	CLASS 4.2, SELF-HEATING SUBSTANCES.
SPECIAL PROCEDURES:	SELF-CONTAINED, POSITIVE PRESSURE BREATHING APPARATUS AND PROPER PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING ANY CHEMICAL SUBSTANCE. HEAT WILL DECOMPOSE BOTH SOLID AND LIQUID XANTHATES YIELDING CARBON DISULPHIDE WHICH IS EXTREMELY FLAMMABLE AND TOXIC.

SECTION 06: ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES, LEAK/SPILL:	IF IN THE LIQUID STATE:. STOP SPILL AT SOURCE. CONTAIN ANY SPILLED MATERIAL TO PREVENT DISCHARGE INTO THE ENVIRONMENT. ELIMINATE ALL SOURCES OF IGNITION. PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM THE AREA. ABSORB WITH INERT DRY MATERIAL. PUT INTO AN APPROVED METAL SALVAGE DRUM FOR DISPOSAL. IF IN THE SOLID STATE:. ELIMINATE ALL SOURCES OF IGNITION. RESTRICT ACCESS TO AREA UNTIL COMPLETION OF CLEAN-UP. ENSURE CLEAN-UP IS CONDUCTED BY TRAINED PERSONNEL ONLY. DO NOT TOUCH SPILLED MATERIAL. DO NOT USE WATER ON SPILLED MATERIAL AS HEAT WILL BE GENERATED. PUT SPILLED MATERIAL INTO APPROVED SALVAGE DRUMS FOR DISPOSAL. FLUSH CLEANED AREA WITH WATER, MAKING SURE NO WATER ENTERS XANTHATE CONTAINERS.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:	AVOID ALL SKIN CONTACT. AVOID CONTACT WITH EYES. AVOID BREATHING VAPOURS. EQUIPMENT SHOULD BE GROUNDED TO AVOID STATIC DISCHARGE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. USE NON-SPARKING TOOLS AND DO NOT SMOKE.
STORAGE NEEDS:	STORE SOLID XANTHATES UNDER COOL, DARK, DRY CONDITIONS. LIQUID PRODUCTS MUST BE KEPT COOL AND USED AS QUICKLY AS POSSIBLE.
SPECIAL SHIPPING INSTRUCTIONS.....	USE PRECAUTION WHEN HANDLING OR SHIPPING ANY CHEMICAL SUBSTANCE. PROTECT AGAINST PHYSICAL DAMAGE.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
ISOPROPANOL	400 ppm				
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE				

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
SODIUM HYDROXIDE	2 mg/m3 (CEILING) ACGIH				
SODIUM SULFIDE	NOT AVAILABLE				

EXPOSURE LIMIT OF MATERIAL:..... TLV FOR DUST: 2 mg/m3; TLV FOR VAPOURS FROM DECOMP.: 31 mg/m3 (see ACGIH).

PROTECTIVE EQUIPMENT:

GLOVES/TYPE:..... WEAR IMPERVIOUS GLOVES (E.G. NEOPRENE, RUBBER) WHEN THERE IS GREATER EXPOSURE RISK.

RESPIRATOR/TYPE:..... IF RESPIRATORY PROTECTION IS REQUIRED, INSTITUTE A COMPLETE RESPIRATORY PROTECTION PROGRAM INCLUDING SELECTION, FIT TESTING, TRAINING, MAINTENANCE AND INSPECTION. REFER TO THE CAS STANDARD Z94.4-M1982 "SELECTION, CARE, AND USE OF RESPIRATORS" WHICH IS AVAILABLE FROM CANADIAN STANDARDS ASSOCIATION, REXDALE ONTARIO, M9W 1R3. IF VAPOURS ARE PRESENT, USE A NIOSH OR MSHA APPROVED RESPIRATOR FOR ACIDIC VAPOURS OR A SELF CONTAINED BREATHING APPARATUS.

EYE/TYPE:..... FACE SHIELD. SAFETY GLASSES WITH SIDE-SHIELDS.

FOOTWEAR/TYPE:..... SAFETY BOOTS.

CLOTHING/TYPE:..... WEAR ADEQUATE PROTECTIVE CLOTHES.

OTHER/TYPE:..... AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE NEAR THE WORK AREA.

ENGINEERING CONTROLS:..... EXPLOSION PROOF MECHANICAL VENTILATION TO LIMIT VAPOUR CONCENTRATION BELOW T.L.V.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:..... SOLID.

ODOUR/APPEARANCE:..... YELLOW TO YELLOW-GREEN.

ODOUR THRESHOLD:..... NOT AVAILABLE.

pH:..... 10% H2O 13 +/- 1.

FREEZING POINT °C:..... >182 Deg C.

BOILING POINT:..... NOT APPLICABLE. M.P. 150 - 250 (decomposes).

FLASH POINT:..... NOT APPLICABLE. -30 °C FOR CARBON DISULPHIDE VAPOURS.

EVAPORATION RATE:..... NOT APPLICABLE.

% VOLATILE:..... NOT AVAILABLE .

BY VOLUME..... < 20.

BY WEIGHT..... NOT AVAILABLE.

UPPER EXPLOSION LIMIT:..... 50% (RESIDUAL CARBON DISULPHIDE).

LOWER EXPLOSION LIMIT:..... 1.25% (RESIDUAL CARBON DISULPHIDE).

VAPOUR PRESSURE:..... NOT APPLICABLE.

REL. VAPOUR DENSITY..... NOT APPLICABLE.

SPECIFIC GRAVITY:..... NOT APPLICABLE.

SOLUBILITY IN WATER (20 °C):..... SOLUBLE.

COEFFICIENT WATER/OIL DIST.:..... NOT AVAILABLE.

AUTO IGNITION TEMPERATURE °C:..... NOT AVAILABLE.

SECTION 10: STABILITY AND REACTIVITY

REACTS VIOLENTLY WITH..... VAPORS OR DUSTS MAY EXPLODE.

CHEMICAL STABILITY:

YES.

NO, WHICH CONDITIONS?..... SOLID XANTHATES ARE STABLE WHEN KEPT COOL AND DRY, EXPOSURE TO HEAT CAUSES DECOMPOSITION. ACIDS AND OXIDIZING AGENTS ACCELERATE AGING. IN SOLUTION, XANTHATES WILL DECOMPOSE SLOWLY EVEN AT ROOM TEMPERATURE.

COMPATIBILITY WITH OTHER SUBSTANCES:

YES.

NO, WHICH ONES?..... STRONG ACIDS. OXIDIZING AGENTS.

RATE OF BURNING:..... NOT AVAILABLE.

EXPLOSIVE POWER:..... NOT AVAILABLE.

EXPLOSION DATA:..... NOT AVAILABLE.

SENSITIVITY TO STATIC DISCHARGE:. CARBON DISULPHIDE VAPOURS WHICH MAY EVOLVE DUE TO DECOMPOSITION CAN BE READILY IGNITED BY STATIC DISCHARGE.

SENSITIVITY TO IMPACT:..... NOT AVAILABLE.

DECOMPOSITION:..... CARBON DISULPHIDE. TRITHIOCARBONATE. ISOPROPYL ALCOHOL.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 11: TOXICOLOGICAL INFORMATION

INGREDIENTS	LC50	LD50
ISOPROPANOL	FISH: >1400 MG/L, 96 HOURS	NOT AVAILABLE
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE	ORAL RAT 250-2000mg/ Kg
SODIUM HYDROXIDE	NOT AVAILABLE	140 - 340 MG/KG RAT ORAL
SODIUM SULFIDE	NO AVAILABLE	ORAL RAT 208 MG/KG

ROUTE OF ENTRY:	EYE, SKIN CONTACT, INHALATION, INGESTION.
IRRITANCY OF MATERIAL:	IRRITANT. REFER TO ROUTE OF ENTRY, SECTION 3.
SKIN CONTACT:	DUST OR VAPORS MAY BE IRRITATING. XANTHATE SOLUTIONS WILL CAUSE SEVERE SKIN IRRITATION.
SKIN ABSORPTION:	NOT AVAILABLE.
EYE	DUST OR VAPORS MAY IRRITATE. XANTHATE SOLUTIONS WILL CAUSE SEVERE EYE IRRITATION.
INGESTION	CAN CAUSE GASTRO-INTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.
INHALATION	AIRBORNE DUST MAY CAUSE IRRITATION OF RESPIRATORY AIRWAYS. VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) CAN CAUSE SEVERE DISTURBANCES OF MOOD AND BEHAVIOR, INCLUDING EXCITATION, ANGER AND VIOLENT DREAMS.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:	MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE TO THIS PRODUCT HAVE NOT BEEN ESTABLISHED. UNNECESSARY EXPOSURE TO THIS PRODUCT OR ANY OTHER CHEMICAL SHOULD BE AVOIDED.
EFFECTS OF ACUTE EXPOSURE:	REFER TO ROUTE OF ENTRY.
EFFECTS OF CHRONIC EXPOSURE:	REFER TO ROUTE OF ENTRY.
INHALATION CHRONIC:	HIGH CONCENTRATIONS OF DECOMPOSITION PRODUCT (CARBON DISULPHIDE) CAN CAUSE DEATH.
REPRODUCTIVE EFFECTS:	NOT AVAILABLE.
REPRODUCTIVE TOXICITY:	NOT AVAILABLE.
SENSITIZING CAPABILITY OF MATERIAL:	NOT AVAILABLE.
SYNERGISTIC MATERIALS:	NOT AVAILABLE.
MUTAGENICITY:	NOT AVAILABLE.
TERATOGENICITY & EMBRYOTOXICITY:	NOT AVAILABLE.
CARCINOGENICITY OF MATERIAL:	NOT AVAILABLE.
ACUTE ORAL TOXICITY	NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.
LC 50 OF MATERIAL, SPECIES & ROUTE:	NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL	NOT AVAILABLE. DO NOT ALLOW TO ENTER SOIL, WATERWAYS OR WASTE WATER. THIS PRODUCT MAY BE HARMFUL TO AQUATIC LIFE. .
BIODEGRADABILITY	NOT AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL, METHOD AND EQUIPMENT:	ALL WASTE FROM THIS PRODUCT INCLUDING ALL EMPTY CONTAINERS MUST BE DISPOSED OF IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

T.D.G. CLASSIFICATION:	CLASS 4.2 UN 3342 P.G. II.
T.D.G. SHIPPING NAME:	XANTHATES.
T.D.G. SHIPPING INFORMATION:	THE DANGEROUS GOODS ARE DESCRIBED IN ACCORDANCE WITH THE UN RECOMMENDATIONS.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION:	CLASS B DIV. 6. CLASS D DIV. 1 SUB. B.
CPR COMPLIANCE	THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE SDS CONTAINS ALL OF THE INFORMATION REQUIRED BY THE CPR.
DSL/NDSL:	ALL COMPONENTS ARE LISTED ON THE DSL.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 16: OTHER INFORMATION

MSDS REVISION DATE:.....	JUNE 19, 2018.
NOTES:.....	The information on this Safety Data Sheet has been obtained from the manufacturer, and where applicable, from other reliable sources such as CCOHS and RTECS. However, CHARLES TENNANT & COMPANY (CANADA) LTD. makes no warranties, expressed or implied, as to the accuracy, completeness or accuracy of the information contained herein, and shall not be held liable (regardless of fault) to anyone directly or indirectly for damages or injuries in the use of this product arising out of or in connection with the accuracy, completeness or adequacy of such information. To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this SDS and any other information regarding hazards or safety, (2) furnish this same information to each of its customers for the product; and (3) requests its customers to notify their employees, customers, and other users of the product of this information.
PREPARED BY	Regulatory Affairs
PREPARATION DATE.....	JUN 21/2018

PROSPEC CHEMICALS
P.O. BOX 3478
176 STURGEON DRIVE
STURGEON COUNTY, ALBERTA, T8L 2T4
CANADA

PRODUCT: NAX 31

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURERS.....	PROSPEC CHEMICALS P.O. BOX 3478 176 STURGEON DRIVE STURGEON COUNTY, ALBERTA T8L 2T4 (780) 992-1522
PRODUCT NAME.....	NAX 31
CHEMICAL NAME:.....	SODIUM ISOPROPYL XANTHATE.
CHEMICAL FAMILY:.....	SALTS OF CARBONIC ACID DITHIO ESTERS.
CHEMICAL FORMULA:.....	NOT APPLICABLE.
MOLECULAR WEIGHT:.....	NOT APPLICABLE.
MATERIAL USE:.....	ORE PROCESSING.

SECTION 02: HAZARDS IDENTIFICATION

HAZARD CLASSIFICATION.....	SELF-HEATING SUBSTANCES AND MIXTURES — CATEGORY 1 . ACUTE TOXICITY (ORAL) — CATEGORY 4. ACUTE TOXICITY (DERMAL) — CATEGORY 4. SKIN IRRITATION — CATEGORY 2. EYE IRRITATION — CATEGORY 2A.
SIGNAL WORD.....	DANGER.
HAZARD STATEMENT	
PREVENTION.....	P235+P410 KEEP COOL. PROTECT FROM SUNLIGHT. P264 WASH SKIN AREA THOROUGHLY AFTER HANDLING. P270 DO NO EAT, DRINK OR SMOKE WHEN USING THIS PRODUCT. P280 WEAR PROTECTIVE GLOVES/PROTECTIVE CLOTHING/EYE PROTECTION/FACE PROTECTION.
RESPONSE.....	P301+P310 IF SWALLOWED: IMMEDIATELY CALL A POISON CENTER OR DOCTOR/PHYSICIAN. P330 RINSE MOUTH. P302+P352 IF ON SKIN: WASH WITH PLENTY OF SOAP AND WATER. P332+P313 IF SKIN IRRITATION OCCURS: GET MEDICAL ADVICE/ATTENTION. P362+P364 TAKE OFF CONTAMINATED CLOTHING AND WASH BEFORE REUSE. P305+P351+P338 IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES, IF PRESENT AND EASY TO DO. CONTINUE RINSING.
STORAGE.....	P407 MAINTAIN AIR GAP BETWEEN STACKS/PALLETS. P420 STORE SEPARATELY.
DISPOSAL.....	P501 DISPOSE OF CONTENTS AND CONTAINER IN ACCORDANCE WITH LOCAL REGULATORY REQUIREMENTS. .
OTHER HAZARDS.....	NONE.

SECTION 03: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS #	WT. %
SODIUM ISOPROPYL XANTHATE	140-93-2	65-80
ISOPROPANOL	67-63-0	1-5
SODIUM HYDROXIDE	1310-73-2	1-5

SECTION 04: FIRST AID MEASURES

SKIN:.....	SEEK MEDICAL ATTENTION IMMEDIATELY. REMOVE ALL CONTAMINATED CLOTHING. WASH SKIN AREAS FOR 60 MINUTES OR UNTIL CHEMICAL IS REMOVED WITH SOAP AND WATER. DO NOT USE SOLVENTS. LAUNDER CLOTHES BEFORE RE-USE.
EYE:.....	CHECK FOR AND REMOVE ANY CONTACT LENSES. FLUSH CONTINUOUSLY WITH WATER FOR 15 MINUTES. FORCIBLY HOLD EYELIDS APART TO ENSURE IRRIGATION OF ALL EYE TISSUE. IF IRRITATION PERSISTS GET MEDICAL ATTENTION.

PRODUCT: NAX 31

SECTION 04: FIRST AID MEASURES

INHALATION:.....	REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION, OR CARDIOPULMONARY RESUSCITATION (CPR) IF REQUIRED. IF BREATHING IS DIFFICULT, GIVE OXYGEN. KEEP WARM AND QUIET, AND OBTAIN MEDICAL ATTENTION.
INGESTION:.....	IF CONSCIOUS:. DO NOT INDUCE VOMITING. HAVE VICTIM RINSE MOUTH THOROUGHLY WITH WATER. GIVE A MINIMUM OF 500 mL WATER. IF INGESTION OF A LARGE AMOUNT DOES OCCUR SEEK MEDICAL ATTENTION. IF VOMITING OCCURS NATURALLY, HAVE VICTIM LEAN FORWARD TO REDUCE RISK OF ASPIRATION. IF UNCONSCIOUS:. IF INGESTION OF A LARGE AMOUNT DOES OCCUR SEEK MEDICAL ATTENTION.
NOTES TO PHYSICIAN:.....	THERE IS NO SPECIFIC ANTIDOTE. TREATMENT OF EXPOSURE SHOULD BE DIRECTED AT THE CONTROL OF SYMPTOMS AND THE CLINICAL CONDITION OF THE PATIENT.
GENERAL ADVICE:.....	CONSULT A PHYSICIAN AND/OR THE NEAREST POISON CONTROL CENTRE FOR ALL BUT MINOR INSTANCES OF INHALATION OR SKIN CONTACT. AVOID HIGH LEVELS OF DUST, USE DUST MASK OR RESPIRATOR WHEN NECESSARY. PRECAUTIONS SHOULD ALWAYS BE TAKEN TO AVOID SKIN/EYE CONTACT WITH ANY CHEMICAL SUBSTANCE.

SECTION 05: FIRE FIGHTING MEASURES

MEANS OF EXTINCTION:.....	CARBON DIOXIDE. DRY CHEMICAL. WATER.
HAZARDOUS COMBUSTION PRODUCTS.	CARBON DISULPHIDE. CARBONYL SULPHIDE. SODIUM SULPHIDE. ISOPROPYL ALCOHOL.
FLAMMABLE LIMITS IN AIR.....	VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) ARE EXTREMELY FLAMMABLE.
IF YES, UNDER WHICH CONDITIONS?.....	SOLID XANTHATE WHEN EXPOSED TO HEAT AND/OR MOISTURE CAUSES DECOMPOSITION, AND VAPOURS ARE VERY FLAMMABLE AND SPONTANEOUS COMBUSTION CAN RESULT.
T.D.G. FLAMMABLE CLASS:.....	CLASS 4.2, SELF-HEATING SUBSTANCES.
SPECIAL PROCEDURES:.....	SELF-CONTAINED, POSITIVE PRESSURE BREATHING APPARATUS AND PROPER PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING ANY CHEMICAL SUBSTANCE. HEAT WILL DECOMPOSE BOTH SOLID AND LIQUID XANTHATES YIELDING CARBON DISULPHIDE WHICH IS EXTREMELY FLAMMABLE AND TOXIC.

SECTION 06: ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES, LEAK/SPILL:...	IF IN THE LIQUID STATE:. STOP SPILL AT SOURCE. CONTAIN ANY SPILLED MATERIAL TO PREVENT DISCHARGE INTO THE ENVIRONMENT. ELIMINATE ALL SOURCES OF IGNITION. PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM THE AREA. ABSORB WITH INERT DRY MATERIAL. PUT INTO AN APPROVED METAL SALVAGE DRUM FOR DISPOSAL. IF IN THE SOLID STATE:. ELIMINATE ALL SOURCES OF IGNITION. RESTRICT ACCESS TO AREA UNTIL COMPLETION OF CLEAN-UP. ENSURE CLEAN-UP IS CONDUCTED BY TRAINED PERSONNEL ONLY. DO NOT TOUCH SPILLED MATERIAL. DO NOT USE WATER ON SPILLED MATERIAL AS HEAT WILL BE GENERATED. PUT SPILLED MATERIAL INTO APPROVED SALVAGE DRUMS FOR DISPOSAL. FLUSH CLEANED AREA WITH WATER, MAKING SURE NO WATER ENTERS XANTHATE CONTAINERS.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:	AVOID ALL SKIN CONTACT. AVOID CONTACT WITH EYES. AVOID BREATHING VAPOURS. EQUIPMENT SHOULD BE GROUNDED TO AVOID STATIC DISCHARGE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. USE NON-SPARKING TOOLS AND DO NOT SMOKE.
STORAGE NEEDS:.....	STORE SOLID XANTHATES UNDER COOL, DARK, DRY CONDITIONS. LIQUID PRODUCTS MUST BE KEPT COOL AND USED AS QUICKLY AS POSSIBLE.
SPECIAL SHIPPING INSTRUCTIONS.....	USE PRECAUTION WHEN HANDLING OR SHIPPING ANY CHEMICAL SUBSTANCE. PROTECT AGAINST PHYSICAL DAMAGE.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE				
ISOPROPANOL	400 ppm				

PRODUCT: NAX 31

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL

SODIUM HYDROXIDE 2 mg/m3 (CEILING) ACGIH

EXPOSURE LIMIT OF MATERIAL:..... TLV FOR DUST: 2 mg/m3. CARBON DISULPHIDE (DECOMPOSITION PRODUCT) ACGIH TLV: TWA: 1ppm 8 hour(s).

PROTECTIVE EQUIPMENT:

GLOVES/TYPE:..... WEAR IMPERVIOUS GLOVES (E.G. NEOPRENE, RUBBER).

RESPIRATOR/TYPE:..... IF RESPIRATORY PROTECTION IS REQUIRED, INSTITUTE A COMPLETE RESPIRATORY PROTECTION PROGRAM INCLUDING SELECTION, FIT TESTING, TRAINING, MAINTENANCE AND INSPECTION. REFER TO THE CAS STANDARD Z94.4-M1982 "SELECTION, CARE, AND USE OF RESPIRATORS" WHICH IS AVAILABLE FROM CANADIAN STANDARDS ASSOCIATION, REXDALE ONTARIO, M9W 1R3. IF VAPOURS ARE PRESENT, USE A NIOSH OR MSHA APPROVED RESPIRATOR FOR ACIDIC VAPOURS OR A SELF CONTAINED BREATHING APPARATUS. SEE M.S.D.S FOR MORE DETAIL ON THIS SECTION.

EYE/TYPE:..... FACE SHIELD. CHEMICAL SAFETY GOGGLES.

FOOTWEAR/TYPE:..... RUBBER SAFETY BOOTS.

CLOTHING/TYPE:..... WEAR ADEQUATE PROTECTIVE CLOTHES.

OTHER/TYPE:..... AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE NEAR THE WORK AREA.

ENGINEERING CONTROLS:..... EXPLOSION PROOF MECHANICAL VENTILATION TO LIMIT VAPOUR CONCENTRATION BELOW T.L.V.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:..... SOLID.

ODOUR/APPEARANCE:..... YELLOW TO YELLOW-GREEN.

ODOUR THRESHOLD:..... NOT AVAILABLE.

pH:..... 10% H2O 13 +/- 1.

FREEZING POINT °C:..... NOT APPLICABLE.

BOILING POINT °C:..... NOT APPLICABLE. M.P. 150 - 250 (decomposes).

FLASH POINT, F, COC..... NOT APPLICABLE. -30 °C FOR CARBON DISULPHIDE VAPOURS.

EVAPORATION RATE:..... NOT APPLICABLE.

% VOLATILE:

BY VOLUME..... < 20.

BY WEIGHT

UPPER EXPLOSION LIMIT:..... 50% (RESIDUAL CARBON DISULPHIDE).

LOWER EXPLOSION LIMIT:..... 1.25% (RESIDUAL CARBON DISULPHIDE).

VAPOUR PRESSURE:..... NOT APPLICABLE.

REL. VAPOUR DENSITY..... NOT APPLICABLE.

SPECIFIC GRAVITY:..... NOT APPLICABLE.

SOLUBILITY IN WATER (20 °C):..... SOLUBLE.

COEFFICIENT WATER/OIL DIST.:..... NOT AVAILABLE.

AUTO IGNITION TEMPERATURE °C:..... 90 (CARBON DISULPHIDE VAPOURS).

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:

YES.

NO, WHICH CONDITIONS?..... SOLID XANTHATES ARE STABLE WHEN KEPT COOL AND DRY, EXPOSURE TO HEAT CAUSES DECOMPOSITION. ACIDS AND OXIDIZING AGENTS ACCELERATE AGING. IN SOLUTION, XANTHATES WILL DECOMPOSE SLOWLY EVEN AT ROOM TEMPERATURE.

COMPATIBILITY WITH OTHER SUBSTANCES:

YES.

NO, WHICH ONES?..... STRONG ACIDS. OXIDIZING AGENTS.

REACTS VIOLENTLY WITH..... VAPORS OR DUSTS MAY EXPLODE.

RATE OF BURNING:..... NOT AVAILABLE.

EXPLOSIVE POWER:..... NOT AVAILABLE.

EXPLOSION DATA:

SENSITIVITY TO STATIC DISCHARGE:..... CARBON DISULPHIDE VAPOURS WHICH MAY EVOLVE DUE TO DECOMPOSITION CAN BE READILY IGNITED BY STATIC DISCHARGE.

SENSITIVITY TO IMPACT:..... NOT AVAILABLE.

DECOMPOSITION:..... CARBON DISULPHIDE. TRITHIOCARBONATE. ISOPROPYL ALCOHOL.

PRODUCT: NAX 31

SECTION 11: TOXICOLOGICAL INFORMATION

INGREDIENTS	LC50	LD50
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE	ORAL RAT 250-2000mg/ Kg
ISOPROPANOL	FISH: >1400 MG/L, 96 HOURS	NOT AVAILABLE
SODIUM HYDROXIDE	NOT AVAILABLE	140 - 340 MG/KG RAT ORAL

ROUTE OF ENTRY:

IRRITANCY OF MATERIAL:..... IRRITANT. REFER TO ROUTE OF ENTRY, SECTION 3.

SKIN CONTACT:..... DUST OR VAPORS MAY BE IRRITATING. XANTHATE SOLUTIONS WILL CAUSE SEVERE SKIN IRRITATION.

SKIN ABSORPTION:..... NOT AVAILABLE.

EYE ..... DUST OR VAPORS MAY IRRITATE. XANTHATE SOLUTIONS WILL CAUSE SEVERE EYE IRRITATION.

INGESTION:..... CAN CAUSE GASTRO-INTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.

INHALATION ..... AIRBORNE DUST MAY CAUSE IRRITATION OF RESPIRATORY AIRWAYS. VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) CAN CAUSE SEVERE DISTURBANCES OF MOOD AND BEHAVIOR, INCLUDING EXCITATION, ANGER AND VIOLENT DREAMS.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE TO THIS PRODUCT HAVE NOT BEEN ESTABLISHED. UNNECESSARY EXPOSURE TO THIS PRODUCT OR ANY OTHER CHEMICAL SHOULD BE AVOIDED.

EFFECTS OF ACUTE EXPOSURE:..... REFER TO ROUTE OF ENTRY.

EFFECTS OF CHRONIC EXPOSURE:..... REFER TO ROUTE OF ENTRY.

INHALATION CHRONIC:..... HIGH CONCENTRATIONS OF DECOMPOSITION PRODUCT (CARBON DISULPHIDE) CAN CAUSE DEATH.

REPRODUCTIVE EFFECTS:

REPRODUCTIVE TOXICITY:..... NOT AVAILABLE.

SENSITIZING CAPABILITY OF MATERIAL: NOT AVAILABLE.

SYNERGISTIC MATERIALS:..... NOT AVAILABLE.

MUTAGENICITY:..... NOT AVAILABLE.

TERATOGENICITY & EMBRYOTOXICITY:. NOT AVAILABLE.

CARCINOGENICITY OF MATERIAL:..... NOT AVAILABLE.

ACUTE ORAL TOXICITY..... NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

LC 50 OF MATERIAL, SPECIES & ROUTE: NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL..... NOT AVAILABLE.

BIODEGRADABILITY..... NOT AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL, METHOD AND EQUIPMENT: ..... ALL WASTE FROM THIS PRODUCT INCLUDING ALL EMPTY CONTAINERS MUST BE DISPOSED OF IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

T.D.G. CLASSIFICATION:..... CLASS 4.2 UN 3342 P.G. II.

T.D.G. SHIPPING NAME:..... XANTHATES.

T.D.G. SHIPPING INFORMATION:..... THE DANGEROUS GOODS ARE DESCRIBED IN ACCORDANCE WITH THE UN RECOMMENDATIONS.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION:..... CLASS B DIV. 6. CLASS D DIV. 1 SUB. B. CLASS E.

CPR COMPLIANCE..... THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL OF THE INFORMATION REQUIRED BY THE CPR.

DSL/NDSL:..... ALL COMPONENTS ARE LISTED ON THE DSL.

SECTION 16: OTHER INFORMATION

MANUFACTURERS MSDS DATE:..... JUNE 21, 2004.

MSDS REVISION DATE:..... SEPTEMBER 28, 2015.

PRODUCT: NAX 31

SECTION 16: OTHER INFORMATION

NOTES:.....	We urge each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or to use and understand the data contained in this MSDS. To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this MSDS and any other information regarding hazards or safety, (2) furnish this same information to each of its customers for the product; and (3) requests its customers to notify their employees, customers, and other users of the product of this information.
PREPARED BY	Regulatory Affairs
PREPARATION DATE.....	OCT 07/2015

Attachment 4

Peak Particle Velocity Calculations

PPV Caclulations

50 ft Distance				
ANFO (Pneumatically Placed)	K Constant	Distance (m)	B Constant	Charge Weight
	600	15.24	-1.6	2.72
Max Velocity (mm/s)	17.0790311			
AP Packaged Emulsion	K Constant	Distance (m)	B Constant	Charge Weight
	600	15.24	-1.6	3.36
Max Velocity (mm/s)	20.24114811			

100 ft Distance				
ANFO (Pneumatically Placed)	K Constant	Distance (m)	B Constant	Charge Weight
	600	30.48	-1.6	2.72
Max Velocity (mm/s)	5.63397916			
AP Packaged Emulsion	K Constant	Distance (m)	B Constant	Charge Weight
	600	30.48	-1.6	3.36
Max Velocity (mm/s)	6.677088763			

200 ft Distance				
ANFO (Pneumatically Placed)	K Constant	Distance (m)	B Constant	Charge Weight
	600	60.96	-1.6	2.72
Max Velocity (mm/s)	1.858520018			
AP Packaged Emulsion	K Constant	Distance (m)	B Constant	Charge Weight
	600	60.96	-1.6	3.36
Max Velocity (mm/s)	2.202617861			

Table B.1 Guidance on effects of vibration levels

Vibration level	Effect
0.14 mm·s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm·s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Table B.2 Transient vibration guide values for cosmetic damage

Line (see Figure B.1)	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

NOTE 1 Values referred to are at the base of the building.

NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Ground vibration

When an explosive is detonated in a blasthole, a pressure wave is generated in the surrounding rock. As this pressure wave moves from the blasthole it forms seismic waves by displacing particles. The particle movement is measured to determine the magnitude of the blast vibration. Maximum particle vibration can be estimated using the following formula.

$$V = K \left[\frac{R}{Q^{0.5}} \right]^{B}$$

Where

V = peak particle velocity (mm/s)
K = site and rock factor constant
Q = maximum instantaneous charge (kg)
B = constant related to the rock and site (usually -1.6)
R = distance from charge (m)

Typical K factors

Free face – hard or highly structured rock	500
Free face average rock	1140
Heavily confined	5000

Recommended maximum Peak Particle Velocities (AS 2187.2 – 1993)

Housing and low rise residential buildings, Commercial buildings not included below	10 mm/s
Commercial and industrial buildings or structures of reinforced concrete or steel constructions	25 mm/s
For high rise, hospitals, long floor spans, dams or historic buildings where no specified limit exists	5 mm/s

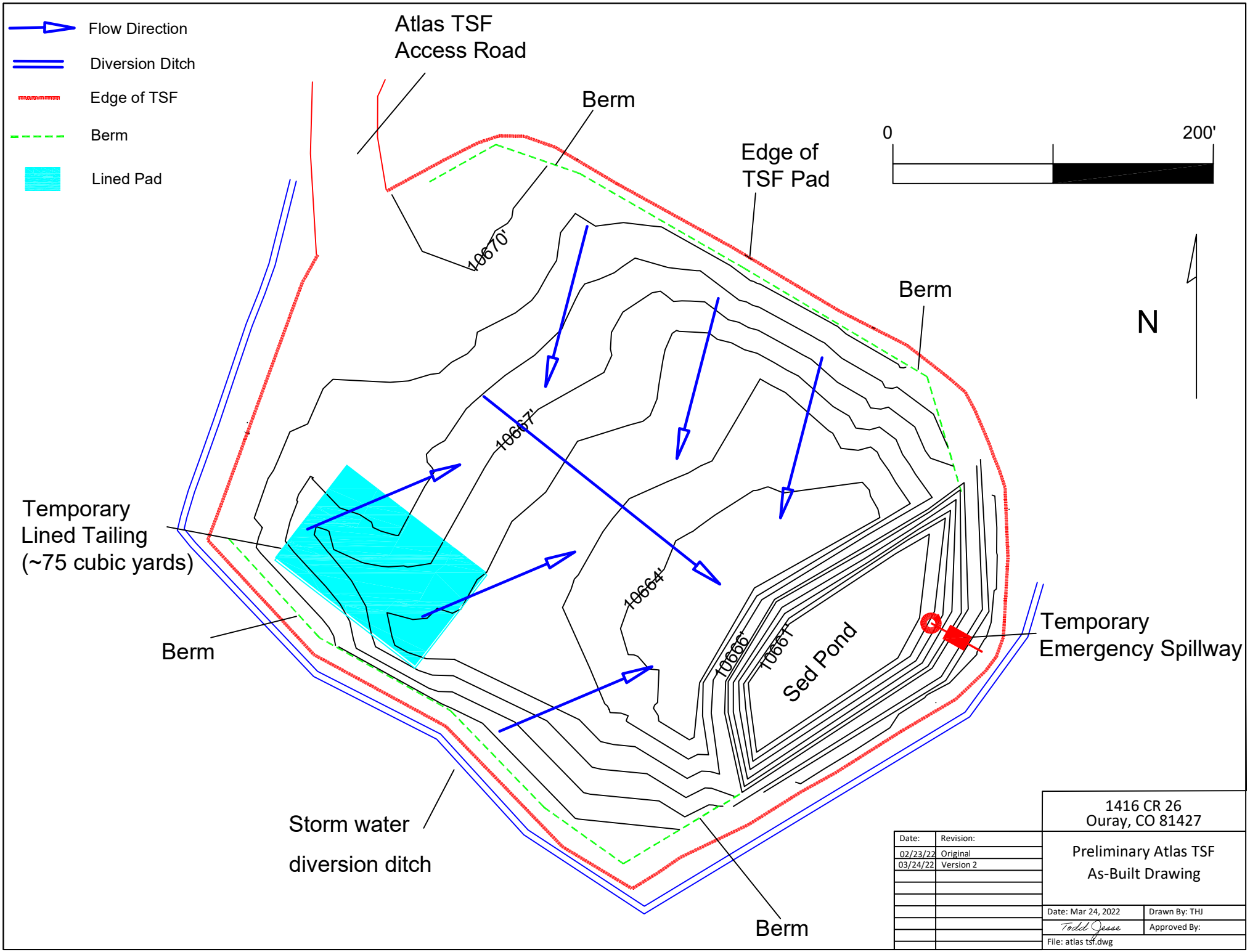
Please reference AS 2187.2 – 2006 for further information

Expected damage

PPV (mm/s)	
13	Lower limit for damage to plaster walls
19	Lower limit for dry wall structures
70	Minor damage
140	>50% chance of minor damage to structures
190	50% chance of major damage

Attachment 5

Atlas Preliminary As-Built Drawings



1416 CR 26
Ouray, CO 81427

Date:	Revision:
02/23/22	Original
03/24/22	Version 2

Preliminary Atlas TSF
As-Built Drawing

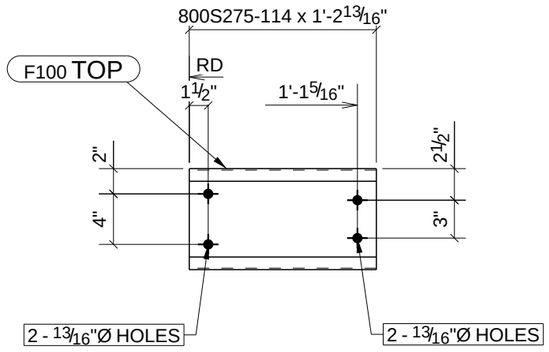
Date: Mar 24, 2022 | Drawn By: THJ

Todd Jesse | Approved By:

File: atlas tsf.dwg

Attachment 6

Proposed Tailings Thickener Building Drawings



4 - 8" x 2 3/4" C GIRTS - F100

BILL OF MATERIAL

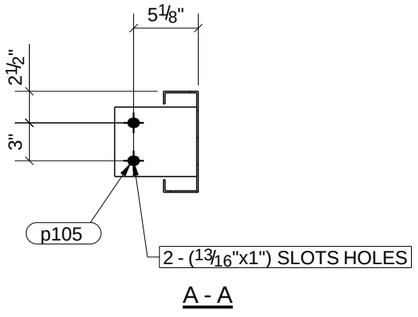
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F100	4	8" x 2 3/4" C GIRTS			SQ-2
F100	4	800S275-114	1'-2 13/16"	30	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		30	

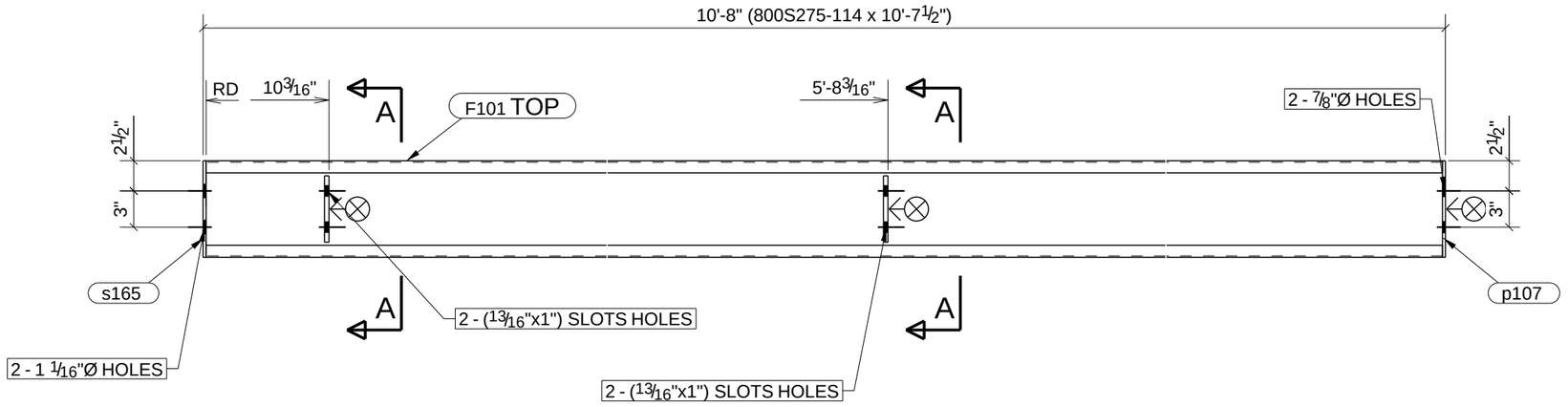
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	F100

GRID LOCATION	BOTTOM ELEVATION
2-3/D	0"





ONE - 8" x 2 3/4" C GIRT - F101

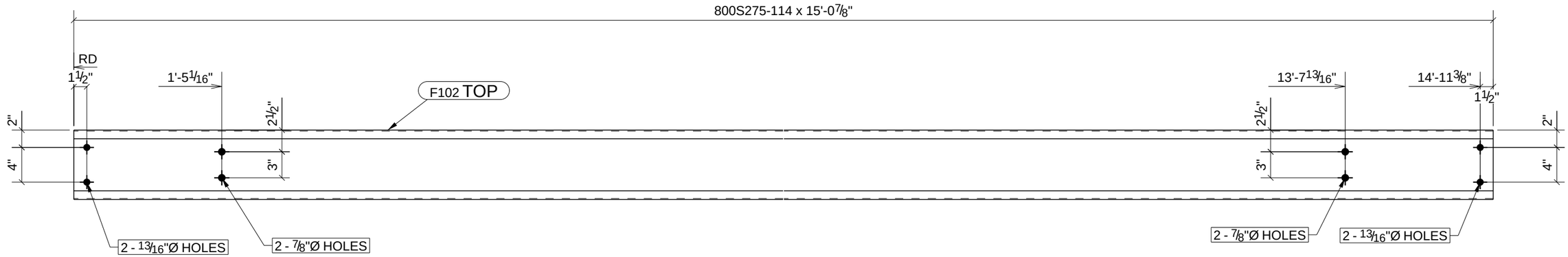
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F101	1	8" x 2 3/4" C GIRT			SQ-2
F101	1	800S275-114	10'-7 1/2"	65	A607-GR.5
p105	2	PL3/8"X5 1/2"	0'-6 1/2"	8	A36
p107	1	PL1/4"X2 3/4"	0'-8"	2	A36
s165	1	PL1/4"X2 3/4"	0'-8"	2	A36
		TOTAL WEIGHT THIS DRAWING		76	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. F101
DATE DRAWN	10/13/2021		



ONE - 8" x 2 3/4" C GIRT - F102

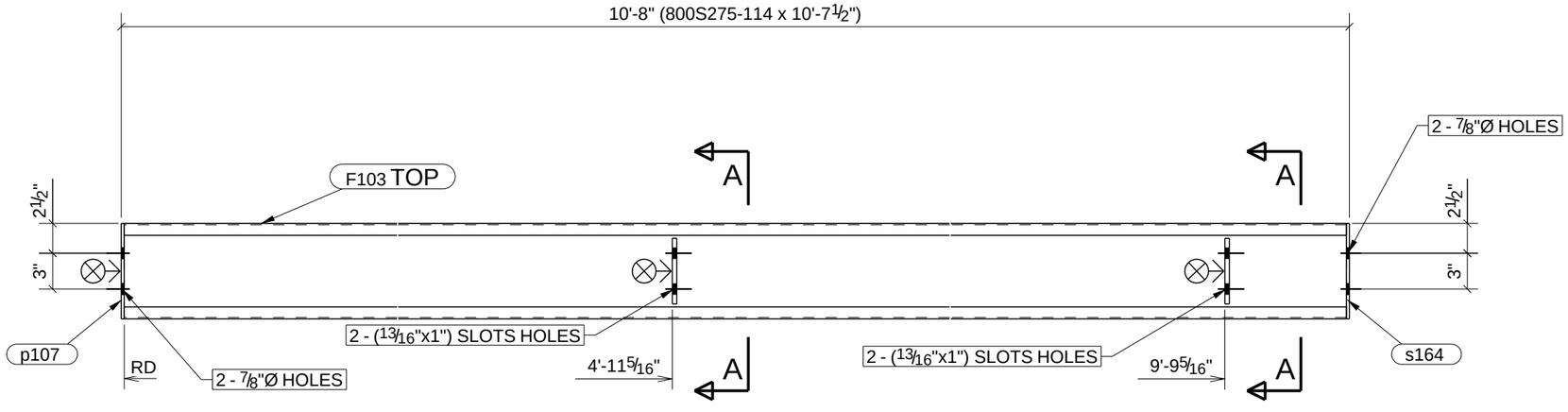
BILL OF MATERIAL

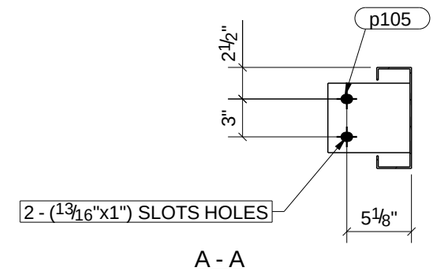
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F102	1	8" x 2 3/4" C GIRT			SQ-2
F102	1	800S275-114	15'-0 7/8"	92	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		92	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. F102
DATE DRAWN	10/13/2021		





A - A

ONE - 8" x 2 3/4" C GIRT - F103

BILL OF MATERIAL

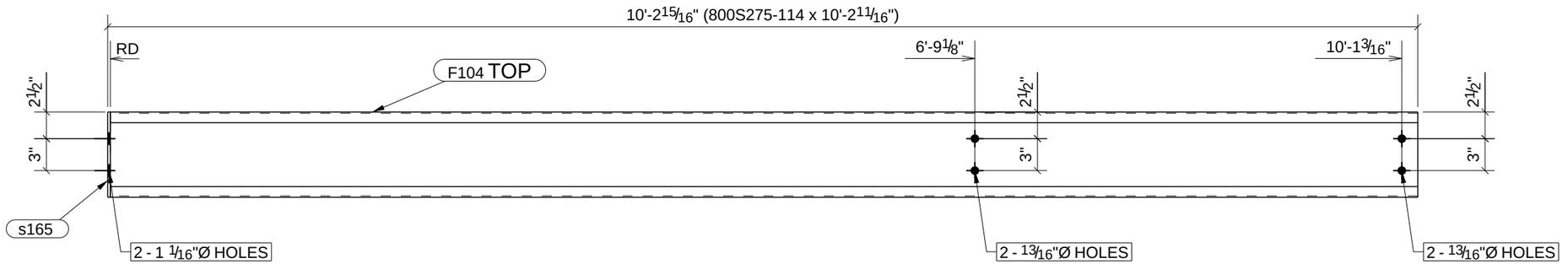
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F103	1	8" x 2 3/4" C GIRT			SQ-2
F103	1	800S275-114	10'-7 1/2"	65	A607-GR.5
p105	2	PL3/8"X5 1/2"	0'-6 1/2"	8	A36
p107	1	PL1/4"X2 3/4"	0'-8"	2	A36
s164	1	PL1/4"X2 3/4"	0'-8"	2	A36
		TOTAL WEIGHT THIS DRAWING		76	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	F103

GRID LOCATION	BOTTOM ELEVATION
3/D	0"



ONE - 8" x 2 3/4" C GIRT - F104

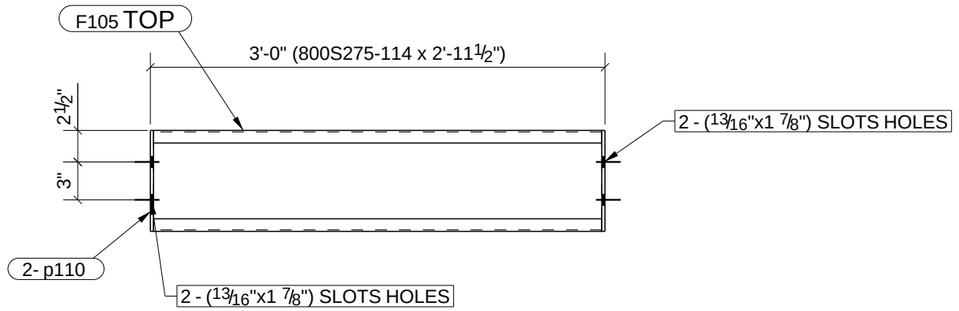
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F104	1	8" x 2 3/4" C GIRT			SQ-2
F104	1	800S275-114	10'-2 11/16"	63	A607-GR.5
s165	1	PL1/4"X2 3/4"	0'-8"	2	A36
		TOTAL WEIGHT THIS DRAWING		64	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	F104



ONE - 8" x 2 3/4" C GIRT - F105

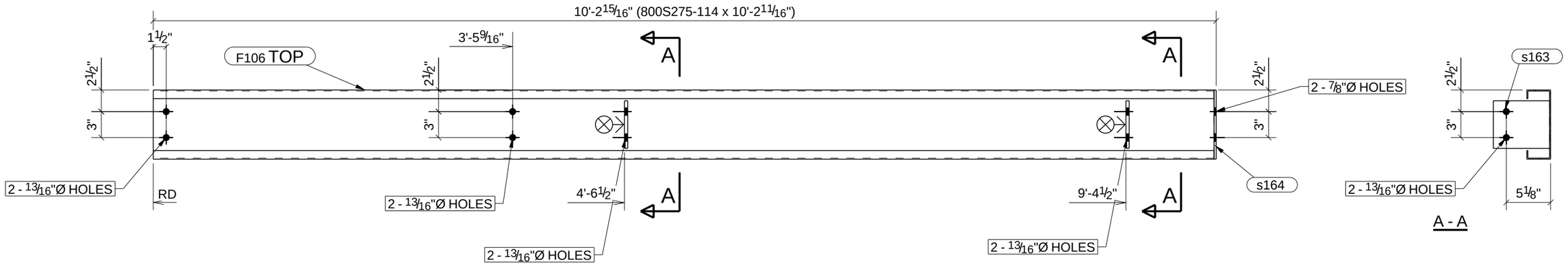
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F105	1	8" x 2 3/4" C GIRT			SQ-2
F105	1	800S275-114	2'-11 1/2"	18	A607-GR.5
p110	2	PL1/4"X2 3/4"	0'-8"	3	A36
		TOTAL WEIGHT THIS DRAWING		21	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	F105



ONE - 8" x 2 3/4" C GIRT - F106

BILL OF MATERIAL

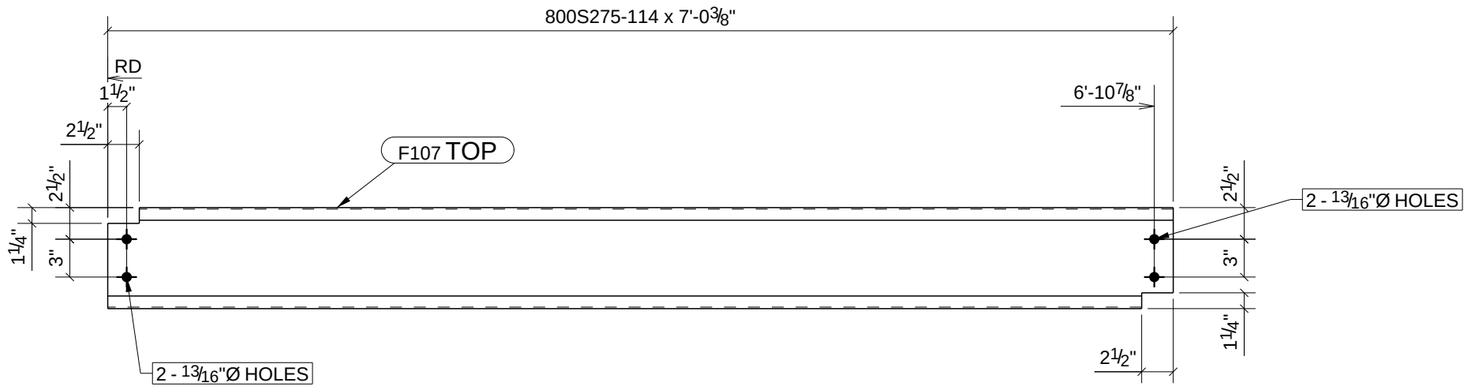
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F106	1	8" x 2 3/4" C GIRT			SQ-2
F106	1	800S275-114	10'-2 11/16"	63	A607-GR.5
s163	2	PL3/8"X5 1/2"	0'-6 1/2"	8	A36
s164	1	PL1/4"X2 3/4"	0'-8"	2	A36
		TOTAL WEIGHT THIS DRAWING		72	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. F106
DATE DRAWN	10/13/2021		

GRID LOCATION	BOTTOM ELEVATION
4/A-B	13'-1"5/16



ONE - 8" x 2 3/4" C GIRT - F107

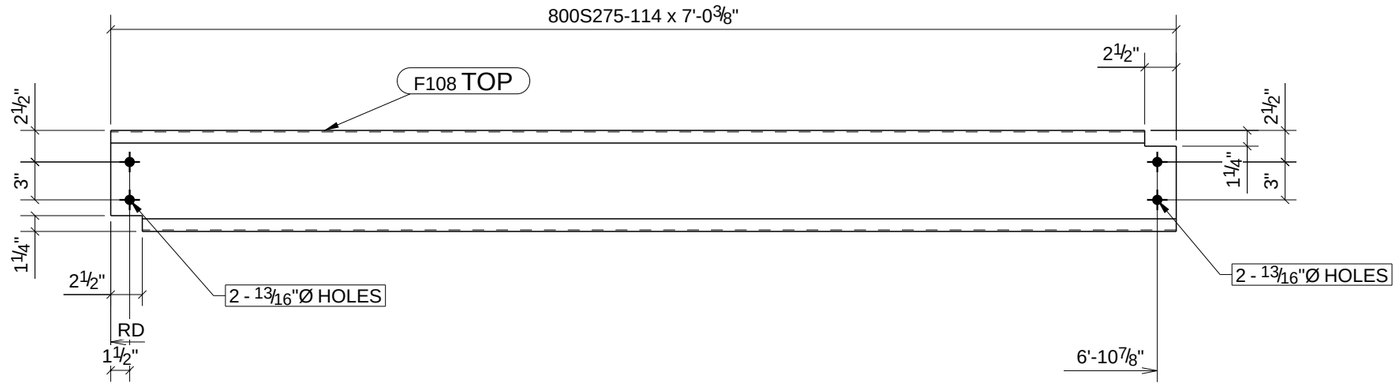
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F107	1	8" x 2 3/4" C GIRT			SQ-2
F107	1	800S275-114	7'-0 3/8"	42	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		42	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	F107



ONE - 8" x 2 3/4" C GIRT - F108

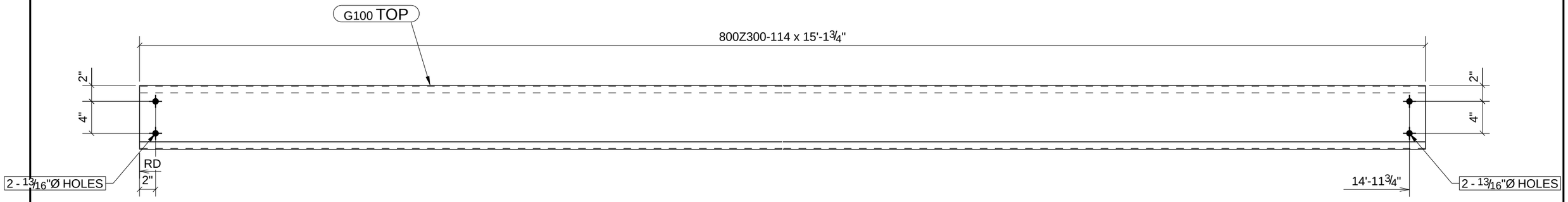
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
F108	1	8" x 2 3/4" C GIRT			SQ-2
F108	1	800S275-114	7'-0 3/8"	42	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		42	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT OPENING SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. F108
DATE DRAWN	10/13/2021		



24 - 8" x 3" Z GIRTS - G100

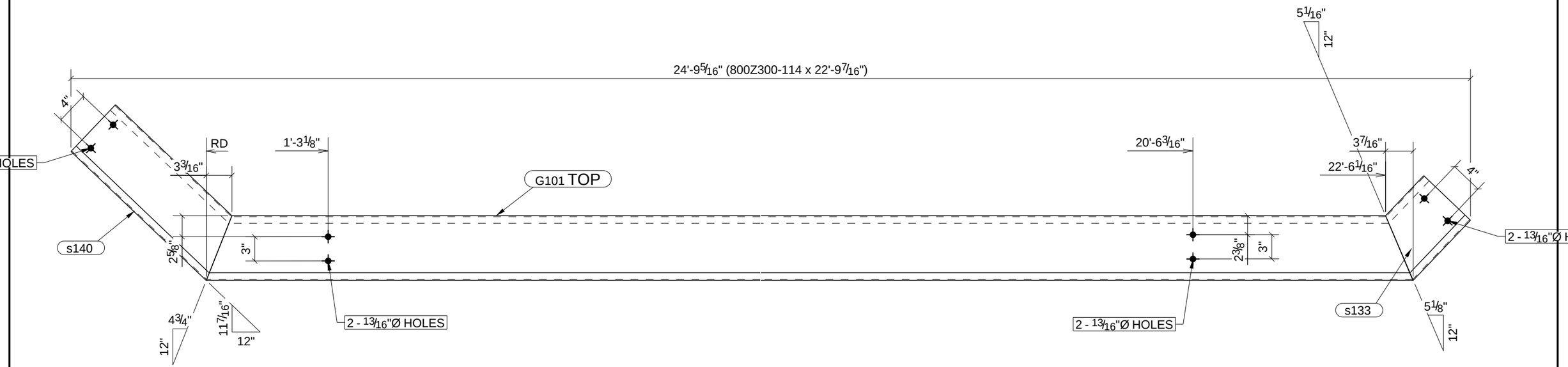
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G100	24	8" x 3" Z GIRTS			SQ-2
G100	24	800Z300-114	15'-1 3/4"	2285	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		2285	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G100



3 - 8" x 3" Z GIRTS - G101

BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G101	3	8" x 3" Z GIRTS			BEV-2
G101	3	800Z300-114	22'-9 7/16"	425	A607-GR.5
s133	3	800Z300-114	0'-10 5/16"	14	A607-GR.5
s140	3	800Z300-114	1'-11 3/16"	34	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		472	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G101
DATE DRAWN	10/13/2021		

ONE - 8" x 3" Z GIRT - G102

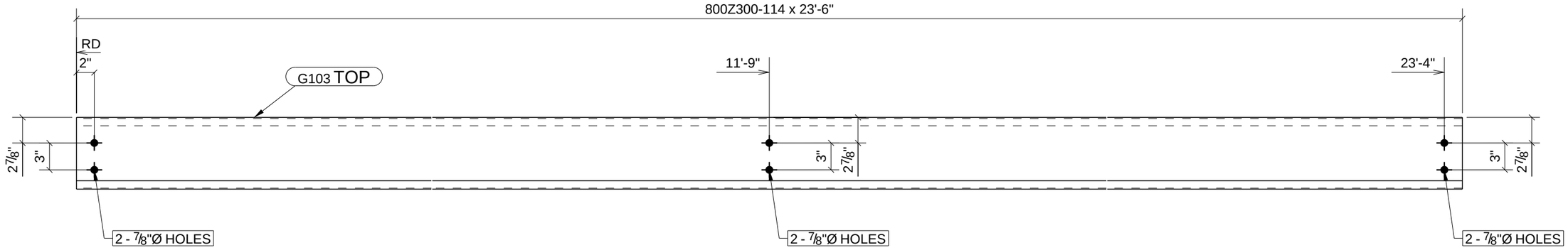
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G102	1	8" x 3" Z GIRT			BEV-2
G102	1	800Z300-114	22'-9 7/16"	142	A607-GR.5
s133	1	800Z300-114	0'-10 5/16"	5	A607-GR.5
s140	1	800Z300-114	1'-11 3/16"	11	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		157	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G102
DATE DRAWN	10/13/2021		



ONE - 8" x 3" Z GIRT - G103

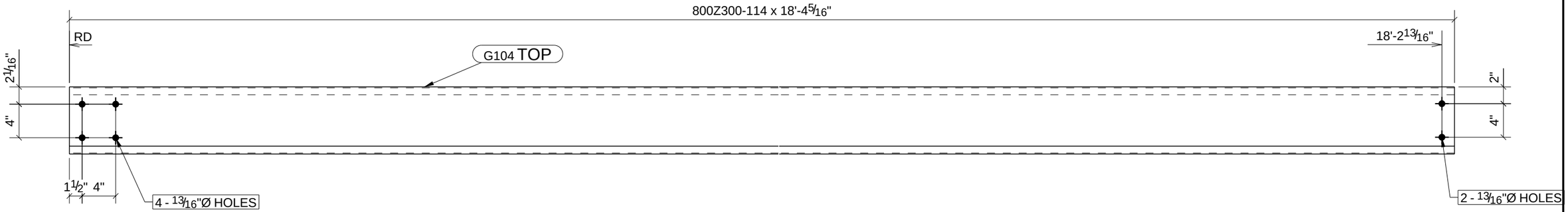
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G103	1	8" x 3" Z GIRT			SQ-2
G103	1	800Z300-114	23'-6"	148	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		148	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G103



4 - 8" x 3" Z GIRTS - G104

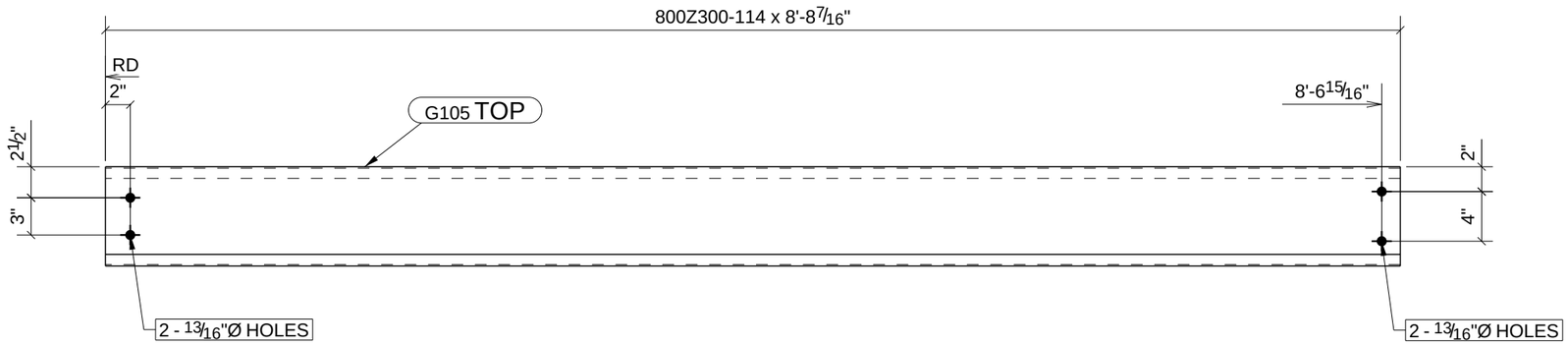
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G104	4	8" x 3" Z GIRTS			SQ-2
G104	4	800Z300-114	18'-4 5/16"	462	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		462	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G104



ONE - 8" x 3" Z GIRT - G105

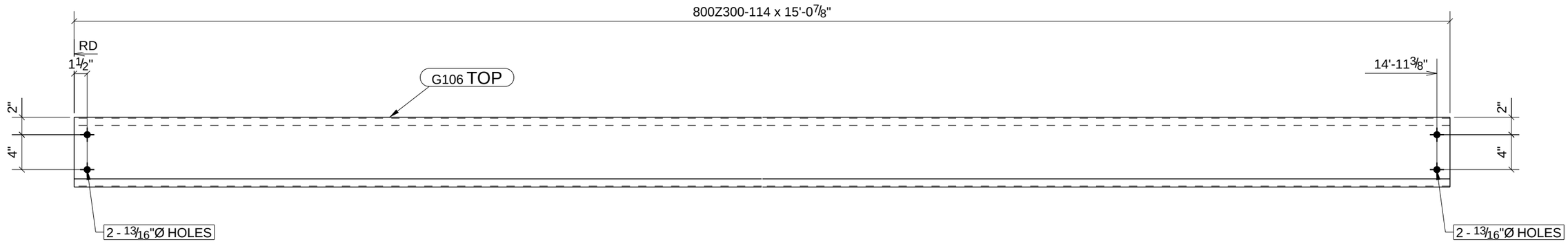
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G105	1	8" x 3" Z GIRT			SQ-2
G105	1	800Z300-114	8'-8 7/16"	55	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		55	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G105



7 - 8" x 3" Z GIRTS - G106

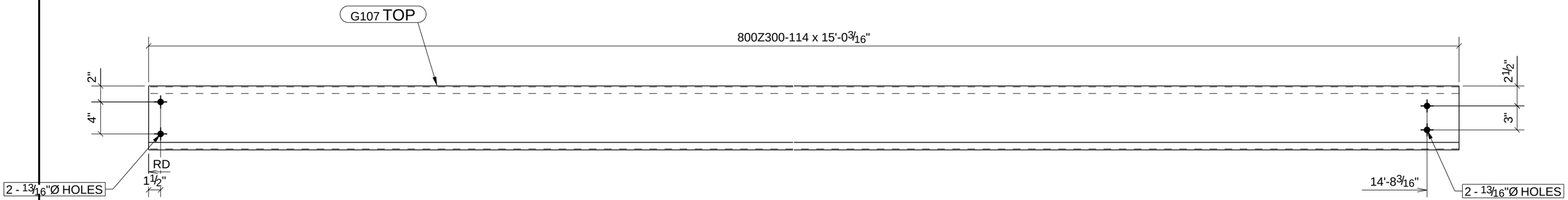
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G106	7	8" x 3" Z GIRTS			SQ-2
G106	7	800Z300-114	15'-0 7/8"	663	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		663	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G106
DATE DRAWN	10/13/2021		



ONE - 8" x 3" Z GIRT - G107

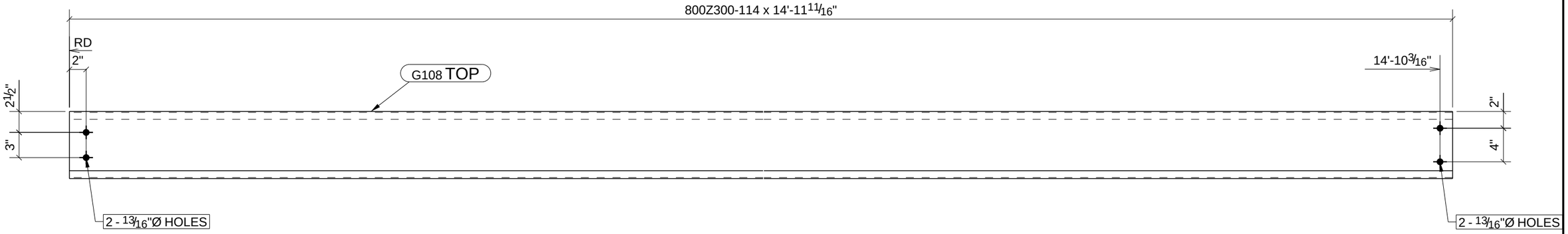
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G107	1	8" x 3" Z GIRT			SQ-2
G107	1	800Z300-114	15'-0 3/16"	94	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		94	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G107
DATE DRAWN	10/13/2021		



ONE - 8" x 3" Z GIRT - G108

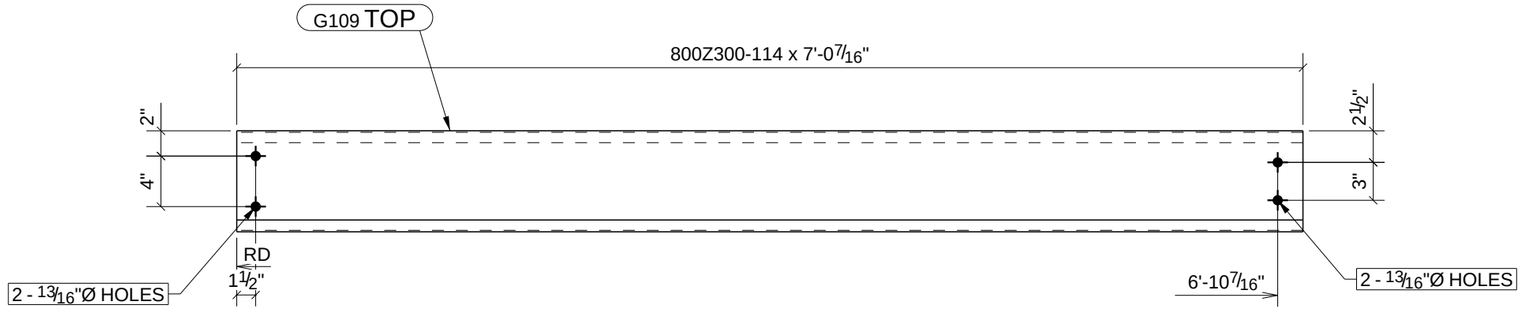
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G108	1	8" x 3" Z GIRT			SQ-2
G108	1	800Z300-114	14'-11 11/16	94	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		94	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G108
DATE DRAWN	10/13/2021		



2 - 8" x 3" Z GIRTS - G109

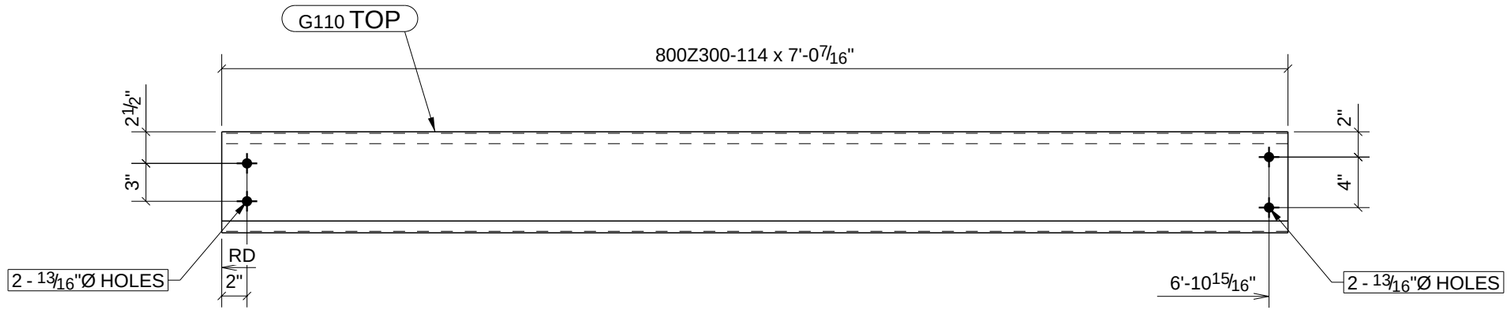
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G109	2	8" x 3" Z GIRTS			SQ-2
G109	2	800Z300-114	7'-0 7/16"	88	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		88	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G109



2 - 8" x 3" Z GIRTS - G110

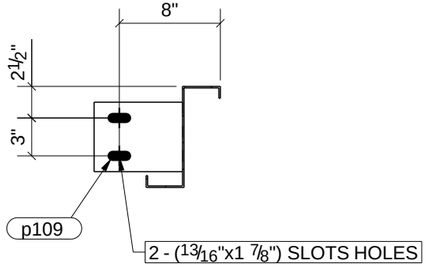
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G110	2	8" x 3" Z GIRTS			SQ-2
G110	2	800Z300-114	7'-0 7/16"	88	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		88	

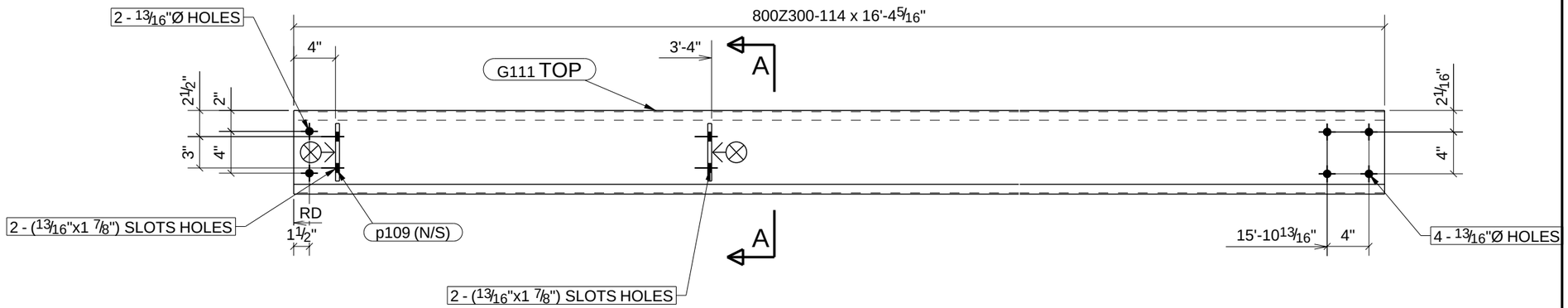
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G110



A - A



ONE - 8" x 3" Z GIRT - G111

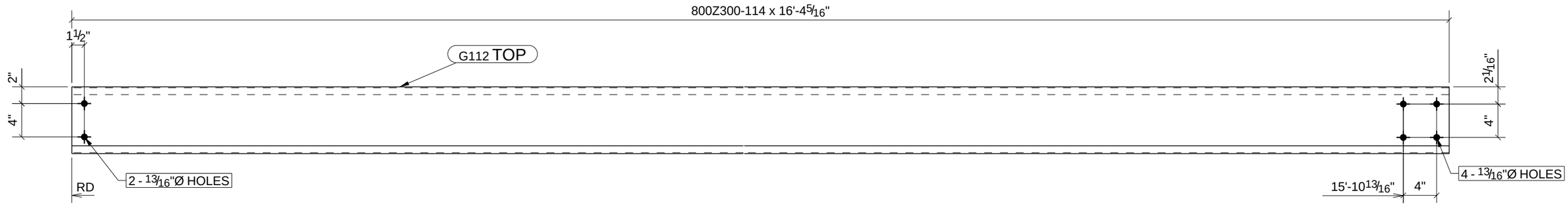
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G111	1	8" x 3" Z GIRT			SQ-2
G111	1	800Z300-114	16'-4 5/16"	103	A607-GR.5
p109	2	PL3/8"X5 1/2"	0'-7"	8	A36
		TOTAL WEIGHT THIS DRAWING		111	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G111
DATE DRAWN	10/13/2021		



3 - 8" x 3" Z GIRTS - G112

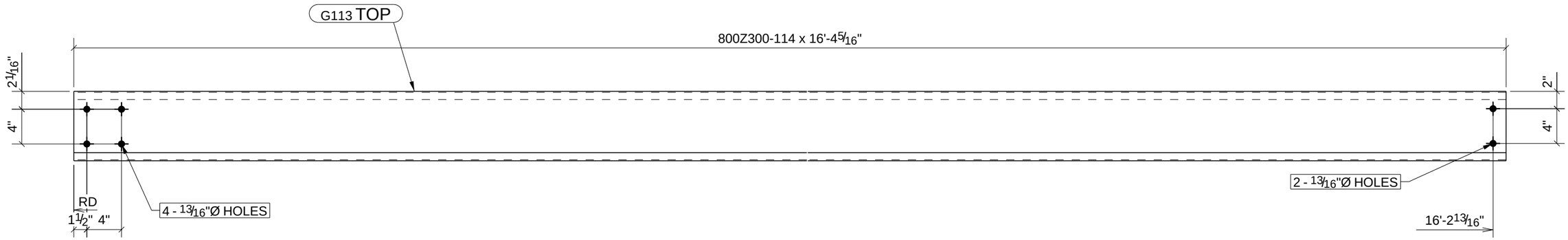
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G112	3	8" x 3" Z GIRTS			SQ-2
G112	3	800Z300-114	16'-4 5/16"	309	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		309	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G112
DATE DRAWN	10/13/2021		



6 - 8" x 3" Z GIRTS - G113

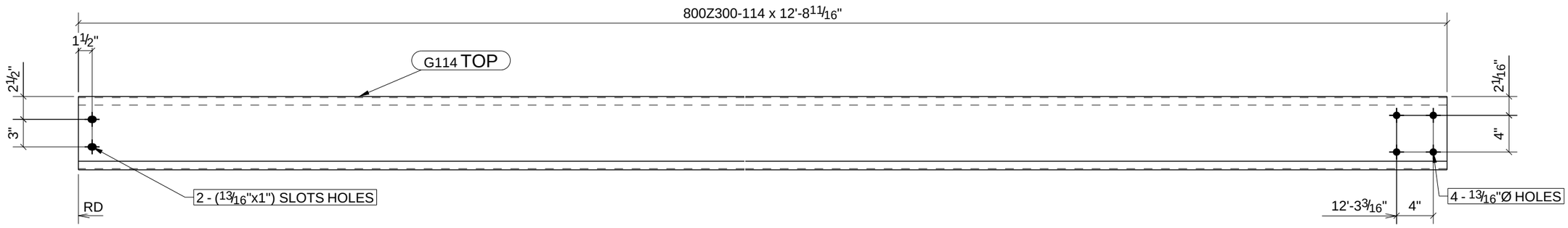
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G113	6	8" x 3" Z GIRTS			SQ-2
G113	6	800Z300-114	16'-4 5/16"	617	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		617	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G113
DATE DRAWN	10/13/2021		



2 - 8" x 3" Z GIRTS - G114

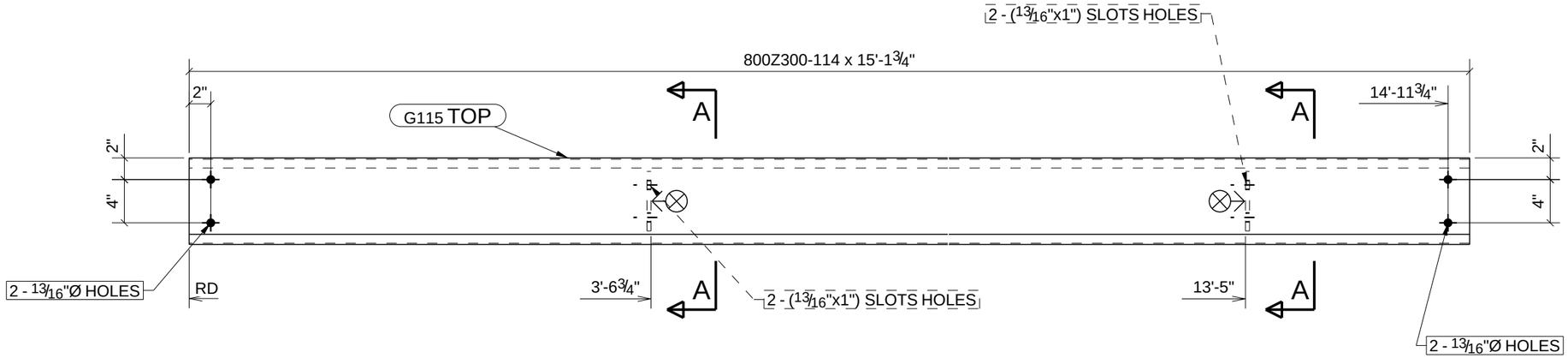
BILL OF MATERIAL

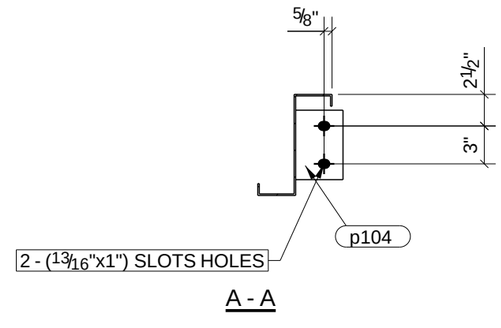
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G114	2	8" x 3" Z GIRTS			SQ-2
G114	2	800Z300-114	12'-8 11/16"	160	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		160	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G114





A - A

2 - 8" x 3" Z GIRTS - G115

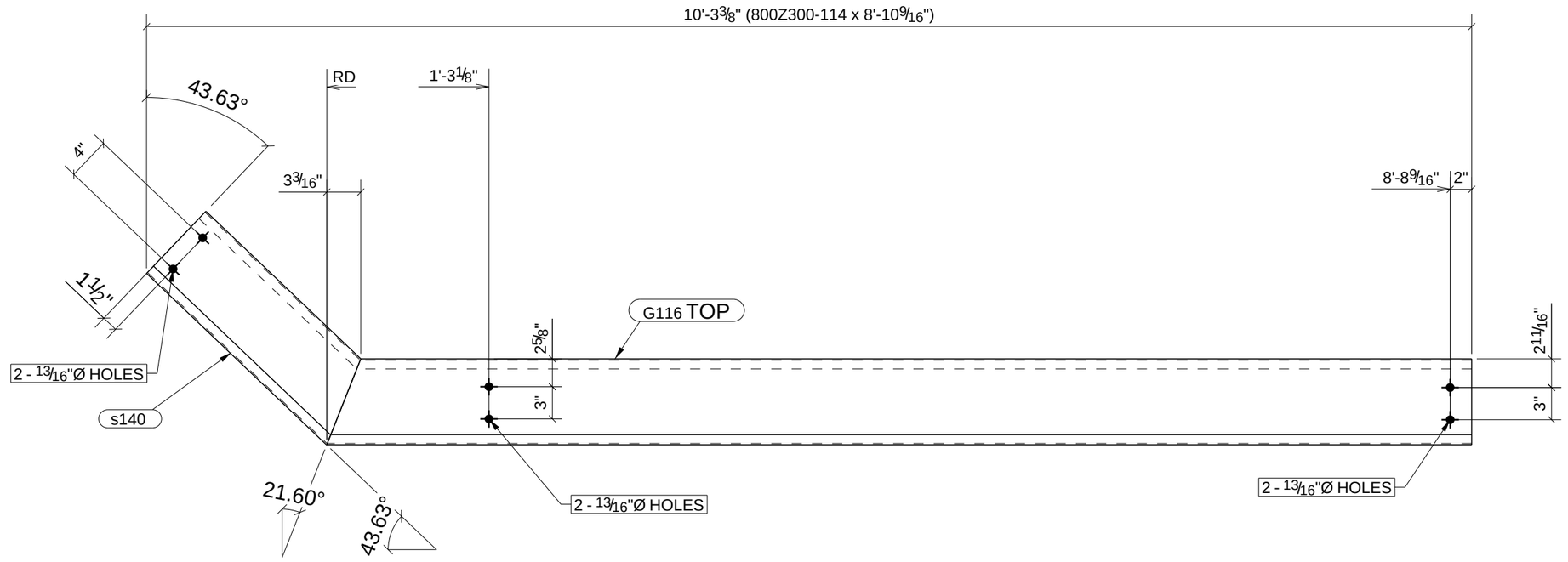
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G115	2	8" x 3" Z GIRTS			SQ-2
G115	2	800Z300-114	15'-1 3/4"	190	A607-GR.5
p104	4	PL3/8"X3 3/4"	0'-5 1/2"	9	A36
		TOTAL WEIGHT THIS DRAWING		199	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	G115



ONE - 8" x 3" Z GIRT - G116

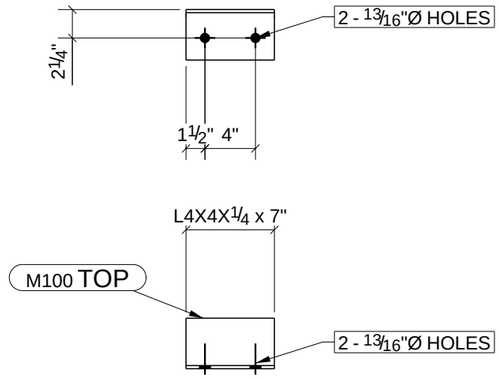
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
G116	1	8" x 3" Z GIRT			SQ-1/BEV-1
G116	1	800Z300-114	8'-10 9/16"	55	A607-GR.5
s140	1	800Z300-114	1'-11 3/16"	11	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		66	

REV	DESCRIPTION	DATE

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. G116
DATE DRAWN	10/13/2021		



16 - ANGLES - M100

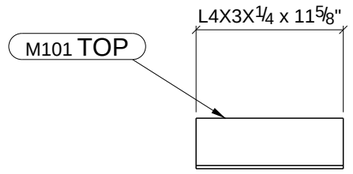
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M100	16	ANGLES			SQ-2
M100	16	L4X4X1/4	0'-7"	61	A36
		TOTAL WEIGHT THIS DRAWING		61	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	GIRT SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M100
DATE DRAWN	10/13/2021		



ONE - ANGLE - M101

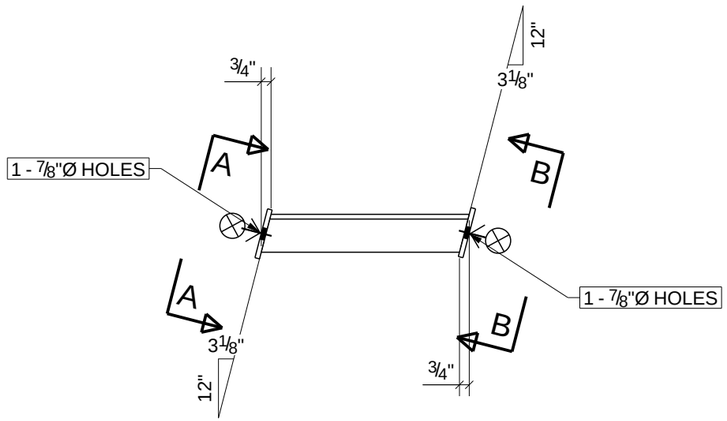
BILL OF MATERIAL

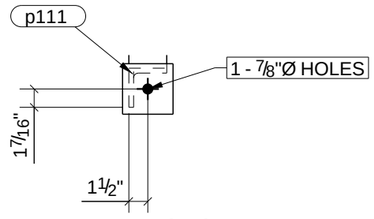
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M101	1	ANGLE			SQ-2
M101	1	L4X3X1/4	0'-11 5/8"	6	A36
		TOTAL WEIGHT THIS DRAWING		6	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

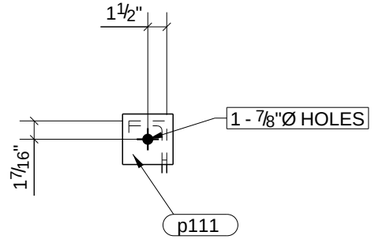
ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M101





A - A



B - B

ONE - ANGLE - M102

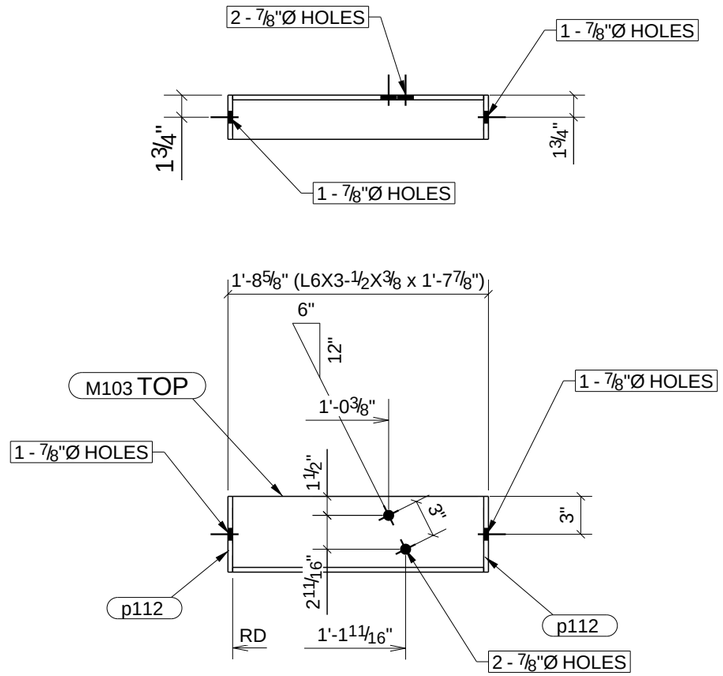
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M102	1	ANGLE			BEV-2
M102	1	L3X3X3/8	1'-4 1/2"	10	A36
p111	2	PL3/8"X4"	0'-4"	3	A36
		TOTAL WEIGHT THIS DRAWING		13	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M102
DATE DRAWN	10/13/2021		



ONE - ANGLE - M103

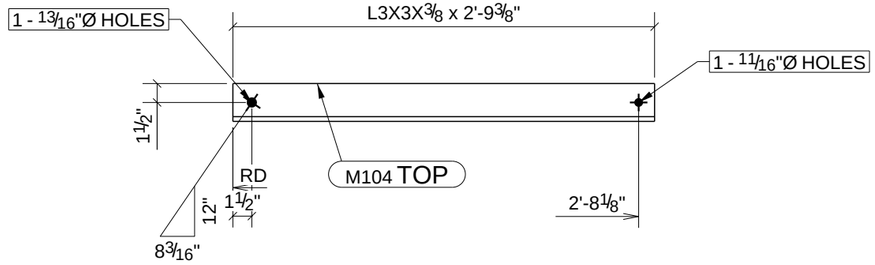
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M103	1	ANGLE			SQ-2
M103	1	L6X3-1/2X3/8	1'-7 7/8"	19	A36
p112	2	PL3/8"X3 1/2"	0'-6"	4	A36
		TOTAL WEIGHT THIS DRAWING		24	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M103



9 - STAYS - M104

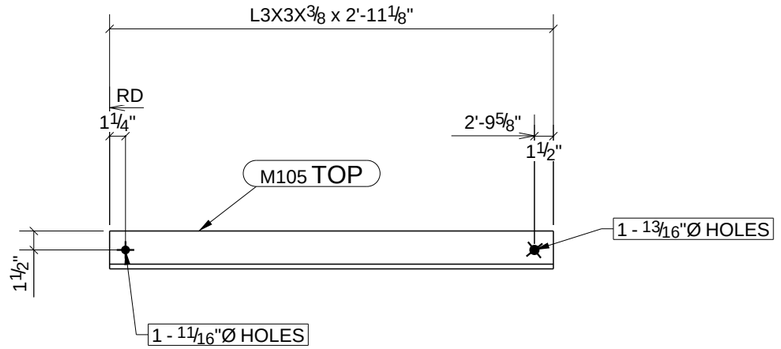
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M104	9	STAYS			SQ-2
M104	9	L3X3X3/8	2'-9 3/8"	180	A36
		TOTAL WEIGHT THIS DRAWING		180	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M104
DATE DRAWN	10/13/2021		



4 - STAYS - M105

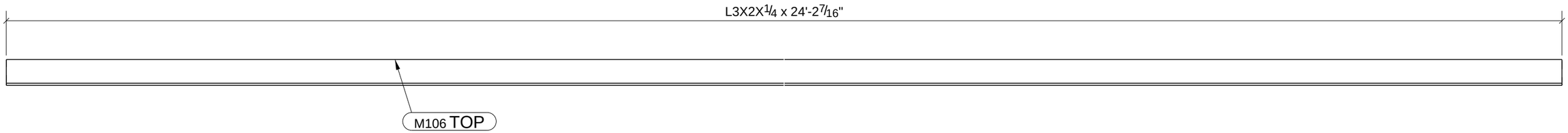
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M105	4	STAYS			SQ-2
M105	4	L3X3X3/8	2'-11 1/8"	84	A36
		TOTAL WEIGHT THIS DRAWING		84	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M105
DATE DRAWN	10/13/2021		



ONE - ANGLE - M106

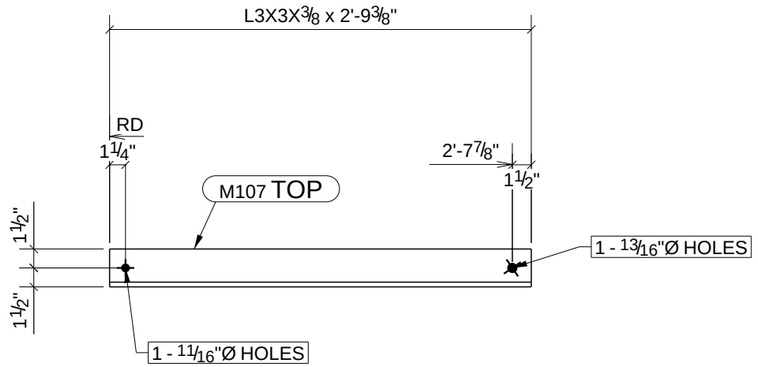
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M106	1	ANGLE			SQ-2
M106	1	L3X2X1/4	24'-2 7/16"	99	A36
		TOTAL WEIGHT THIS DRAWING		99	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M106



6 - STAYS - M107

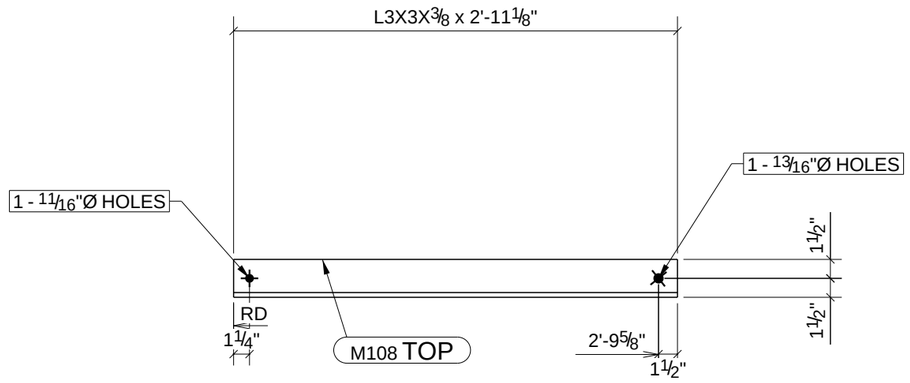
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M107	6	STAYS			SQ-2
M107	6	L3X3X3/8	2'-9 3/8"	120	A36
		TOTAL WEIGHT THIS DRAWING		120	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M107
DATE DRAWN	10/13/2021		



53 - STAYS - M108

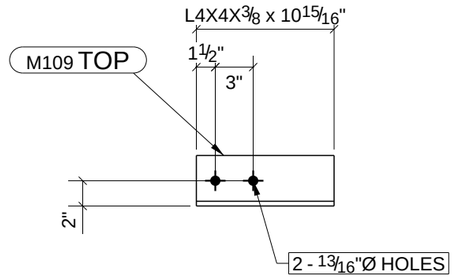
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M108	53	STAYS			SQ-2
M108	53	L3X3X3/8	2'-11 1/8"	1115	A36
		TOTAL WEIGHT THIS DRAWING		1115	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M108



ONE - ANGLE - M109

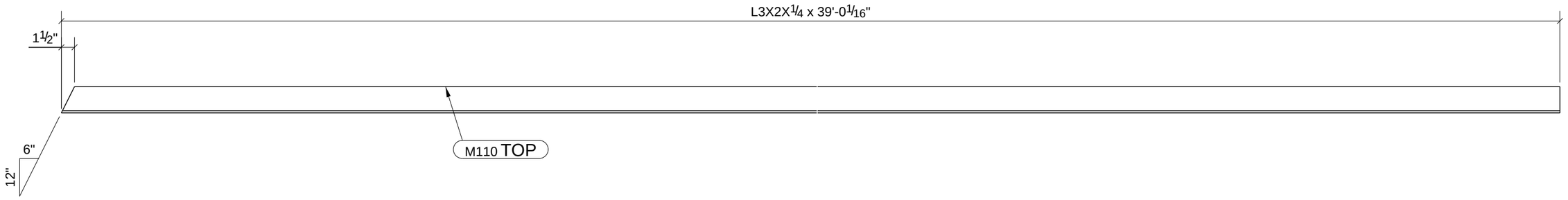
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M109	1	ANGLE			SQ-2
M109	1	L4X4X3/8	0'-10 15/16"	9	A36
		TOTAL WEIGHT THIS DRAWING		9	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M109



ONE - ANGLE - M110

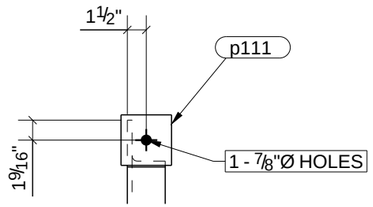
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M110	1	ANGLE			SQ-1/BEV-1
M110	1	L3X2X1/4	39'-0 1/16"	159	A36
		TOTAL WEIGHT THIS DRAWING		159	

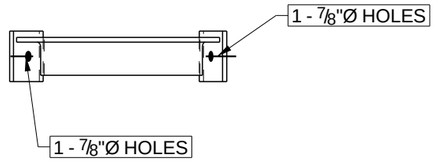
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

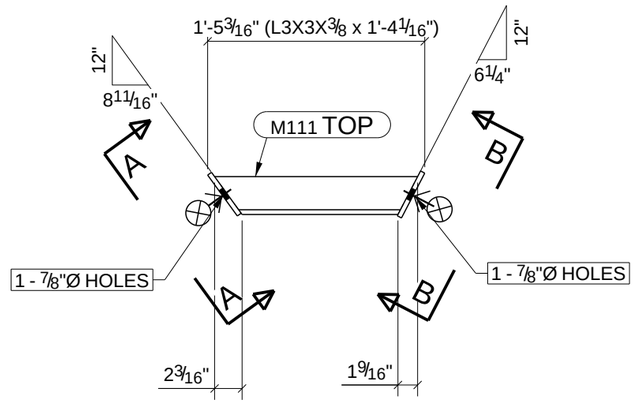
ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

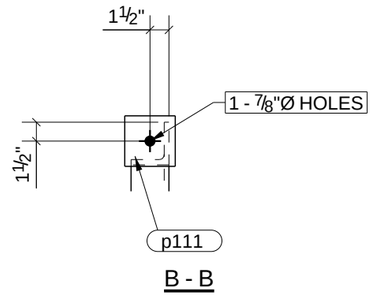
DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M110



A - A







B - B

ONE - ANGLE - M111

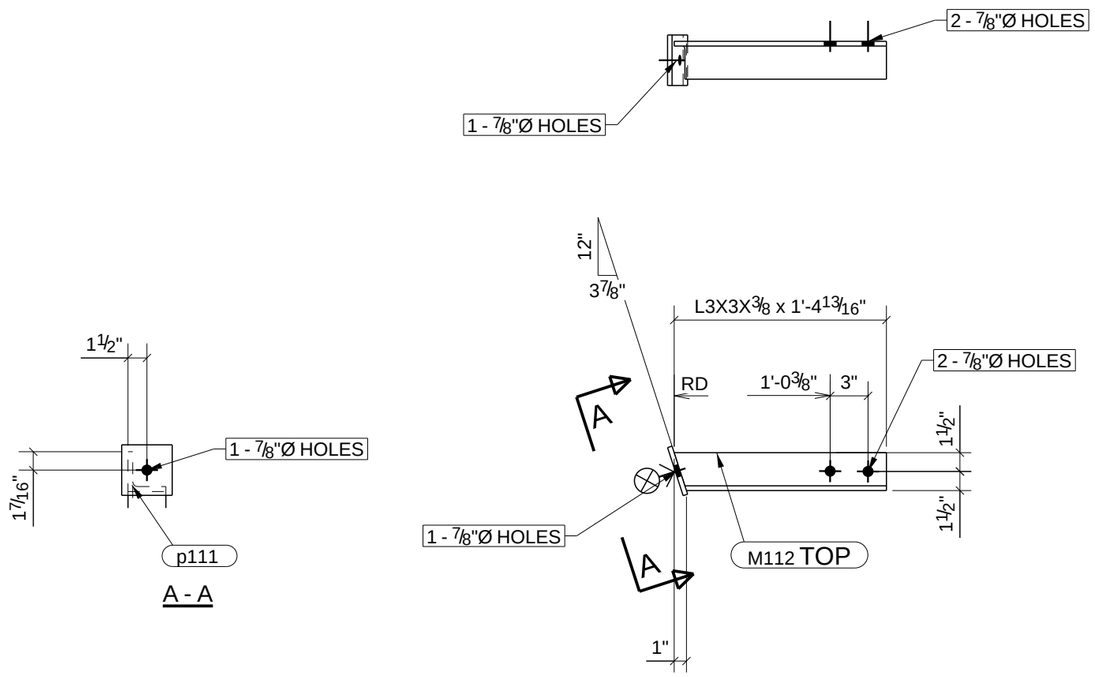
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M111	1	ANGLE			BEV-2
M111	1	L3X3X3/8	1'-4 1/16"	10	A36
p111	2	PL3/8"X4"	0'-4"	3	A36
		TOTAL WEIGHT THIS DRAWING		13	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M111
DATE DRAWN	10/13/2021		



2 - ANGLES - M112

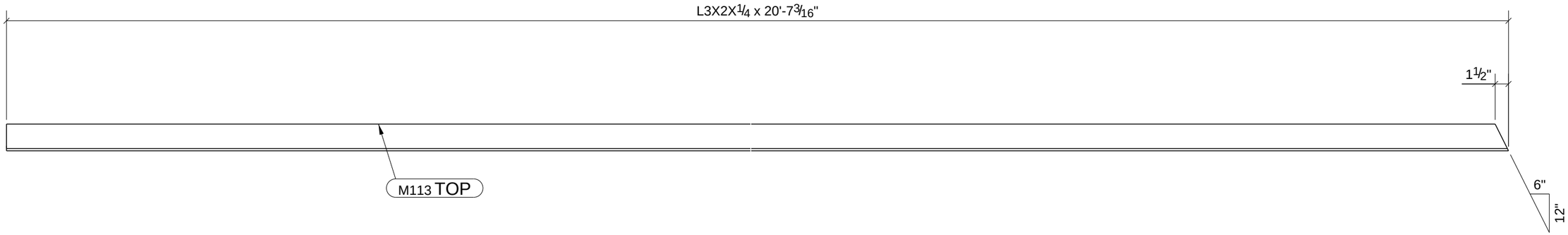
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M112	2	ANGLES			SQ-1/BEV-1
M112	2	L3X3X3/8	1'-4 13/16"	20	A36
p111	2	PL3/8"X4"	0'-4"	3	A36
		TOTAL WEIGHT THIS DRAWING		24	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M112
DATE DRAWN	10/13/2021		



ONE - ANGLE - M113

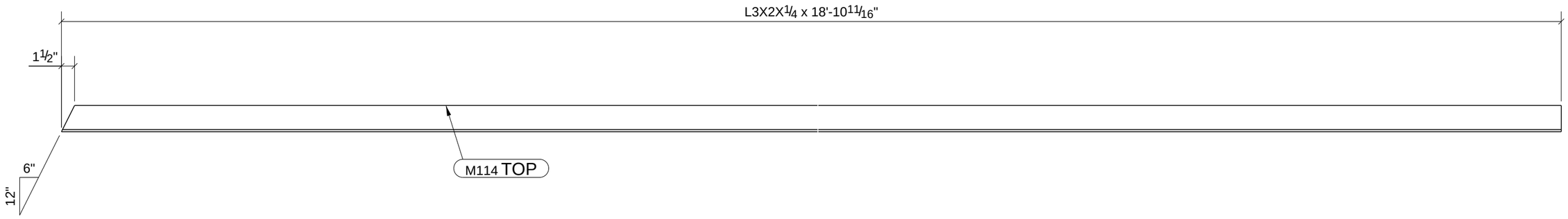
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M113	1	ANGLE			SQ-1/BEV-1
M113	1	L3X2X1/4	20'-7 3/16"	84	A36
		TOTAL WEIGHT THIS DRAWING		84	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M113
DATE DRAWN	10/13/2021		



ONE - ANGLE - M114

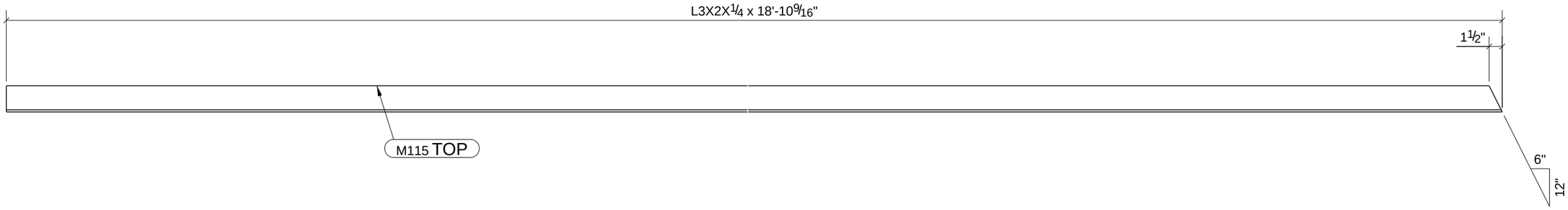
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M114	1	ANGLE			SQ-1/BEV-1
M114	1	L3X2X1/4	18'-10 11/16	77	A36
		TOTAL WEIGHT THIS DRAWING		77	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M114



ONE - ANGLE - M115

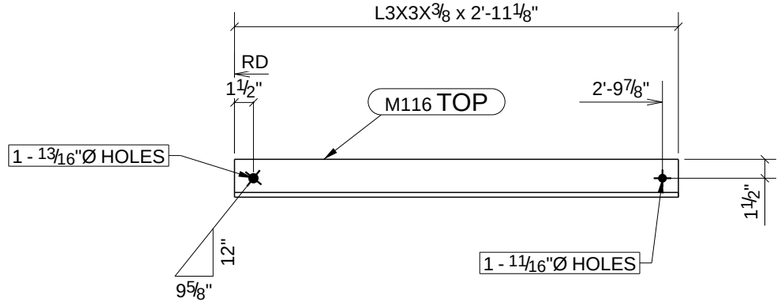
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M115	1	ANGLE			SQ-1/BEV-1
M115	1	L3X2X1/4	18'-10 9/16"	77	A36
		TOTAL WEIGHT THIS DRAWING		77	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M115



3 - STAYS - M116

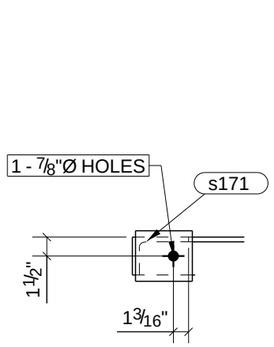
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M116	3	STAYS			SQ-2
M116	3	L3X3X3/8	2'-11 1/8"	63	A36
		TOTAL WEIGHT THIS DRAWING		63	

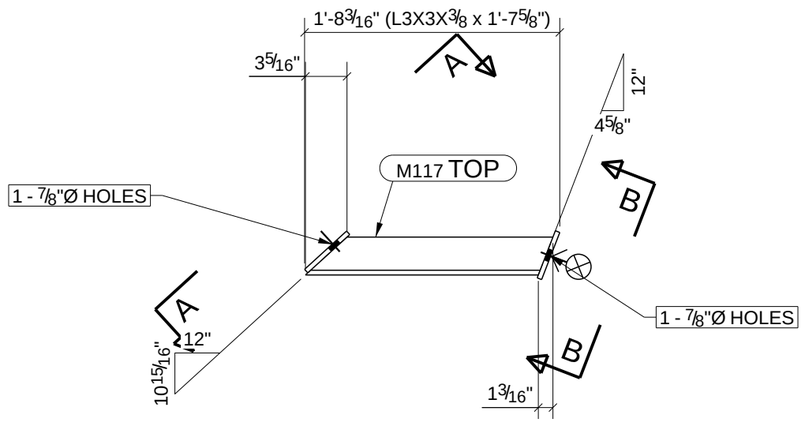
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

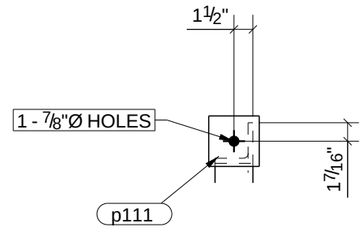
ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M116
DATE DRAWN	10/13/2021		



A - A





B - B

2 - ANGLES - M117

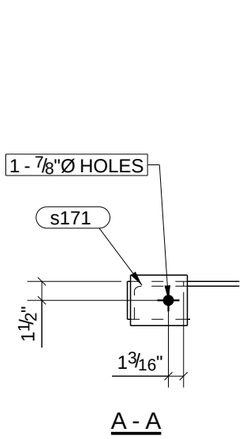
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M117	2	ANGLES			BEV-2
M117	2	L3X3X3/8	1'-7 5/8"	23	A36
p111	2	PL3/8"X4"	0'-4"	3	A36
s171	2	PL3/8"X4"	0'-4 1/2"	4	A36
		TOTAL WEIGHT THIS DRAWING		31	

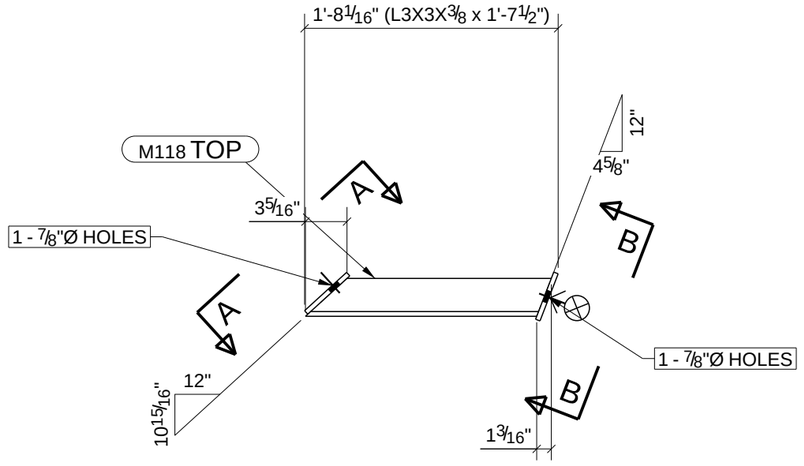
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

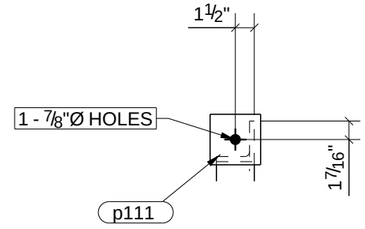
ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. M117
DATE DRAWN	10/13/2021		



A - A





B - B

ONE - ANGLE - M118

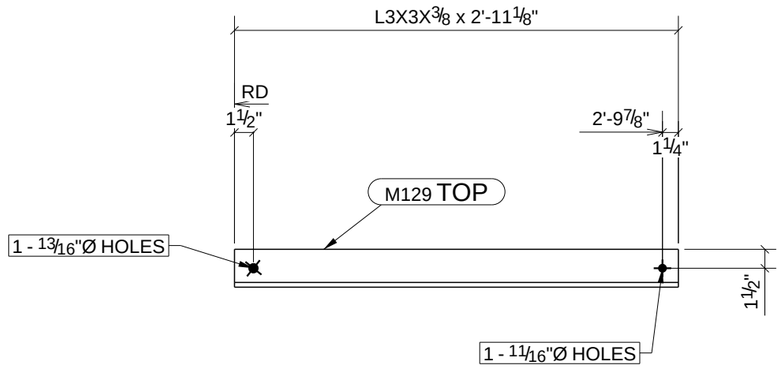
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M118	1	ANGLE			BEV-2
M118	1	L3X3X3/8	1'-7 1/2"	12	A36
p111	1	PL3/8"X4"	0'-4"	2	A36
s171	1	PL3/8"X4"	0'-4 1/2"	2	A36
		TOTAL WEIGHT THIS DRAWING		15	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M118



45 - STAYS - M129

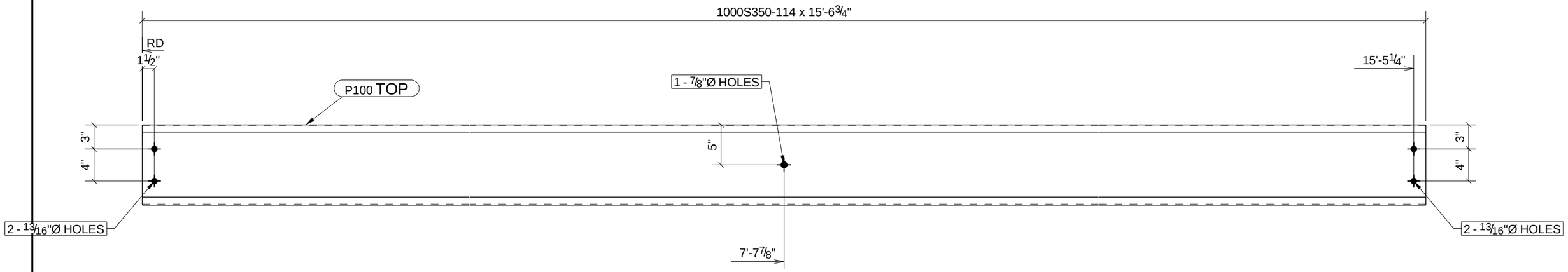
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
M129	45	STAYS			SQ-2
M129	45	L3X3X3/8	2'-11 1/8"	947	A36
		TOTAL WEIGHT THIS DRAWING		947	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN SUPPORT		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	M129



ONE - 10" x 3 1/2" C PURLIN - P100

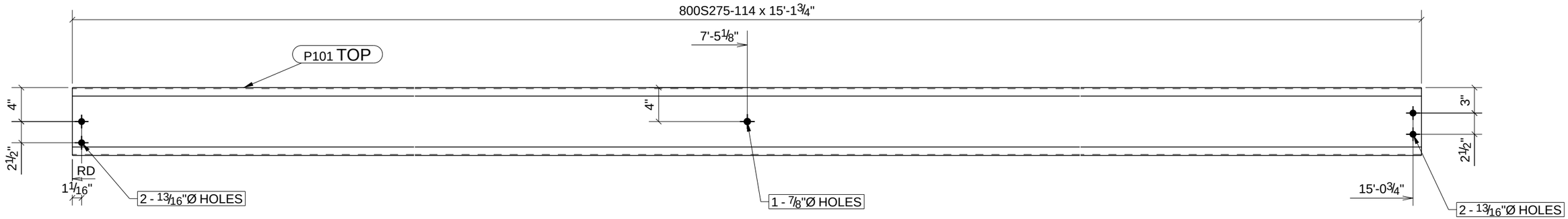
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P100	1	10" x 3 1/2" C PURLIN			SQ-2
P100	1	1000S350-114	15'-6 3/4"	118	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		118	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P100



ONE - 8" x 2 3/4" C GIRT - P101

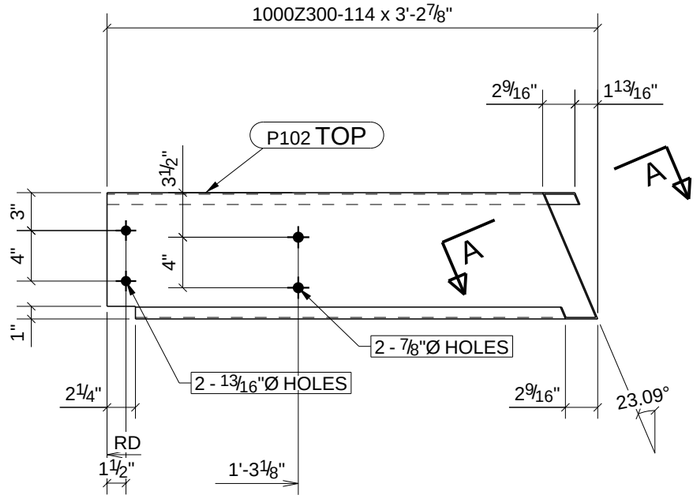
BILL OF MATERIAL

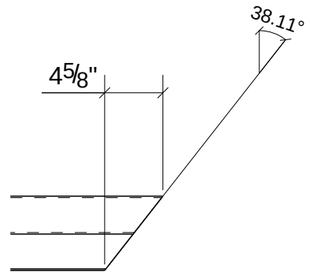
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P101	1	8" x 2 3/4" C GIRT			SQ-2
P101	1	800S275-114	15'-1 3/4"	93	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		93	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P101





A - A

ONE - 12" x 3" Z PURLIN - P102

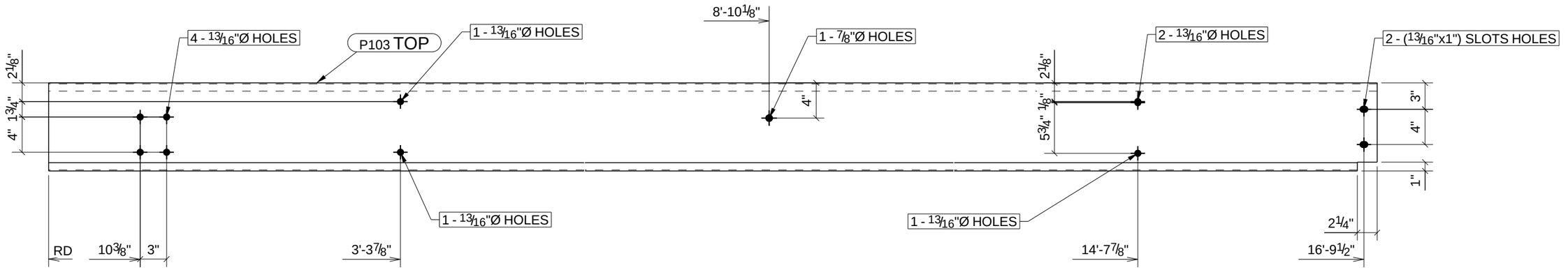
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P102	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P102	1	1000Z300-114	3'-2 7/8"	21	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		21	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P102



ONE - 12" x 3" Z PURLIN - P103

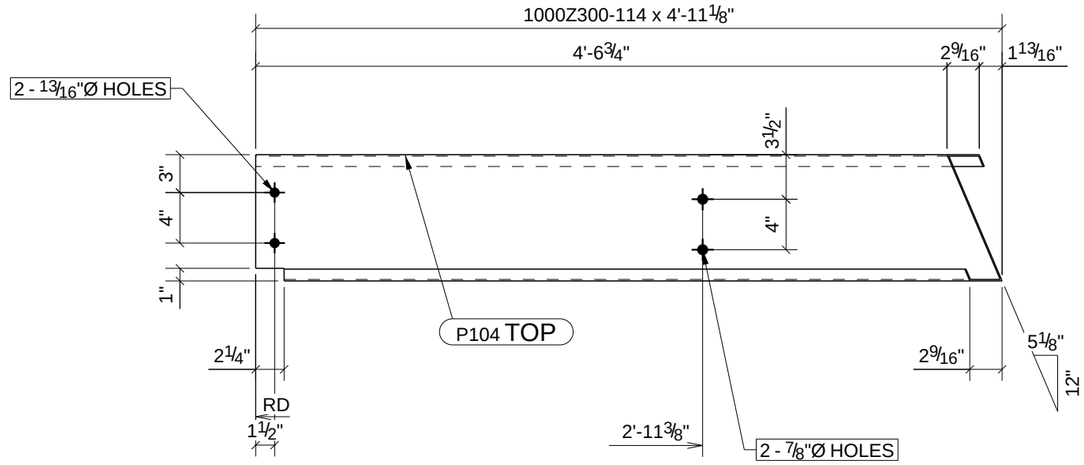
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P103	1	12" x 3" Z PURLIN			SQ-2
P103	1	1000Z300-114	16'-11"	120	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		120	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P103



ONE - 12" x 3" Z PURLIN - P104

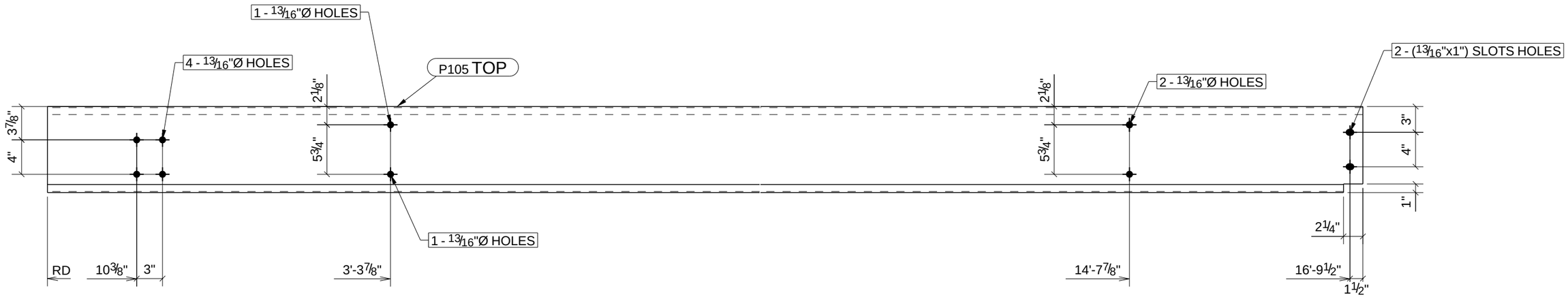
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P104	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P104	1	1000Z300-114	4'-11 1/8"	33	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		33	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P104
DATE DRAWN	10/13/2021		



8 - 12" x 3" Z PURLINS - P105

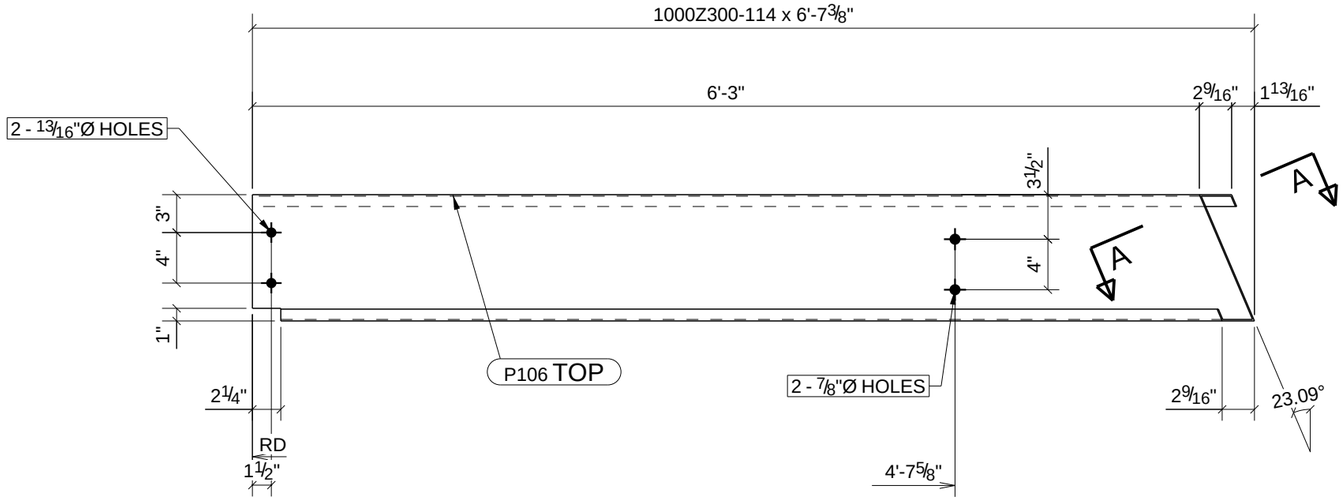
BILL OF MATERIAL

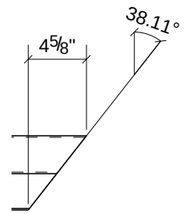
MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P105	8	12" x 3" Z PURLINS			SQ-2
P105	8	1000Z300-114	16'-11"	959	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		959	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P105





A - A

ONE - 12" x 3" Z PURLIN - P106

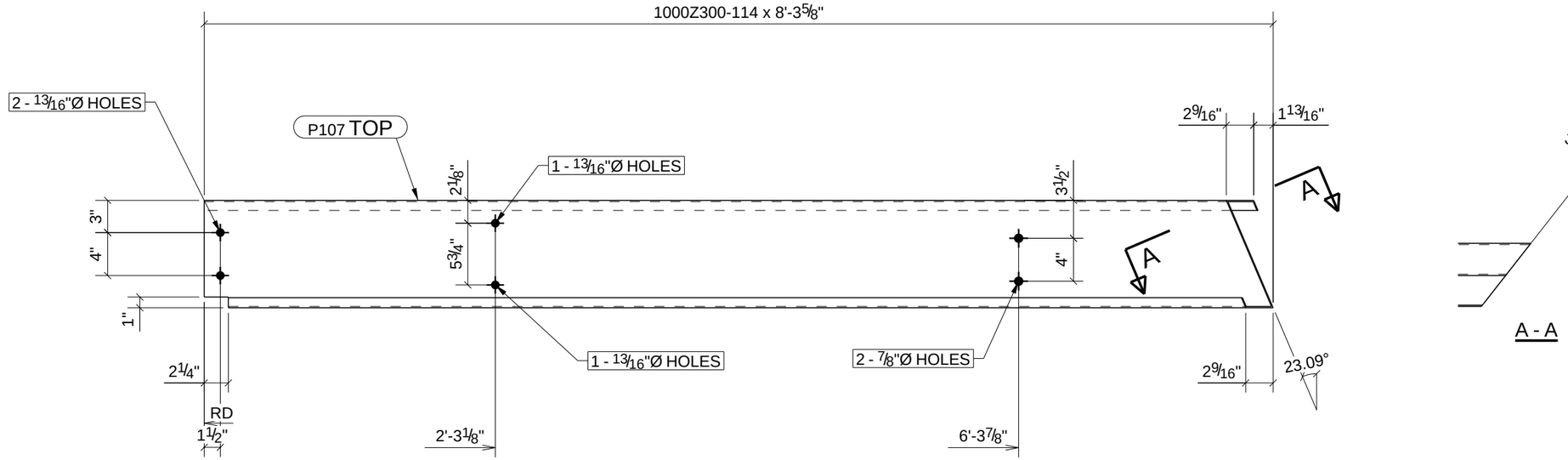
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P106	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P106	1	1000Z300-114	6'-7 3/8"	45	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		45	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P106
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P107

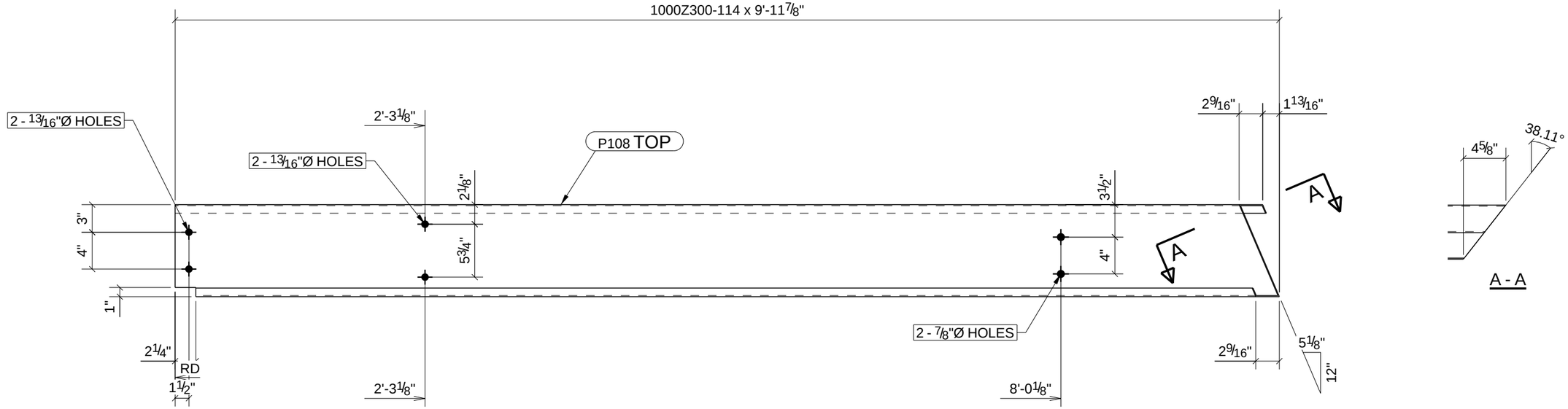
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P107	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P107	1	1000Z300-114	8'-3 5/8"	57	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		57	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P107
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P108

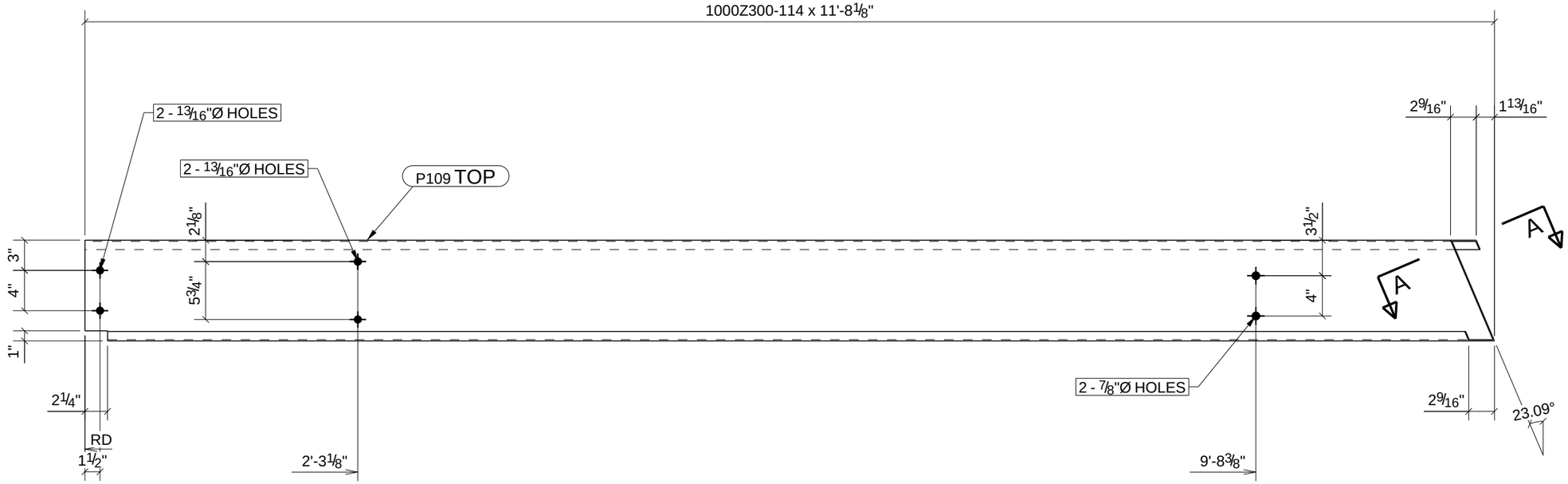
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P108	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P108	1	1000Z300-114	9'-11 7/8"	69	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		69	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P108
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P109

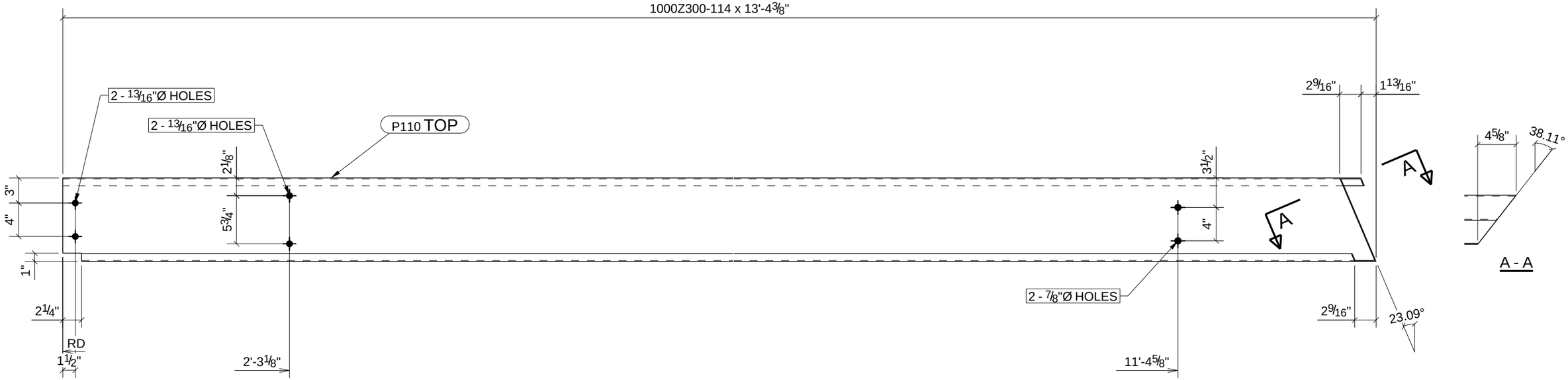
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P109	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P109	1	1000Z300-114	11'-8 1/8"	81	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		81	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P109
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P110

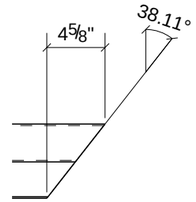
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P110	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P110	1	1000Z300-114	13'-4 3/8"	93	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		93	

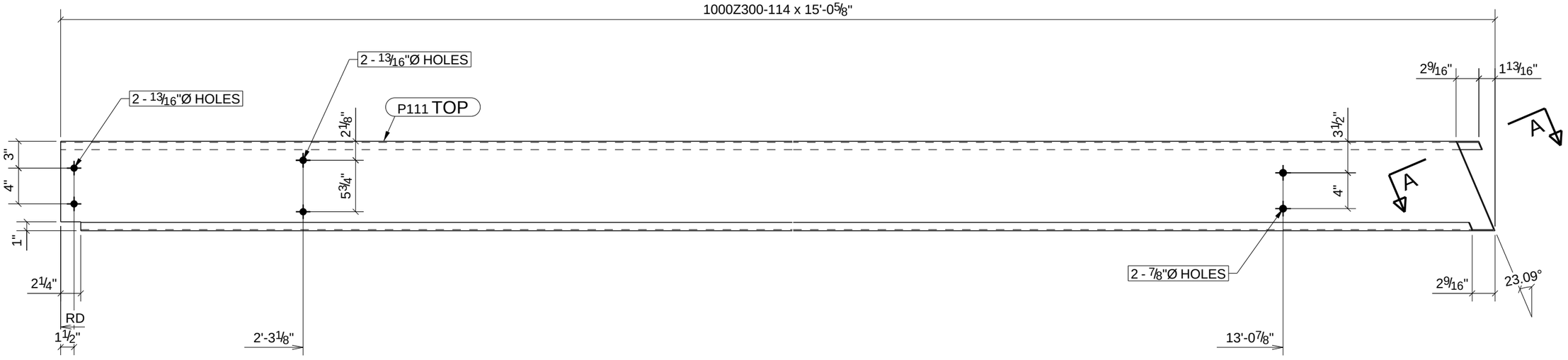
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P110



A - A



ONE - 12" x 3" Z PURLIN - P111

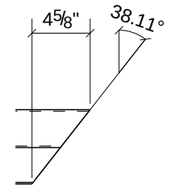
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P111	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P111	1	1000Z300-114	15'-0 5/8"	105	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		105	

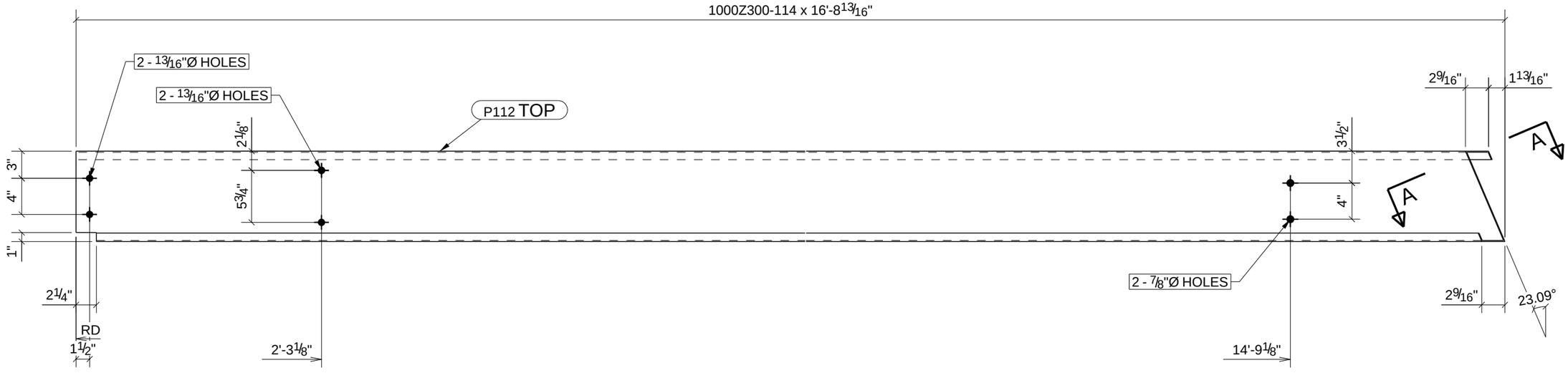
REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P111



A - A



ONE - 12" x 3" Z PURLIN - P112

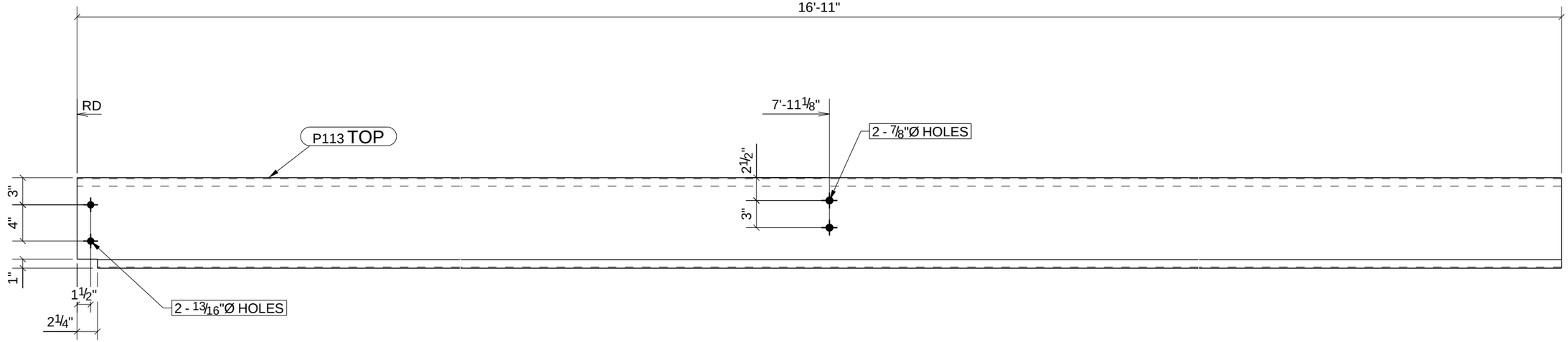
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P112	1	12" x 3" Z PURLIN			SQ-1/BEV-1
P112	1	1000Z300-114	16'-8 13/16"	117	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		117	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P112



ONE - 12" x 3" Z PURLIN - P113

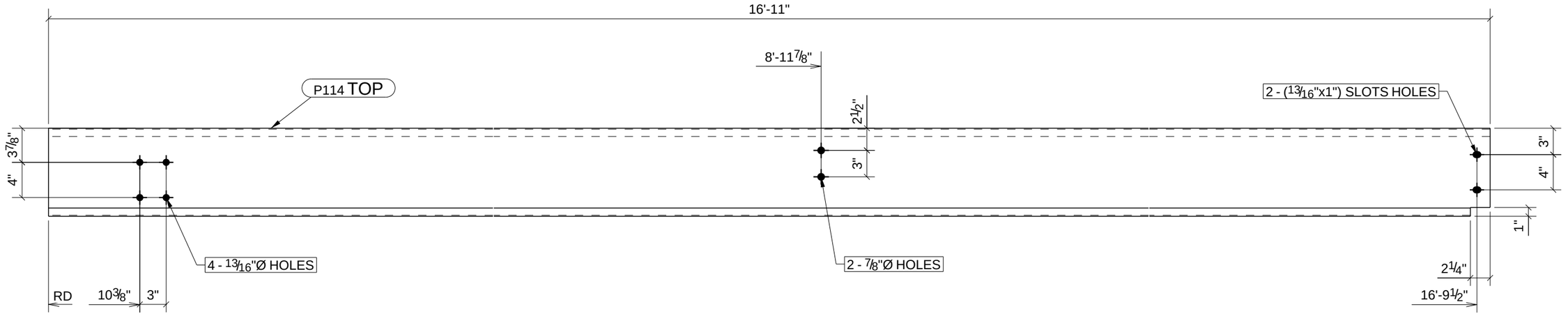
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P113	1	12" x 3" Z PURLIN			SQ-2
P113	1	1000Z300-114	16'-11"	120	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		120	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P113
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P114

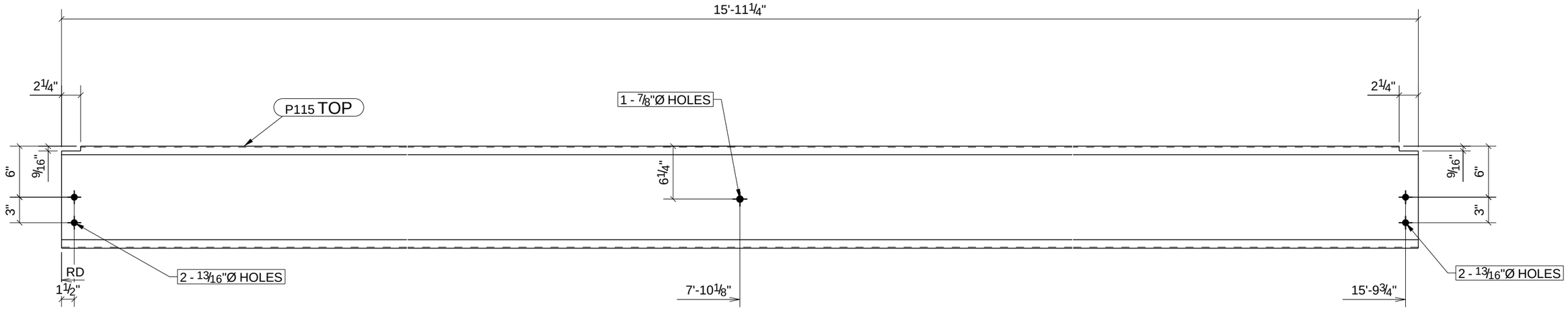
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P114	1	12" x 3" Z PURLIN			SQ-2
P114	1	1000Z300-114	16'-11"	120	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		120	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P114



ONE - 12" x 3 1/2" C PURLIN - P115

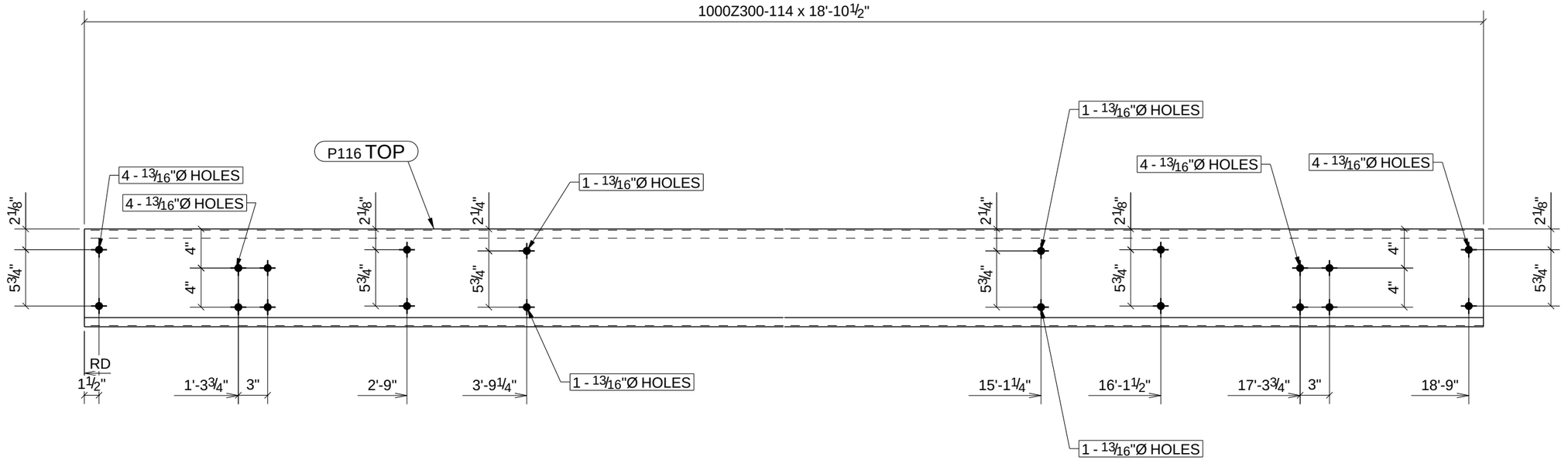
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P115	1	12" x 3 1/2" C PURLIN			SQ-2
P115	1	1200S350-114	15'-11 1/4"	133	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		133	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P115
DATE DRAWN	10/13/2021		



15 - 12" x 3" Z PURLINS - P116

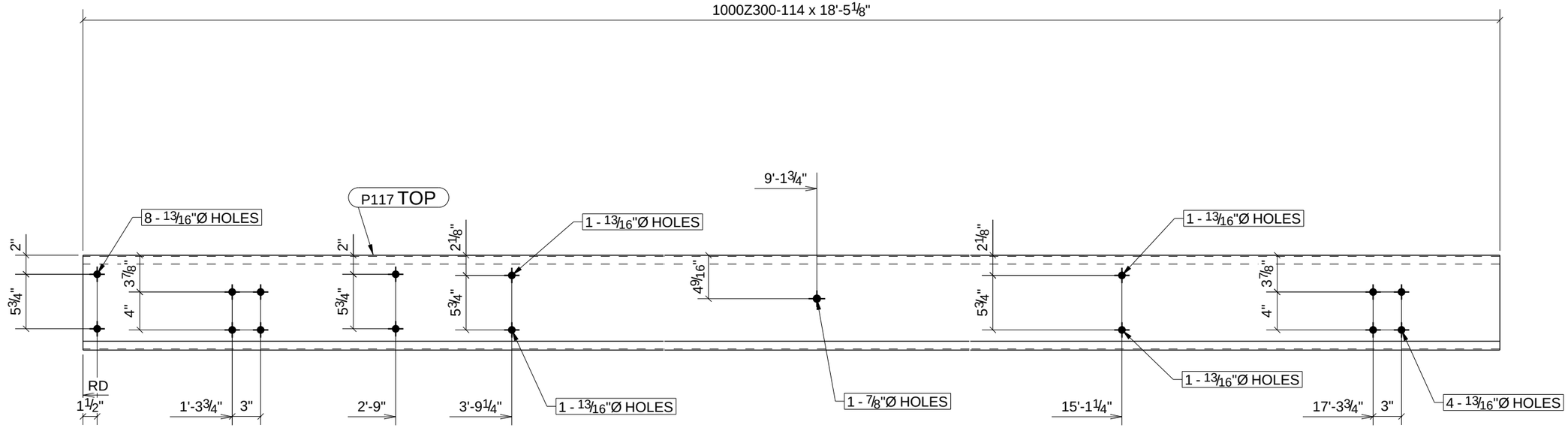
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P116	15	12" x 3" Z PURLINS			SQ-2
P116	15	1000Z300-114	18'-10 1/2"	2011	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		2011	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P116
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P117

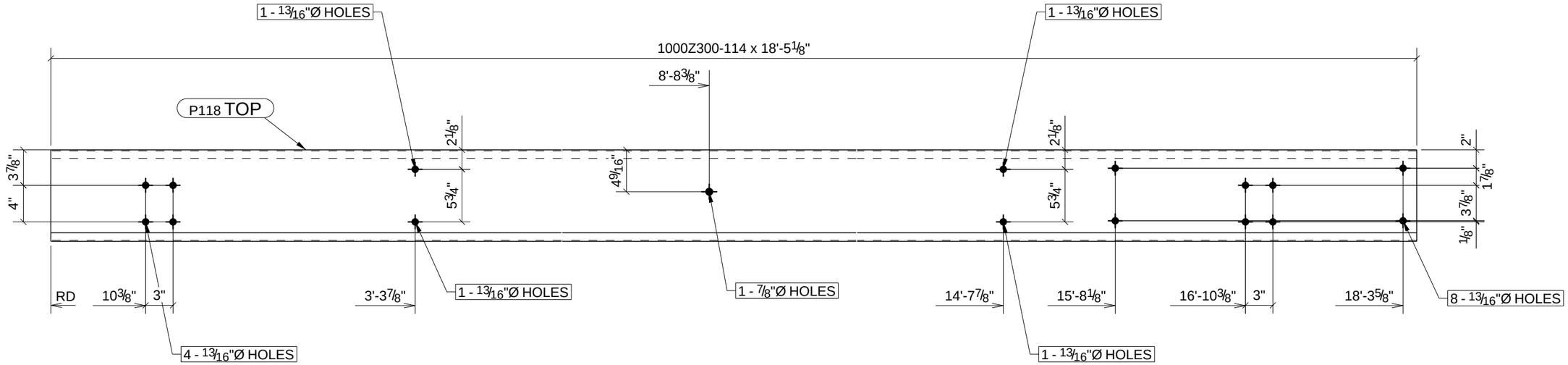
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P117	1	12" x 3" Z PURLIN			SQ-2
P117	1	1000Z300-114	18'-5 1/8"	131	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		131	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P117
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P118

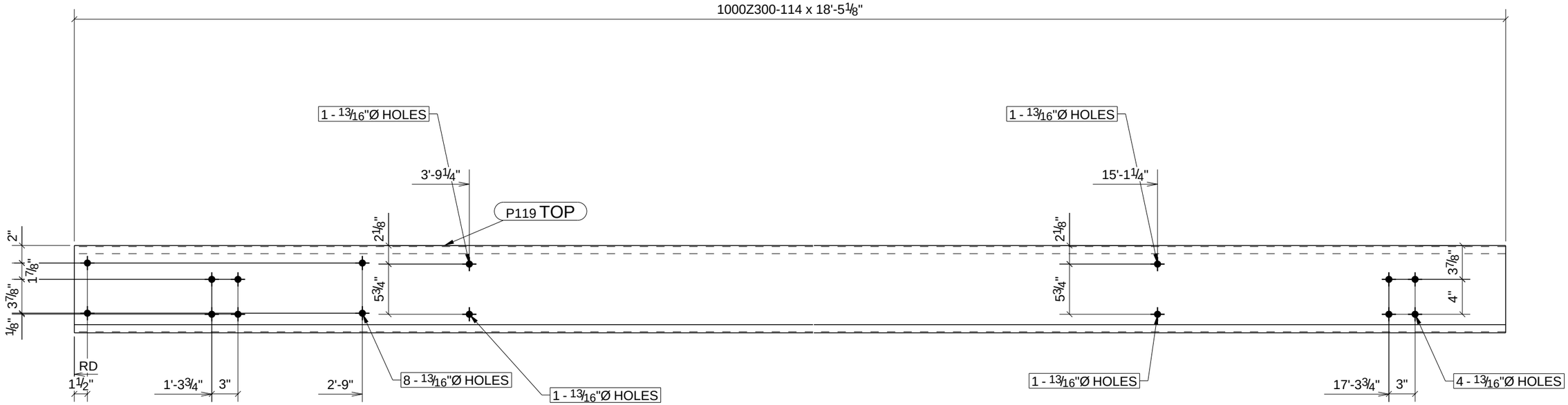
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P118	1	12" x 3" Z PURLIN			SQ-2
P118	1	1000Z300-114	18'-5 1/8"	131	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		131	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P118



14 - 12" x 3" Z PURLINS - P119

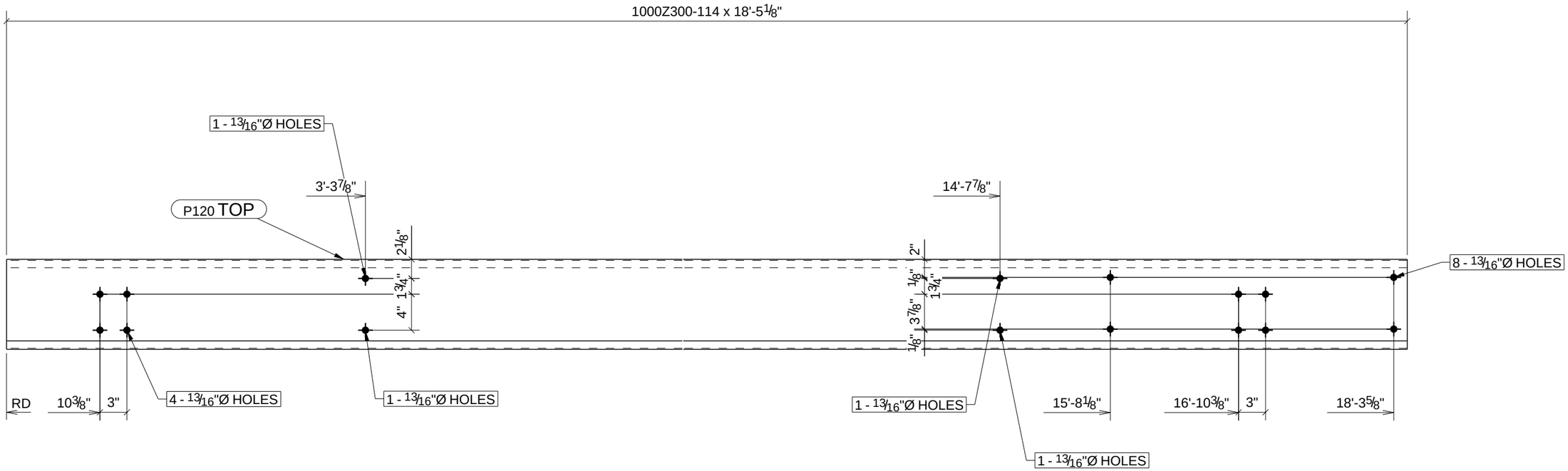
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P119	14	12" x 3" Z PURLINS			SQ-2
P119	14	1000Z300-114	18'-5 1/8"	1833	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		1833	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P119
DATE DRAWN	10/13/2021		



14 - 12" x 3" Z PURLINS - P120

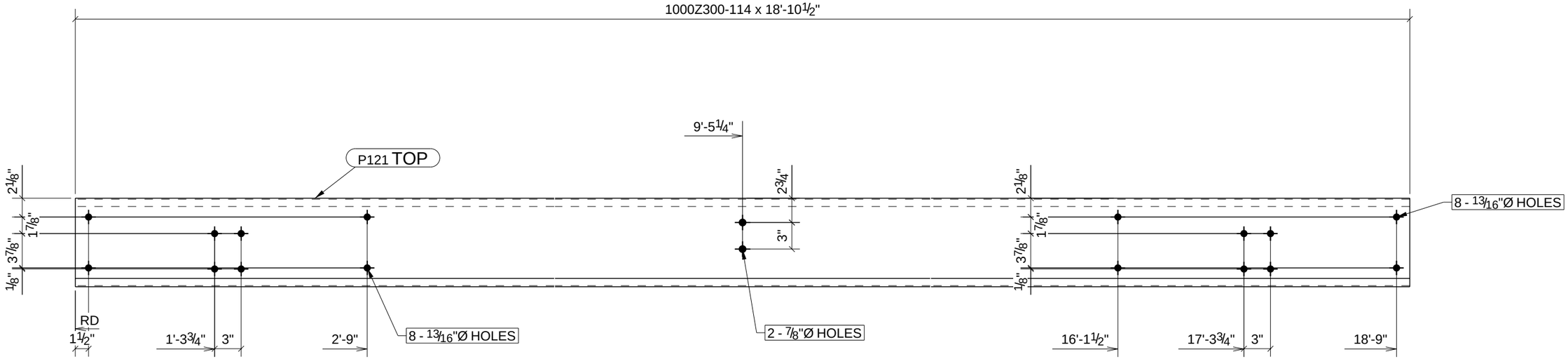
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P120	14	12" x 3" Z PURLINS			SQ-2
P120	14	1000Z300-114	18'-5 1/8"	1833	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		1833	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P120



2 - 12" x 3" Z PURLINS - P121

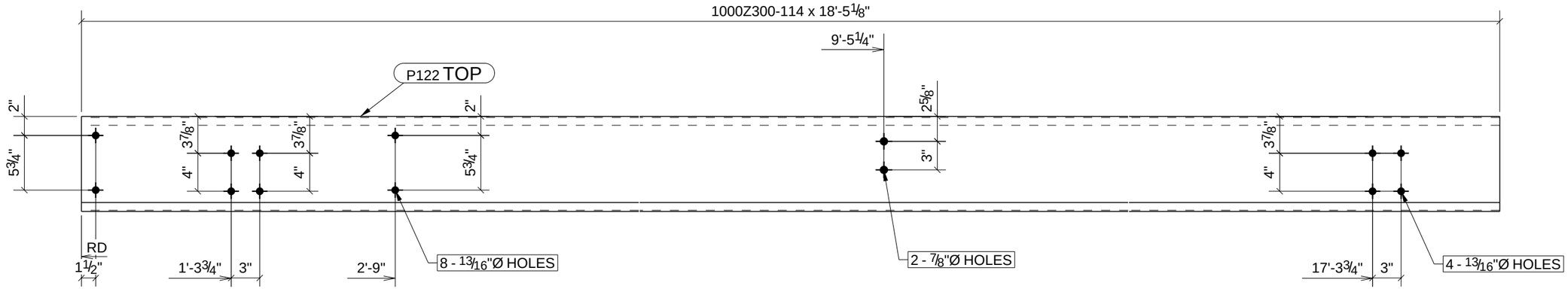
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P121	2	12" x 3" Z PURLINS			SQ-2
P121	2	1000Z300-114	18'-10 1/2"	268	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		268	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P121



2 - 12" x 3" Z PURLINS - P122

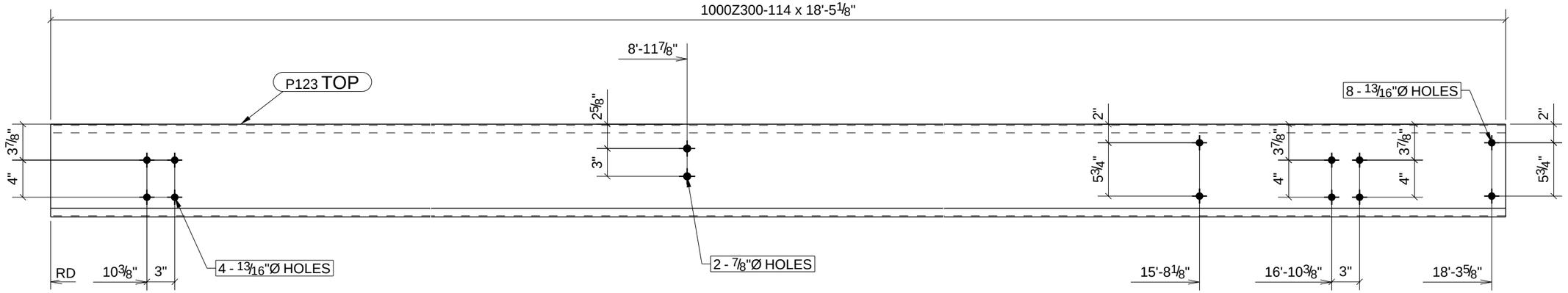
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P122	2	12" x 3" Z PURLINS			SQ-2
P122	2	1000Z300-114	18'-5 1/8"	262	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		262	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P122
DATE DRAWN	10/13/2021		



2 - 12" x 3" Z PURLINS - P123

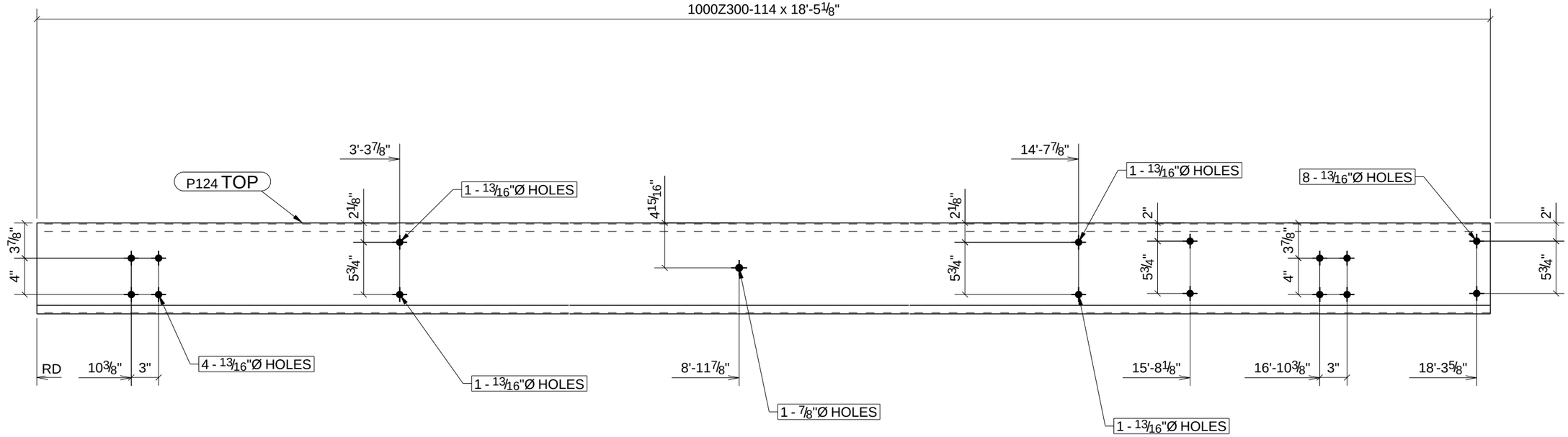
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P123	2	12" x 3" Z PURLINS			SQ-2
P123	2	1000Z300-114	18'-5 1/8"	262	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		262	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P123



ONE - 12" x 3" Z PURLIN - P124

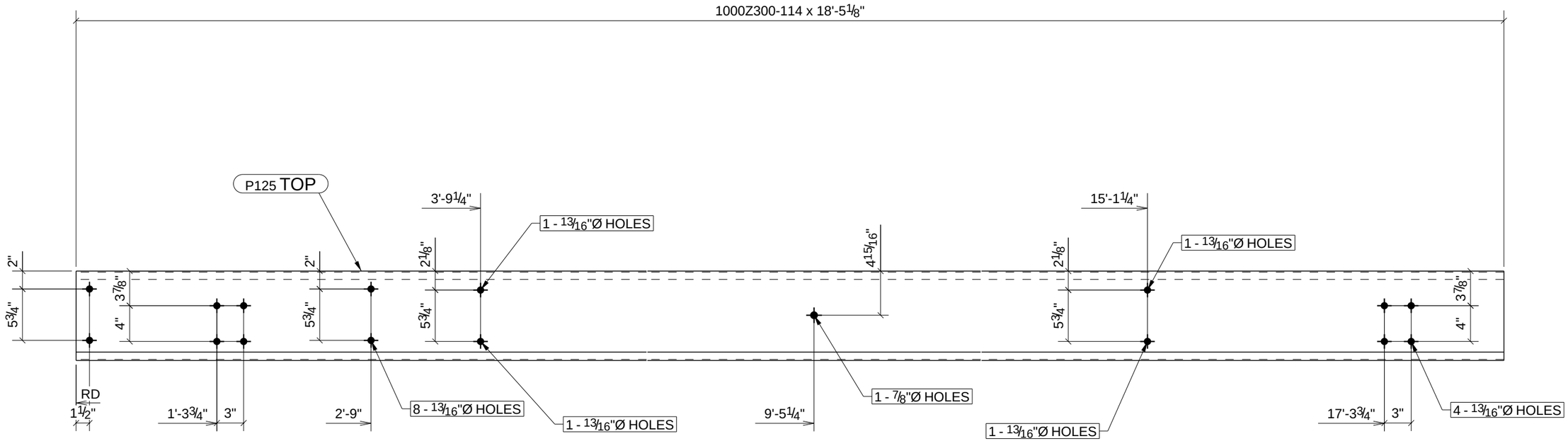
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P124	1	12" x 3" Z PURLIN			SQ-2
P124	1	1000Z300-114	18'-5 1/8"	131	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		131	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P124
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P125

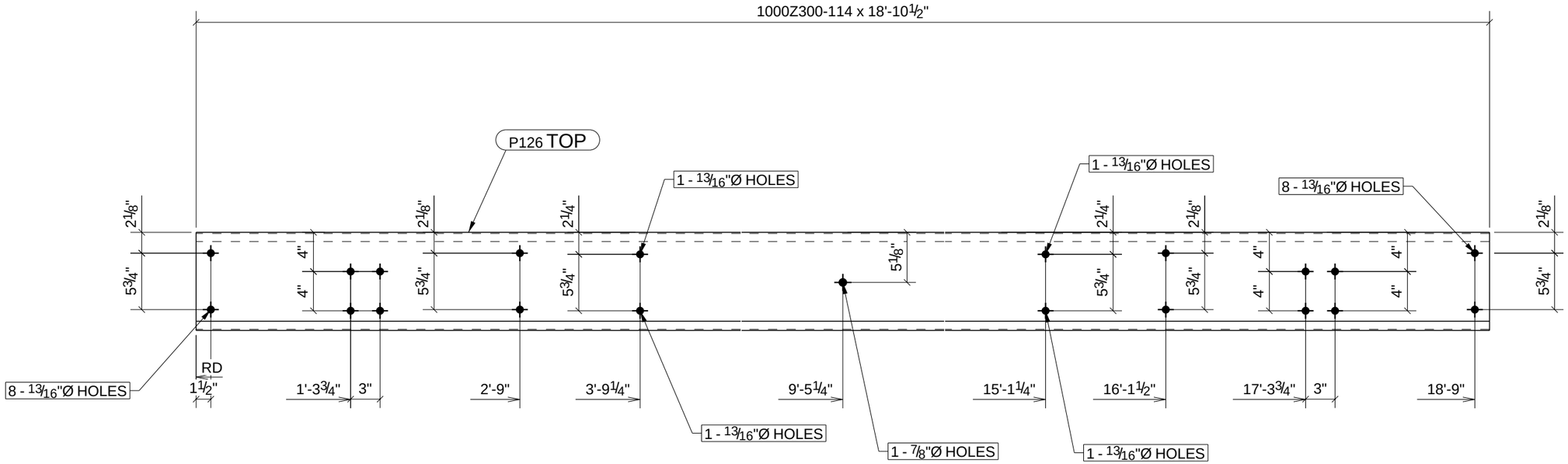
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P125	1	12" x 3" Z PURLIN			SQ-2
P125	1	1000Z300-114	18'-5 1/8"	131	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		131	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P125
DATE DRAWN	10/13/2021		



ONE - 12" x 3" Z PURLIN - P126

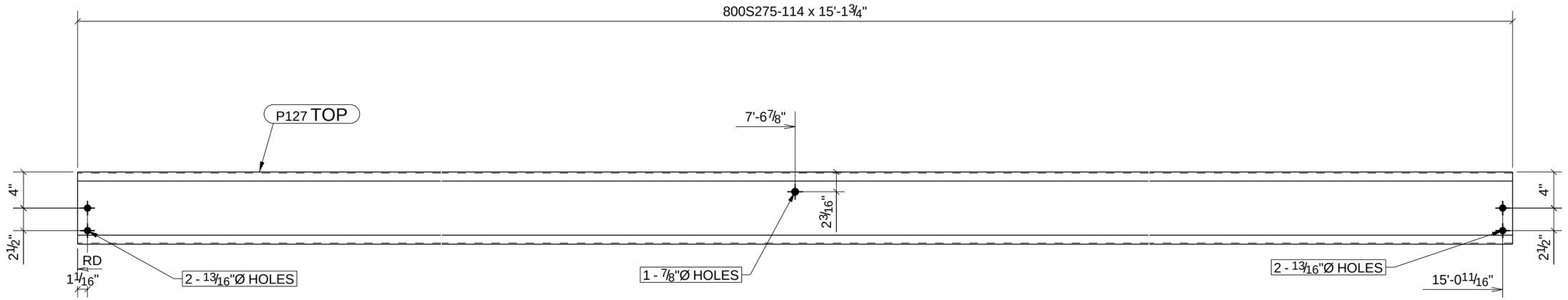
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P126	1	12" x 3" Z PURLIN			SQ-2
P126	1	1000Z300-114	18'-10 1/2"	134	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		134	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	P126



3 - 8" x 2 3/4" C GIRTS - P127

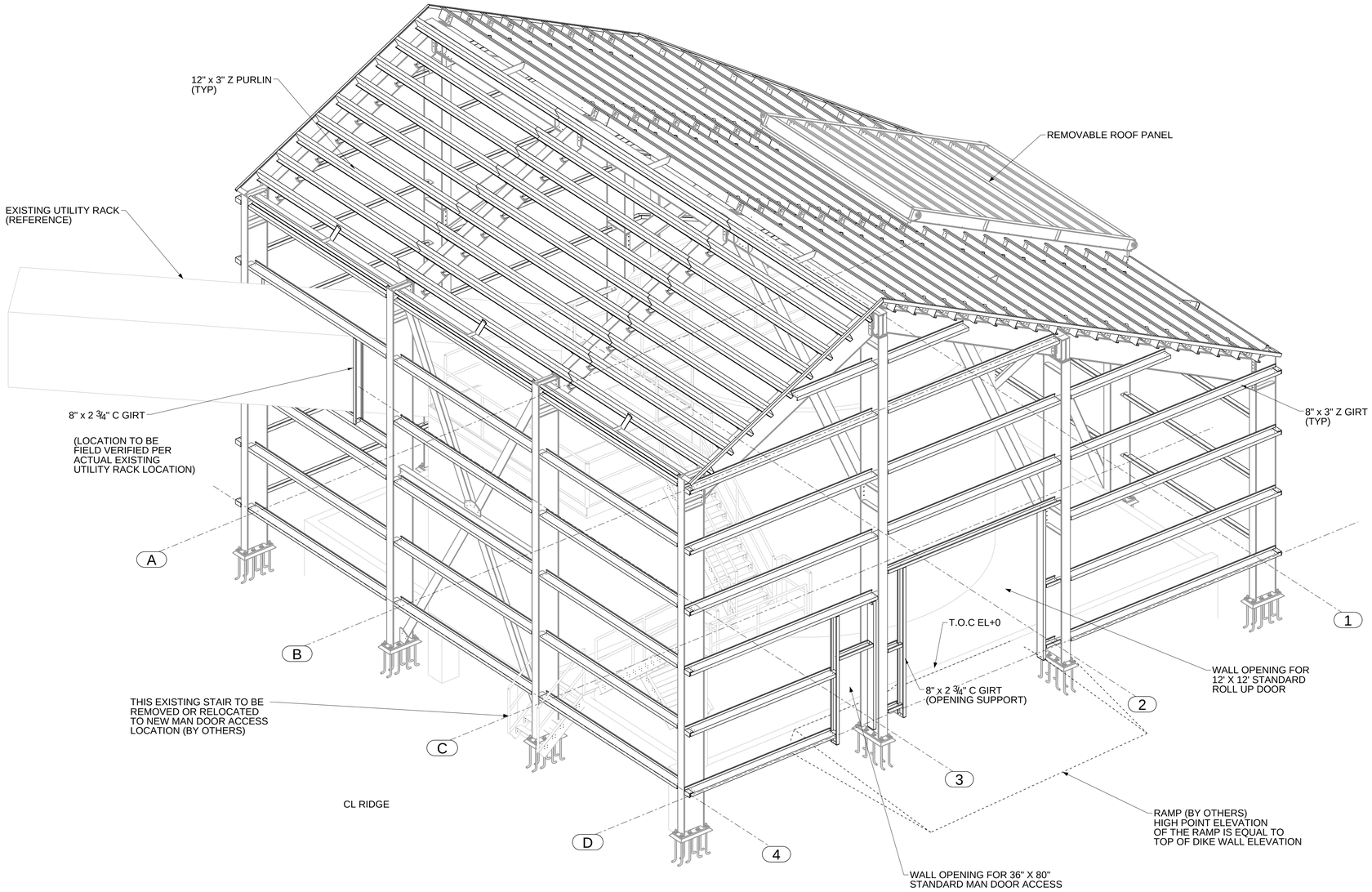
BILL OF MATERIAL

MARK	QTY	DESCRIPTION	LENGTH	WEIGHT	REMARKS
P127	3	8" x 2 3/4" C GIRTS			SQ-2
P127	3	800S275-114	15'-1 3/4"	279	A607-GR.5
		TOTAL WEIGHT THIS DRAWING		279	

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	PURLIN		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No. 13	DRG No. P127
DATE DRAWN	10/13/2021		



PURLINS & GIRTS 3D VIEW

NOTE:

1. ELEVATION INFORMATION SHOWN IN THIS DRAWING IS BASED FROM THE DIKE WALL DATUM POINT ELEVATION EL 0' AT THE WALL OPENING AND RAMP LOCATION.
2. WORK THIS DRAWING WITH ERECTION DWG E11 TO E14.

ERECTION DRAWING LIST:

SEQUENCE#1 THICKENER TANK SHED STRUCTURAL FRAME

DWG #	DESCRIPTION
E1	TANK SHED OVERALL 3D VIEWS, DRAWING LIST AND GENERAL NOTES (THIS DWG)
E2	TANK SHED STRUCTURAL FRAME 3D VIEW
E3	TANK SHED STRUCTURAL FRAME ANCHOR BOLT LOCATION PLAN
E4	TANK SHED STRUCTURAL FRAME PLAN
E5	TANK SHED STRUCTURAL FRAME ALONG GRID 1 TO 4
E6	TANK SHED STRUCTURAL FRAME ALONG GRID A TO D
E7	REMOVABLE ROOF PANEL PLAN, SECTIONS & DETAILS

SEQUENCE#2 THICKENER TANK SHED PURLINS & GIRTS

DWG #	DESCRIPTION
E10	TANK SHED PURLINS & GIRTS 3D VIEW
E11	TANK SHED PURLINS & GIRTS PLANS
E12	TANK SHED PURLINS & GIRTS SECTIONS (SHT 1 OF 3)
E13	TANK SHED PURLINS & GIRTS SECTIONS (SHT 2 OF 3)
E14	TANK SHED PURLINS & GIRTS SECTIONS (SHT 3 OF 3)

REV	DESCRIPTION	DATE
A	ISSUED FOR APPROVAL	10/15/2021

ELITE WELDING
19911 HW 550
MONTROSE, CO 81403

DESCRIPTION	TANK SHED -PURLINS & GIRTS 3D VIEW		
PROJECT NAME	THICKENER TANK SHED		
DRAWN BY	EL	JOB No.	DRG No.
DATE DRAWN	10/13/2021	13	E10