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Southland Resources, Inc.
Searles Mine No. 8, P-3966, R-10
Basin 023 Re-evaluation

10 Year 24 Hour Storm Event

Jared P. Johnsey, P.E.

General Information

Storm Information:

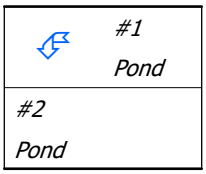
Storm Type:	DRN 58
Design Storm:	10 yr - 24 hr
Rainfall Depth:	6.000 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	96.000%	89.000%
2.0000	95.000%	74.000%
1.0000	92.000%	73.000%
0.5000	90.000%	60.000%
0.3000	88.000%	48.000%
0.2000	85.000%	40.000%
0.1000	74.000%	32.000%
0.0500	55.000%	26.000%
0.0300	44.000%	22.000%
0.0200	37.000%	18.000%
0.0100	28.000%	14.000%
0.0050	21.000%	10.000%
0.0030	15.000%	7.000%
0.0010	6.000%	2.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.104	0.343	Freshwater Impoundment No. 1
Pond	#2	==>	End	0.000	0.000	Basin 023



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	5. Nearly bare and untilled, and alluvial valley fans	13.91	195.50	1,405.00	3.73	0.104
#1	**Muskingum K:**					**0.104**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	1.300	1.300	2.04	0.65	0.0	0	0.00	0.00
	Out			1.03	0.65	0.0	0	0.00	0.00
#2	In	440.000	441.300	194.71	76.55	12,908.0	310,803	208.58	77.51
	Out			179.39	76.23	1,486.3	42,505	0.07	0.00

Particle Size Distribution(s) at Each Structure

Structure #1 (Freshwater Impoundment No. 1):

Size (mm)	In	Out
3.0000	96.000%	100.000%
2.0000	95.000%	100.000%
1.0000	92.000%	100.000%
0.5000	90.000%	100.000%
0.3000	88.000%	100.000%
0.2000	85.000%	100.000%
0.1000	74.000%	100.000%
0.0500	55.000%	100.000%
0.0300	44.000%	100.000%
0.0200	37.000%	100.000%
0.0100	28.000%	100.000%
0.0050	21.000%	100.000%
0.0030	15.000%	100.000%
0.0010	6.000%	100.000%
0.0001	0.000%	0.000%

Structure #2:

Size (mm)	In	Out
3.0000	94.219%	100.000%
2.0000	78.454%	100.000%
1.0000	77.403%	100.000%
0.5000	63.740%	100.000%
0.3000	51.128%	100.000%
0.2000	42.720%	100.000%
0.1000	34.289%	100.000%
0.0500	27.952%	100.000%
0.0300	23.710%	100.000%
0.0200	19.410%	100.000%
0.0100	15.088%	100.000%
0.0050	10.788%	93.692%
0.0030	7.555%	65.613%
0.0010	2.177%	18.908%

Size (mm)	In	Out
0.0001	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Freshwater Impoundment No. 1

Pond Inputs:

Initial Pool Elev:	628.00 ft
Initial Pool:	2.33 ac-ft
*Sediment Storage:	7.43 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0240	628.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0240	628.00	0.90	0.00

Pond Results:

Peak Elevation:	628.14 ft
H'graph Detention Time:	1.68 hrs
Pond Model:	CSTRS
Dewater Time:	0.71 days
Trap Efficiency:	98.96 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
625.99	1.110	0.000	0.000		Top of Sed. Storage
626.00	1.110	0.007	0.000		
626.50	1.135	0.568	0.000		
627.00	1.159	1.142	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
627.50	1.185	1.728	0.000		
628.00	1.210	2.326	0.000		Spillway #1 Spillway #2
628.10	1.215	2.448	0.896	15.75	
628.14	1.217	2.491	1.029	1.35	Peak Stage
628.50	1.235	2.938	2.402		
629.00	1.260	3.561	3.610		
629.50	1.285	4.197	6.059		
630.00	1.310	4.846	7.080		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
625.99	0.000	0.000	0.000
626.00	0.000	0.000	0.000
626.50	0.000	0.000	0.000
627.00	0.000	0.000	0.000
627.50	0.000	0.000	0.000
628.00	0.000	0.000	0.000
628.10	(2)>0.448	(2)>0.448	0.896
628.50	(1)>1.201	(1)>1.201	2.402
629.00	(1)>1.805	(1)>1.805	3.610
629.50	(5)>3.029	(5)>3.029	6.059
630.00	(6)>3.540	(6)>3.540	7.080

Structure #2 (Pond)

Basin 023

Pond Inputs:

Initial Pool Elev:	434.50 ft
Initial Pool:	1.61 ac-ft
*Sediment Storage:	12.91 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
437.50	20.00	2.00:1	2.00:1	10.00

Fixed Siphon

Crest Elev	Inlet Elev	Outlet Elev	Diameter (in)	Length (ft)	Manning's n
437.00	434.50	425.00	6.00	75.00	0.0130

Pond Results:

Peak Elevation:	440.29 ft
H'graph Detention Time:	2.69 hrs
Pond Model:	CSTRS
Dewater Time:	1.62 days
Trap Efficiency:	88.49 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
433.50	1.575	0.000	0.000		Top of Sed. Storage
434.00	1.600	0.792	0.000		
434.50	1.654	1.606	0.000		
435.00	1.708	2.446	2.954	3.44*	
435.50	1.764	3.314	3.030	3.47*	
436.00	1.820	4.210	3.105	3.49*	
436.50	1.862	5.130	3.179	3.50*	
437.00	1.904	6.071	3.250	3.50*	Spillway #2
437.50	1.947	7.034	3.321	3.70	Spillway #1
438.00	1.990	8.018	5.221	4.10	
438.50	2.032	9.024	28.941	2.10	
439.00	2.074	10.050	57.430	8.00	
439.50	2.117	11.098	96.626	1.85	
440.00	2.160	12.167	145.627	1.00	
440.29	2.184	12.790	179.386	0.70	Peak Stage
440.50	2.202	13.257	204.691		
441.00	2.244	14.369	274.146		
441.50	2.287	15.502	354.352		
442.00	2.330	16.656	445.678		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Fixed Siphon (cfs)	Combined Total Discharge (cfs)
433.50	0.000	0.000	0.000
434.00	0.000	0.000	0.000
434.50	0.000	0.000	0.000
435.00	0.000	2.954*	2.954
435.50	0.000	3.030*	3.030
436.00	0.000	3.105*	3.105
436.50	0.000	3.179*	3.179
437.00	0.000	3.250	3.250
437.50	0.000	3.321	3.321
438.00	1.830	3.390	5.221
438.50	25.483	3.458	28.941
439.00	53.905	3.525	57.430
439.50	93.036	3.591	96.626
440.00	141.972	3.656	145.627
440.50	200.972	3.720	204.691
441.00	270.364	3.782	274.146
441.50	350.507	3.844	354.352
442.00	441.772	3.905	445.678

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.300	0.010	0.000	0.000	100.000	F	2.04	0.649
	Σ	**1.300**						**2.04**	**0.649**
#2	1	117.000	0.370	0.000	0.000	81.000	F	137.30	35.603
	2	21.400	0.300	0.319	0.361	74.000	M	17.62	4.539
	3	299.900	0.800	0.405	0.231	62.000	S	87.47	34.910
	4	1.700	0.010	0.000	0.000	100.000	F	2.67	0.849
	Σ	**441.300**						**194.71**	**76.551**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.001	200.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**0.0**	**0**	**0.00**	**0.00**
#2	1	0.240	200.00	20.00	0.9000	1.0000	2	12,820.2	394,616	265.74	158.11
	2	0.240	200.00	15.00	0.0500	1.0000	2	55.3	15,517	10.22	5.87
	3	0.320	400.00	20.00	0.0030	1.0000	1	80.3	2,623	1.07	0.69
	4	0.001	400.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**12,908.0**	**310,803**	**208.58**	**77.51**

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Southland Resources, Inc.
Searles Mine No. 8, P-3966, R-10
Basin 023 Re-evaluation

25 Year 6 Hour Storm Event

Jared P. Johnsey, P.E.

General Information

Storm Information:

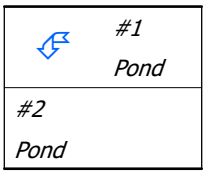
Storm Type:	SCS-6
Design Storm:	25 yr - 6 hr
Rainfall Depth:	5.100 inches

Particle Size Distribution:

Size (mm)	Topsoil	Spoil
3.0000	96.000%	89.000%
2.0000	95.000%	74.000%
1.0000	92.000%	73.000%
0.5000	90.000%	60.000%
0.3000	88.000%	48.000%
0.2000	85.000%	40.000%
0.1000	74.000%	32.000%
0.0500	55.000%	26.000%
0.0300	44.000%	22.000%
0.0200	37.000%	18.000%
0.0100	28.000%	14.000%
0.0050	21.000%	10.000%
0.0030	15.000%	7.000%
0.0010	6.000%	2.000%
0.0001	0.000%	0.000%

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.104	0.343	Freshwater Impoundment No. 1
Pond	#2	==>	End	0.000	0.000	Basin 023



Structure Routing Details:

Stru #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	5. Nearly bare and untilled, and alluvial valley fans	13.91	195.50	1,405.00	3.73	0.104
#1	**Muskingum K:**					**0.104**

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc. (ml/l)	24VW (ml/l)
#1	In	1.300	1.300	7.19	0.55	0.0	0	0.00	0.00
	Out			1.49	0.55	0.0	0	0.00	0.00
#2	In	440.000	441.300	395.55	57.99	19,878.2	569,222	372.09	137.80
	Out			262.28	61.85	2,896.8	97,311	1.05	0.49

Particle Size Distribution(s) at Each Structure

Structure #1 (Freshwater Impoundment No. 1):

Size (mm)	In	Out
3.0000	96.000%	100.000%
2.0000	95.000%	100.000%
1.0000	92.000%	100.000%
0.5000	90.000%	100.000%
0.3000	88.000%	100.000%
0.2000	85.000%	100.000%
0.1000	74.000%	100.000%
0.0500	55.000%	100.000%
0.0300	44.000%	100.000%
0.0200	37.000%	100.000%
0.0100	28.000%	100.000%
0.0050	21.000%	100.000%
0.0030	15.000%	100.000%
0.0010	6.000%	100.000%
0.0001	0.000%	0.000%

Structure #2:

Size (mm)	In	Out
3.0000	100.000%	100.000%
2.0000	89.390%	100.000%
1.0000	88.187%	100.000%
0.5000	72.553%	100.000%
0.3000	58.122%	100.000%
0.2000	48.501%	100.000%
0.1000	38.881%	100.000%
0.0500	31.665%	100.000%
0.0300	26.855%	100.000%
0.0200	22.044%	100.000%
0.0100	17.219%	100.000%
0.0050	12.325%	84.579%
0.0030	8.631%	59.229%
0.0010	2.486%	17.058%

Size (mm)	In	Out
0.0001	0.000%	0.000%

Structure Detail:

Structure #1 (Pond)

Freshwater Impoundment No. 1

Pond Inputs:

Initial Pool Elev:	628.00 ft
Initial Pool:	2.33 ac-ft
*Sediment Storage:	7.43 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0240	628.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
12.00	40.00	2.00	0.0240	628.00	0.90	0.00

Pond Results:

Peak Elevation:	628.26 ft
H'graph Detention Time:	2.08 hrs
Pond Model:	CSTRS
Dewater Time:	0.49 days
Trap Efficiency:	98.36 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
625.99	1.110	0.000	0.000		Top of Sed. Storage
626.00	1.110	0.007	0.000		
626.50	1.135	0.568	0.000		
627.00	1.159	1.142	0.000		

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
627.50	1.185	1.728	0.000		
628.00	1.210	2.326	0.000		Spillway #1 Spillway #2
628.10	1.215	2.448	0.896	8.50	
628.26	1.223	2.642	1.494	3.30	Peak Stage
628.50	1.235	2.938	2.402		
629.00	1.260	3.561	3.610		
629.50	1.285	4.197	6.059		
630.00	1.310	4.846	7.080		

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
625.99	0.000	0.000	0.000
626.00	0.000	0.000	0.000
626.50	0.000	0.000	0.000
627.00	0.000	0.000	0.000
627.50	0.000	0.000	0.000
628.00	0.000	0.000	0.000
628.10	(2)>0.448	(2)>0.448	0.896
628.50	(1)>1.201	(1)>1.201	2.402
629.00	(1)>1.805	(1)>1.805	3.610
629.50	(5)>3.029	(5)>3.029	6.059
630.00	(6)>3.540	(6)>3.540	7.080

Structure #2 (Pond)

Basin 023

Pond Inputs:

Initial Pool Elev:	434.50 ft
Initial Pool:	1.61 ac-ft
*Sediment Storage:	12.91 ac-ft
Dead Space:	20.00 %

**Sediment capacity was entered by user*

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
437.50	20.00	2.00:1	2.00:1	10.00

Fixed Siphon

Crest Elev	Inlet Elev	Outlet Elev	Diameter (in)	Length (ft)	Manning's n
437.00	434.50	425.00	6.00	75.00	0.0130

Pond Results:

Peak Elevation:	440.91 ft
H'graph Detention Time:	4.77 hrs
Pond Model:	CSTRS
Dewater Time:	1.35 days
Trap Efficiency:	85.43 %

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
433.50	1.575	0.000	0.000		Top of Sed. Storage
434.00	1.600	0.792	0.000		
434.50	1.654	1.606	0.000		
435.00	1.708	2.446	2.954	3.44*	
435.50	1.764	3.314	3.030	3.47*	
436.00	1.820	4.210	3.105	3.49*	
436.50	1.862	5.130	3.179	3.50*	
437.00	1.904	6.071	3.250	3.50*	Spillway #2
437.50	1.947	7.034	3.321	3.55	Spillway #1
438.00	1.990	8.018	5.221	3.95	
438.50	2.032	9.024	28.941	3.30	
439.00	2.074	10.050	57.430	0.95	
439.50	2.117	11.098	96.626	0.95	
440.00	2.160	12.167	145.627	0.65	
440.50	2.202	13.257	204.691	0.80	
440.91	2.237	14.179	262.279	0.75	Peak Stage
441.00	2.244	14.369	274.146		
441.50	2.287	15.502	354.352		
442.00	2.330	16.656	445.678		

**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Fixed Siphon (cfs)	Combined Total Discharge (cfs)
433.50	0.000	0.000	0.000
434.00	0.000	0.000	0.000
434.50	0.000	0.000	0.000
435.00	0.000	2.954*	2.954
435.50	0.000	3.030*	3.030
436.00	0.000	3.105*	3.105
436.50	0.000	3.179*	3.179
437.00	0.000	3.250	3.250
437.50	0.000	3.321	3.321
438.00	1.830	3.390	5.221
438.50	25.483	3.458	28.941
439.00	53.905	3.525	57.430
439.50	93.036	3.591	96.626
440.00	141.972	3.656	145.627
440.50	200.972	3.720	204.691
441.00	270.364	3.782	274.146
441.50	350.507	3.844	354.352
442.00	441.772	3.905	445.678

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1.300	0.010	0.000	0.000	100.000	F	7.19	0.551
	Σ	**1.300**						**7.19**	**0.551**
#2	1	117.000	0.370	0.000	0.000	81.000	F	376.96	28.179
	2	21.400	0.300	0.319	0.361	74.000	M	45.42	3.483
	3	299.900	0.800	0.405	0.231	62.000	S	126.45	25.057
	4	1.700	0.010	0.000	0.000	100.000	F	9.40	0.721
	Σ	**441.300**						**395.55**	**57.991**

Subwatershed Sedimentology Detail:

Stru #	SWS #	Soil K	L (ft)	S (%)	C	P	PS #	Sediment (tons)	Peak Sediment Conc. (mg/l)	Peak Settleable Conc (ml/l)	24VW (ml/l)
#1	1	0.001	200.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**0.0**	**0**	**0.00**	**0.00**
#2	1	0.240	200.00	20.00	0.9000	1.0000	2	19,799.2	588,662	386.24	274.14
	2	0.240	200.00	15.00	0.0500	1.0000	2	81.0	25,369	16.09	10.76
	3	0.320	400.00	20.00	0.0030	1.0000	1	82.0	3,265	0.58	0.43
	4	0.001	400.00	0.01	0.0001	1.0000	1	0.0	0	0.00	0.00
	Σ							**19,878.2**	**569,222**	**372.09**	**137.80**