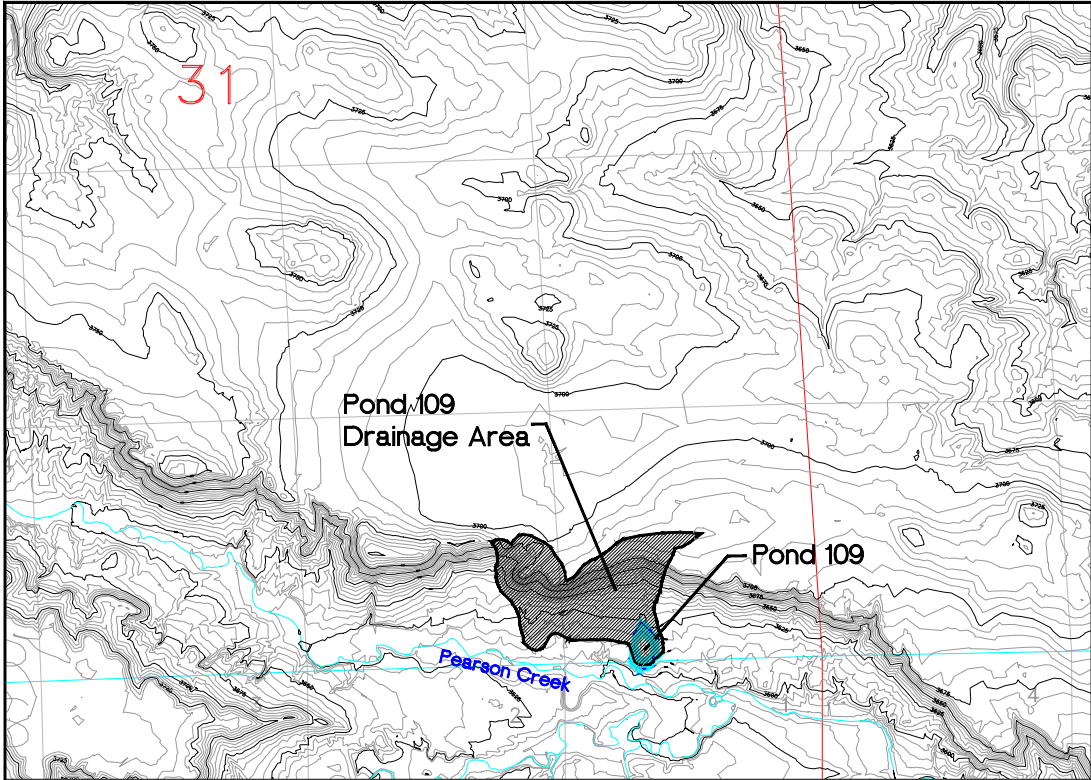
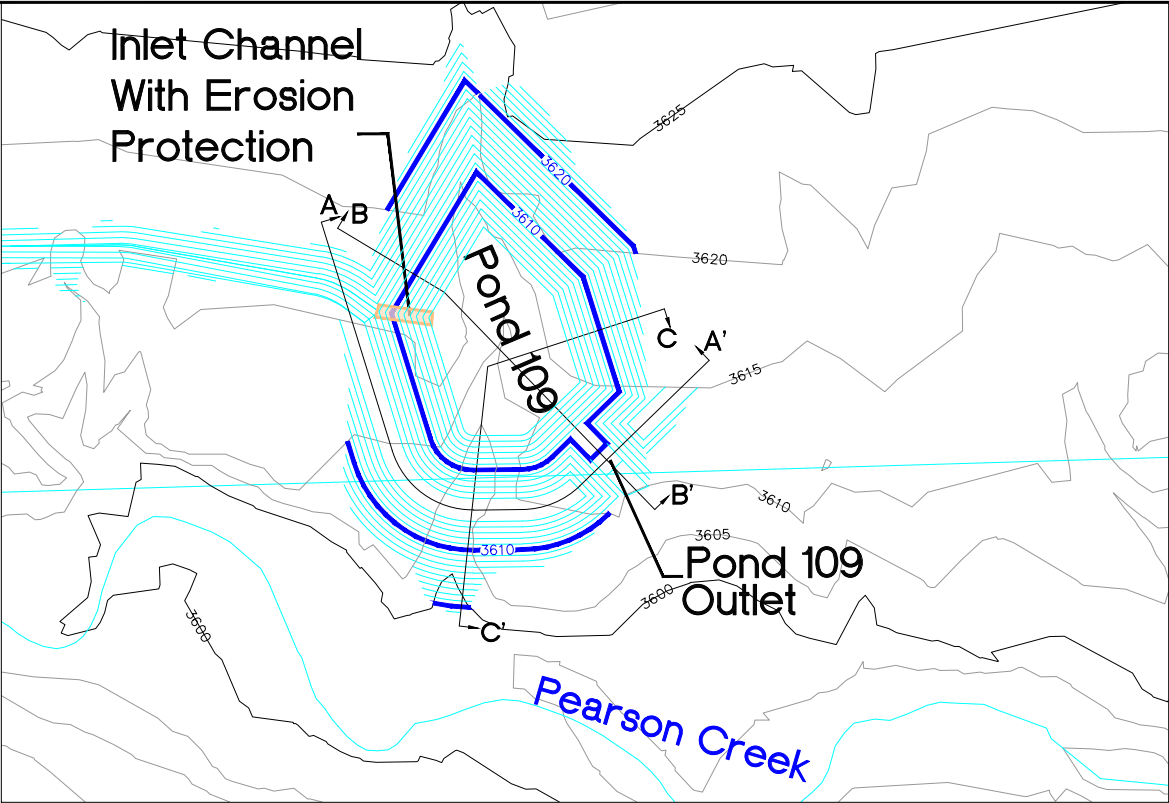




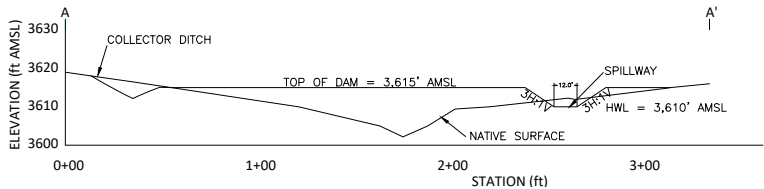
LOCATION MAP

SCALE: 1" = 1,000', C.I. = 5'
POND IS LOCATED IN SESE SECTION 31, T8S, R40E.



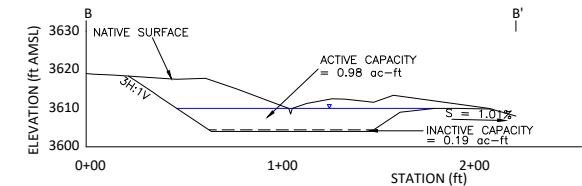
PLAN MAP

SCALE: 1" = 100', POND C.I. = 1', OUTER C.I. = 5'



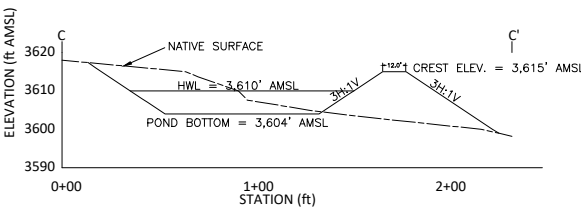
PROFILE A-A'

SCALE: H: 1" = 100'
V: 1" = 50'



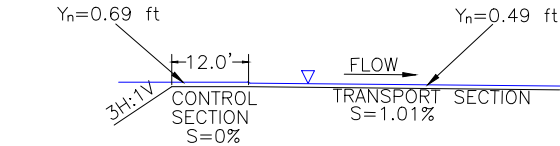
PROFILE B-B'

SCALE: H: 1" = 100'
V: 1" = 50'

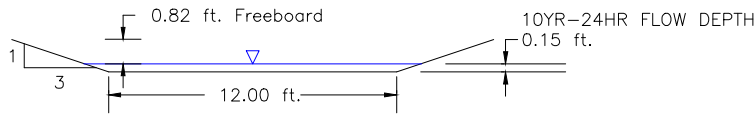


PROFILE C-C'

SCALE: H: 1" = 100'
V: 1" = 50'



EMERGENCY SPILLWAY DETAILS
NOT TO SCALE



Trapezoidal Channel
Equal Side Slopes
Channel Lining: NAG Erosion Control Blanket C350 or Equivalent

INLET CHANNEL AND EROSION PROTECTION
NOT TO SCALE

INLET CHANNEL HYDRAULICS

CHANNEL TYPE = TRAPEZOIDAL, EQUAL SIDE SLOPES
BOTTOM WIDTH = 12 ft
SIDE SLOPES = 3H:1V
MAXIMUM SLOPE = 33% (POND FACE SLOPE)
10YR-24HR PEAK FLOW = 10.30 cfs
CHANNEL LINING = N.A.G. C350 EROSION CONTROL BLANKET (PERMANENT) WITH VEGETATION

RETARDANCE CLASS = C
VEGETATION TYPE = BUNCH TYPE
VEGETATION DENSITY = FAIR (50-75%)
SOIL TYPE = SILT LOAM
VELOCITY = 6.56 ft/s
NORMAL DEPTH = 0.13 ft
MANNING'S N = 0.032
PERMISSABLE SHEAR STRESS = 12.0 lbs/ft²
CALCULATED SHEAR STRESS = 2.63 lbs/ft²

SPILLWAY CONTROL
SECTION HYDRAULICS

$Q = CLH^{3/2}$
 $Q_{25-24} = 18.76 \text{ cfs}$
 $C = 2.75$
 $L = 12 \text{ ft}$
 $H = 0.69 \text{ ft}$
 $V = 2.28 \text{ ft/s}$

SPILLWAY TRANSPORT
SECTION HYDRAULICS

$Q_{25-24} = \frac{1.487}{n} AR^{2/3} S^{1/2}$
 $Q_{25-24} = 18.76 \text{ cfs}$
 $n = 0.03$
 $S = 0.010 \text{ ft/ft}$
 $Z = 3H:1V$
 $b = 12 \text{ ft}$
 $A = 6.57 \text{ ft}^2$
 $WP = 15.08 \text{ ft}$
 $R = 0.44 \text{ ft}$
 $V = 2.86 \text{ ft/s}$
 $Y_n = 0.49 \text{ ft}$

AREA-ELEVATION-CAPACITY TABLE				
ELEVATION (FT AMSL)	AREA (ACRES)	INCREMENTAL CAPACITY (ACRE-FEET)	CUMULATIVE CAPACITY (ACRE-FEET)	USE
3,604.00	0.13		0.00	INACTIVE CAPACITY VOLUME = 0.19 AC-FT. sediment storage
3,605.00	0.15	0.14	0.14	
		0.05		
3,605.34	0.15		0.19	ACTIVE CAPACITY VOLUME = 0.98 AC-FT. 10-YEAR / 24-HOUR RUNOFF VOLUME = 0.85 AC-FT.
		0.11		
3,606.00	0.17		0.29	
		0.18		
3,607.00	0.19		0.47	
		0.21		
3,608.00	0.22		0.68	
		0.23		
3,609.00	0.24		0.91	
		0.26		
3,610.00	0.27		1.17	
HIGH WATER LINE = 3,610.00 FT. AMSL, TOTAL CAPACITY = 1.17 AC-FT.				

POND 109 DRAINAGE AREA DATA

TOTAL DRAINAGE AREA = 9.72 acres
LONGEST WATERCOURSE = 1,521 ft
AVERAGE LAND SLOPE = 24.36%
CURVE NUMBER = 87 (Disturbed Mine Land)
SOILS = Hydrologic Soils Group C
TIME OF CONCENTRATION = 0.10 Hours

RUNOFF ESTIMATE TO POND 109

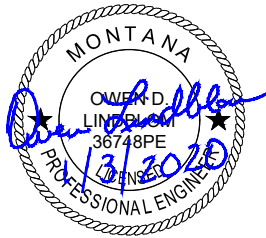
RAINFALL DISTRIBUTION = SCS TYPE II
PRECIPITATION (10YR-24HR) = 2.19 in
PEAK Q (10YR-24HR) = 14.00 cfs
VOLUME (10YR-24HR) = 0.85 ac-ft
DESIGN METHOD = SCS RUNOFF CURVE NUMBER METHOD AND SCS TRIANGULAR HYDROGRAPH METHOD (TRIHIDRO)

POND 109 DESIGN CAPACITY

SEDIMENT CAPACITY (0.02 ac-ft per acre) = 0.19 ac-ft
10YR-24HR RUNOFF VOLUME = 0.85 ac-ft
SURPLUS VOLUME = 0.13 ac-ft
TOTAL DESIGN CAPACITY = 1.17 ac-ft

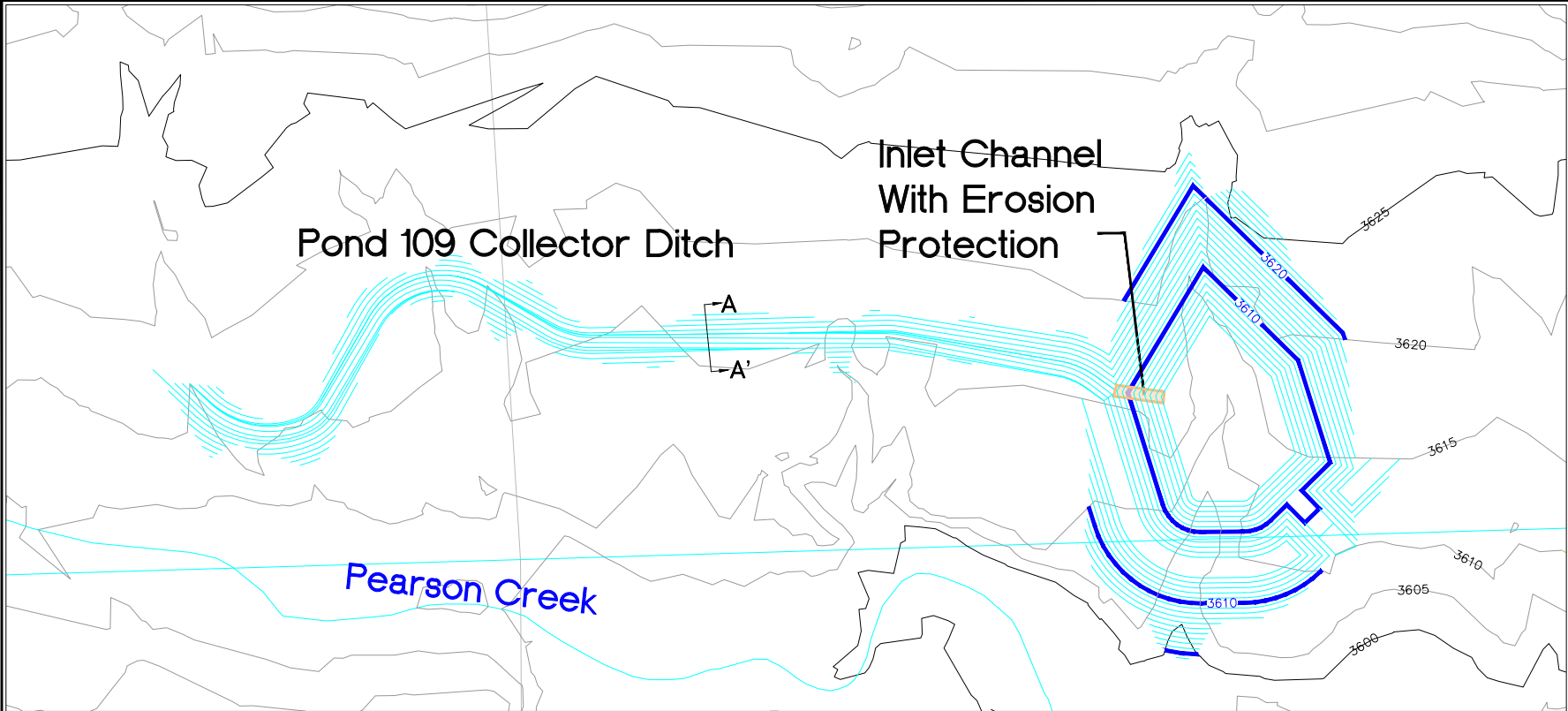
CERTIFICATE OF ENGINEER

I, Owen Lindblom, hereby certify that this map and drawings were prepared by myself or under my direct supervision and that they correctly represent the facilities and conditions described in the accompanying application.



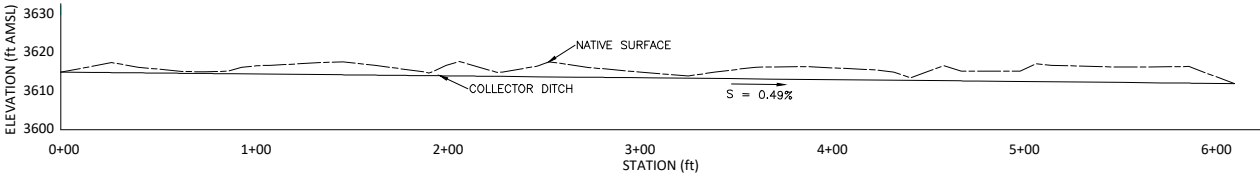
OWEN LINDBLOM, P.E. No. 36748PE

CLOUD PEAK ENERGY		SPRING CREEK MINE P.O. BOX 67, DECKER, MT 59025 PHONE: (406) 757-2581	
DATE	REVISION	Sediment Control Pond 109 Design	
BY			
DESIGN	ODL	DRAWN	ODL
DATE	01/03/2020	SHEET	1 OF 2
SCALE	As Shown	CONTOUR INTERVAL	As Shown
FILE NUMBER	Pond 109.dwg		



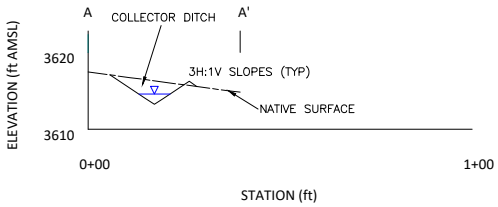
COLLECTOR DITCH PLAN VIEW

SCALE: 1" = 100', POND C.I. = 1', OUTER C.I. = 5'



POND 108 COLLECTOR DITCH PROFILE

SCALE: H: 1" = 100'
V: 1" = 50'



SECTION A-A'

SCALE: H: 1" = 50'
V: 1" = 25'

POND 109 COLLECTOR DITCH

DRAINAGE AREA DATA

TOTAL DRAINAGE AREA = 6.77 acres
LONGEST WATERCOURSE = 1,435 ft
AVERAGE LAND SLOPE = 27.22%
CURVE NUMBER = 87 (Disturbed Mine Land)
SOILS = Hydrologic Soils Group C
TIME OF CONCENTRATION = 0.10 Hours

RUNOFF ESTIMATE TO POND 109

RAINFALL DISTRIBUTION = SCS TYPE II
PRECIPITATION (10YR-24HR) = 2.19 in
PEAK Q (10YR-24HR) = 10.30 cfs
PEAK Q (25YR-24HR) = 13.79 cfs
DESIGN METHOD = SCS RUNOFF CURVE NUMBER METHOD AND SCS TRIANGULAR HYDROGRAPH METHOD (TRIHYDRO)

COLLECTOR DITCH

HYDRAULICS

$$Q_{25-24} = \frac{1.487}{n} AR^{2/3} S^{1/2}$$

$Q_{25-24} = 13.79 \text{ cfs}$ $A = 5.38 \text{ ft}^2$
 $n = 0.03$ $WP = 8.47 \text{ ft}$
 $S = 0.005 \text{ ft/ft}$ $R = 0.64 \text{ ft}$
 $Z = 3H:1V$ $V = 2.56 \text{ ft/s}$
 $b = 0 \text{ ft}$ $Y_n = 1.34 \text{ ft}$



		SPRING CREEK MINE P.O. BOX 67, DECKER, MT 59025 PHONE: (406) 757-2581	
DATE	REVISION	Sediment Control Pond 109 Design	
BY			
DESIGN	ODL	DRAWN	ODL
DATE	01/03/2020	SHEET	2 OF 2
SCALE	As Shown	CONTOUR INTERVAL	As Shown
FILE NUMBER	Pond_109.dwg		