VOLUME II

LIST OF EXHIBITS - CONTINUED

VOLUME II-E

LIST OF EXHIBITS - CONTINUED

- Barricade Chamber Access Escape Shaft
- 10-Right Dewatering Boreholes 1 and 2
- Substation No. 11 (NMD) Power-Drop Borehole
- NW Mains Ventilation Shaft and Borehole
- 6-Main North Ventilation/Escape Shaft and associated utility boreholes (7)
- EMD Ventilation/Escape Shafts (2, sealed in late 2009)
- 18-Right Ventilation/Escape Shaft (sealed in late 2009)
- 18-Left Ventilation Intake and Return Shafts and associated utility boreholes
- 19-Right Mine Dewatering Borehole
- 16-Left Utility Borehole
- 17-Left Cement (WMD Stabilization) Borehole (sealed in 2013)
- 15-Left Ventilation Shaft (permitted, pad constructed. Shaft and Rock dust tank installation withdrawn)
- 5-Main North Borehole
- 10-East Emergency Borehole (permitted but not completed)
- SWMD Thickener Underflow Borehole
- Sandstone Sub Thickener Underflow Borehole
- SWMD and WMD Thickener Underflow boreholes (2)
- 7-East Cross Entries Cement Borehole

As shown on Figure EX49EE-F1, TC has identified two potential borehole locations, although only one location will ultimately be developed and completed. The drill pad size would be the same, regardless of location, and TC will permit and bond for the maximum road disturbance. Road and pad construction will involve placement of construction sediment controls, soil recovery, installation of drainage features, any necessary cut/fill work to establish the road profile and pad, and placement and compaction of approximately 3 inches of suitable road-base materials and 8 inches of pit-run gravel for the road, and gravel surfacing on the pad. The 24-foot wide road surface will be graded and crowned to promote effective drainage. The total road disturbance will be approximately 1.6 acres, and the maximum pad disturbance (including cut/fill slopes and diversion ditches) will be approximately 2.3 acres.

The proposed pad and road locations are on a low-gradient sidehill, so upgradient drainage will be limited. The limited amount of drainage from upgradient areas will be routed under the road through culverts or intercepted and routed around the borehole pad by a small perimeter diversion ditch on the east, south, and west sides of the pad, utilizing small rock-lined sediment traps to control discharge and sediment. Drainage from the borehole pad areas will be controlled under a Small-Area Exemption, with gravel surfacing on the pad and road to control runoff and sediment, stabilization of cut/fill areas with temporary revegetation seeding, control of runoff from outslope areas for the original by the perimeter ditch and sediment traps, and control of drainage from the new pad by the existing down-gradient control features (wattles of equivalent). Drainage designs for the culverts and diversion ditch are provided in Exhibit EX49EE.

Borehole completion will involve drilling, installing, and grouting steel surface casing in place to a maximum depth of approximately 60 feet (dependent on the ground conditions encountered). The boreholes will then be advanced, to depth to intercept the Wolf Creek mine workings (original boreholes) and Wadge mine workings (additional boreholes). Water, drilling fluids, and cuttings will be contained within one or more excavated pits or portable steel tanks (porta-pits) on the borehole pad. For the original boreholes, the surface casing for the larger utility borehole will be 32-inches in diameter. If dry, this borehole will be drilled to 22-inches and cased to 16-inches, or if wet, 30-inches and cased to 24-inches. The surface casing for the smaller utility borehole will be 24-inches. The smaller utility borehole will be drilled to 22-inches and cased to 16-inches if wet. If dry, this borehole will be drilled to 13.75-inches. A 6.675-inch and 3.5-inch carrier pipe will be placed and grouted in either the 16-inch casing (wet) or 13.75-inch (dry) borehole. The larger carrier pipe may be used for grouting, material transfer, or other utility needs. The smaller carrier pipe may be used as a power drop or for a communications line(s). The two additional boreholes will be drilled to a maximum diameter of 18-inches and a maximum depth of 990-feet and cased to a maximum diameter of 14-inches.

Power to the 9-East Utility Borehole Installation will be provided by a branch-line from the existing nearby powerline, extending from 990 to 1,700 feet, depending on which pad location is selected. Powerline construction will require placement of from 14 to 34 power-poles, dependent on which pad location is selected and power-pole spacing (50 to 75 feet). A switch and transformer on the Yampa valley Electric line at the connection with the branch-line, and a drop-line at the pad location will provide power to the portable skid-mounted exhauster units on the original pad and up to two wheel-mounted exhausters on the new boreholes. Power for the two additional boreholes will be provided by a drop-line on the existing pad and by a short (approximately 500-foot w/a maximum of two poles) extension from the existing line for the new pad. The 9-East Utility Borehole Installation will remain in place until it is no longer needed to support ongoing operations (estimated life of approximately 3-years) and will then be reclaimed. Reclamation will involve plugging and sealing the boreholes, removing the powerline, re-grading the pads and road, drainage reestablishment, soil material replacement, and reseeding.

7 East Cross Entries Cement Borehole (TR21-97)

In 2019 the 7 east cross entries were mined by the continuous miner in order to increase the rate of development of the 7 East entries and allow two continuous miner sections to be mining simultaneously. In 2022 the long wall will mine through the 7 East cross entries. For the safety of the mine and to protect the long wall equipment TC will fill the cross entries with cement grout that is similar in strength and hardness to that of the coal seam. In order to pump grout in to the cross entries a borehole from the surface will be drilled. The borehole pad site will be located off the 6MN road. For access to the pad site TC will use an existing ranch road that is located across from the 10Right well house site. TC will do improvements to the road to make it stable for large truck traffic. In addition to the ranch road TC will construct an additional 2800 feet of new road to access the pad. The total length of the access road is approximately 6,300. The pad

site will be approximately 450’ x 450’ and approximately 12” of topsoil will be salvaged, seeded and stockpiled adjacent to the pad location to be used for reclamation. Refer to Exhibit 49FF.

Borehole completion will involve drilling, installing, and grouting steel surface casing in place to a maximum depth of approximately 60 feet (dependent on the ground conditions encountered) The borehole will be drilled to a depth of 1400 feet into the 7 East entries. The borehole will be 12 inches in diameter and house an 8 5/8 diameter casing. Water, drilling fluids, and cuttings will be contained within one or more excavated pits located on the pad site.

Due to the large volume of cement needed to fill the entries and to be able to pump the cement continuously a cement batch plant will be set up on the pad site. The cement grout will be pumped directly into the borehole on the pad site into the 7 East cross entries.

The pad location is relatively flat and therefore minimal diversion water is expected. Diversion ditches will be placed on the upslope sides of the pad to control any runoff water. The ditches will then be filtered with rock check dams at the ends and vegetation throughout the ditch.

criteria for a Small Area Exemption, the proposed drainage control measures should be effective in controlling runoff and sedimentation, and construction of full-scale drainage and sediment control structures is neither needed nor justified.

10-East Emergency Air Borehole (MR15-289) – The existing access road, temporary site access, and proposed pad are located on adjacent minor ridgelines, and will have minimal impact relative to runoff and sediment contributions. Upgradient drainage will be limited, and the road will not cross any natural drainages so no culverts will be required. Site drainage will be effectively controlled under a Small Area Exemption by diverting any limited upgradient drainage around the pad area with a small upgradient interceptor ditch and temporary revegetation of the pad surface and associated cut/fill areas. The interceptor ditch will drain through a rock-lined sediment trap to the adjacent drainage to the west. As a very limited disturbance area (approximately 1.5 acres for the pad disturbance) the disturbance area meets the applicable criteria for a Small Area Exemption, the proposed drainage control measures should be effective in controlling runoff and sedimentation, and construction of full-scale drainage and sediment control structures is neither needed nor justified.

13-Left Outby Utility Borehole (MR15-291) – Given the limited disturbance areas, the location of the road and pad on a low-gradient sidehill, and the very temporary nature of the planned disturbance, the 13LT Outby Utility Borehole pad, and associated road will have minimal impact relative to runoff and sediment contributions. The limited amount of drainage from upgradient areas will be intercepted and routed around the borehole pad by a small upgradient diversion ditch on the southwest and northwest sides of the pad. The existing ranch road crosses a small ephemeral drainage, and the existing culvert will remain in-place. The culvert installation will be evaluated relative to condition and cover to carry the anticipated truck traffic, the culvert will be replaced or extended as necessary, and adequate cover will be placed to carry the anticipated loads, without crushing the culvert. Drainage from the borehole pad area will be controlled under a Small-Area Exemption, with gravel surfacing on the pad and road to control runoff and sediment and placement of rigid sediment filter material on the northeast side of the pad area. The upgradient diversion ditches will drain through rock sediment basins to the undisturbed adjacent lands, and pad cut/fill areas will be stabilized with temporary revegetation seeding. As a very limited disturbance area (approximately 1.0 acres for the pad and road, of which 2.4 acres is road) the disturbance areas meet the applicable criteria for a Small Area Exemption, the proposed drainage control measures should be effective in controlling runoff and sedimentation, and construction of full-scale drainage and sediment control structures is neither needed nor justified.

9-East Utility Borehole Installation (MR16-296) – The 9-East Utility Borehole Installation will involve limited surface disturbance for the required pad and light-use road and will remain in-place for a limited time (estimated life of 3-years). With limited run-on from the small upgradient drainage area, which will be conveyed under the road through a series of culverts or diverted around the pad by a perimeter ditch with rock-lined sediment traps, and a limited disturbance area, site drainage control will be addressed through a Small Area Exemption. Runoff and sediment from the pad and road will be effectively controlled through the use of gravel surfacing, revegetation of cut/fill areas, and downgradient sediment control for the soil stockpiles. With a limited disturbance area (approximately 2.1 acres for the pad and 1.6 acres for the road) the disturbance areas meet the applicable criteria for a Small Area Exemption, the proposed drainage control measures should be effective in controlling runoff and sedimentation, and construction of full-scale drainage and sediment control structures is neither needed nor justified.

7 East Cross Entries Borehole (TR21-97) The 7East Borehole pad and access road will involve the construction of the pad site and short access road which will only be used for a limited time while the cement grout is being pumped underground. With limited run-off from the small upgradient drainage area, which will be conveyed around the pad by a perimeter ditch with rock-lined sediment traps, and a limited disturbance area, site drainage control will be addressed through a Small Area Exemption. Runoff and sediment from the pad and road will be effectively controlled through the use of gravel surfacing, revegetation of cut/fill areas, and downgradient sediment control for the soil stockpiles. With a limited disturbance area (approximately 4.65 acres for the pad) the disturbance areas meet the applicable criteria for a Small Area Exemption, the proposed drainage control measures should be effective in controlling runoff and sedimentation, and construction of full-scale drainage and sediment control structures is neither needed nor justified.

Field Geotechnical Investigations – TC occasionally conducts field geotechnical investigations prior to, and as the basis for, design and construction of engineered structures. Geotechnical investigations typically involve shallow soil borings (up to 30 feet) using a hollow-stem auger, and/or excavation of shallow (up to 15 feet) test pits. For both soils borings and test pits, surface disturbance is minimal (no more than 10 x 10 feet for boreholes, and 10 x 15 feet for test pits) and both disturbance and subsequent stabilization occur within a timeframe of less than one day for each site (typically

test pit excavation/soils boring, and backfilling and leveling of the resultant small area/auger-hole, occurs in a continuous sequence within the course of less than two hours for each location). The geotechnical investigation activities do not involve the use of water and are conducted under dry conditions, so the potential for related hydrologic impacts is negligible. All geotechnical disturbance is reseeded by broadcast seeding within 6-months of disturbance, although natural revegetation typically occurs much sooner due to the limited timeframe and extent of the associated disturbance. Occasionally perforated PVC pipe may be inserted in a completed borehole, and the remainder of the hole backfilled with clean gravel, as a temporary piezometer installation to measure any fluctuation in water-levels. This type of piezometer installation is normally very temporary (typically used less

salvaged and placed in stockpile for future use in reclaiming the site. A temporary soil stockpile(s) will be established on the northwest side of the pad area. The natural vegetative materials incorporated into the soil, and seeding with the topsoil stockpile stabilization seed mixture, will stabilize and protect the stockpiled soil materials. Soil salvage volumes are indicated on Table 49A.

9-East Utility Borehole Installation (MR16-296) - Light-use road and pad construction for the 9-East Utility Borehole Installation will involve removal of any large vegetation and stripping and stockpiling of other vegetation, soil, and organic materials. The road and pad are located on a low-gradient sidehill, with a pad area of approximately 2.1 acres, and a road corridor of approximately 1.6 acre. TC will recover and salvage up to 2 feet of soil from the road and pad areas, resulting in recovery and stockpiling of a maximum volume of approximately 11,880 cubic yards of soil material for future use in reclaiming the site. Note that, based on available soil mapping information and descriptions, soil depths in the project area vary, but may be up to 38-inches in thickness. TC proposes to recover up to 24-inches of soil, both in order to minimize site disturbance and because replacement of 24-inches of soil material is more than adequate to support effective revegetation efforts in this area. Temporary soil stockpiles will be established at reasonable intervals along the road and adjacent to the pad area. The natural vegetative materials incorporated into the soil, and seeding with the topsoil stockpile stabilization seed mixture, will stabilize and protect the stockpiled soil materials. Soil salvage volumes are indicated on Table 49A.

7 East Cross Entries Borehole (TR21-97) - Access road and pad constructions for the 7 East Cross entries borehole will involve removing the vegetation and stripping and stockpiling the topsoil. The access road and the pad are located on minimal sloping ground therefore very little earthwork will be required. The pad site will be approximately 450' X 450' for an area of ~4.65 acres. The access road will be a total of 6,300 feet and 30 feet wide for a total area of disturbance equal to 4.34 acres. 3,500 feet of the access road is an existing ranch road that will be improved for truck traffic. TC will recover and salvage 12 inches of topsoil for an approximately volume of 7,500 cubic yards. Soil salvage volumes are indicated on Table 49A.

TABLE 49A
Soil Stockpile Summary

STOCKPILE ID	CURRENT VOLUME (CY)	VOLUME TO BE ADDED (CY)	TOTAL VOLUME (CY)
FCB-1	7,400	0	7,400
FCB-2	350	0	350
FCB-3	150	0	150
FCVF-1	350	0	350
SSS-1	2,000	0	2,000
RDT-1	800	0	800
WWTF-1	4,000	0	4,000
SF-1	54,850	0	54,850
SF-2	55,850	0	55,850
SF-3	109,400	300	109,700
SF-4	3,650	0	3,650
SF-5	700	1,450	2,150
SF-6	152,750	450	153,200
SF-7	38,700	0	38,700
SF-8	4,100	0	4,100
SF-9	5,800	0	5,800
SF-10	350	0	350
SF-11	100	0	100
SPSP-1	6,300	100	6,400
SPSP-2	4,150	0	4,150
SF-12,13,14 (1)	20,000	0	20,000
SF-15	0	800	800
SF-16	0	2,200	2,200
SF-17	0	900	900
CRDA-S1 and S2	131,800	185,400(2)	317,200(2)
TOTAL	603,550	191,600	795,150
EASTERN AND NORTHERN MINING DISTRICTS			
10RT Dewatering Borehole	7,200	250	7,450
10RT Dewatering Treatment Pond (includes access road)	0	6,300	6,300
EMD Ventilation Site	4,750	0	4,750
7 North Escape Shaft	2,200	0	2,200
MC Shop to FC Tipple	12,800	0	12,800
NMD Power Borehole & Road	0	5,700	5,700
Ventilation Shaft & Road	0	2,550	2,550
18RT Shaft & Road(3)	0	6,600	6,600
6MN Shaft, Road, & Reservoir(4)	0	23,700	23,700
19RT Borehole/Pipeline	0	6,050	6,050
5MN Cement Borehole	0	6,550	6,550
TOTAL	26,950	57,700	84,650
WESTERN MINING DISTRICT			
18Lft Shaft & Road	0	13,550	13,550
WMD Stab. Borehole	0	2,600	2,600
17LT Rockdust Install.	0	4,000	4,000
15LT Vent Shaft	0	5,600	5,600
16LT Utility Borehole	0	10,900	10,900
13LT Utility Borehole	0	8,230	8,230
TOTAL	0	44,880	44,880
WOLF CREEK RESERVE			
9E and 10E Boreholes	0	13,780	13,780
7 East Cross Entries	0	7,500	7,500
TOTAL	0	21,280	21,280

(1) Soil from Stockpiles SF-12 and 13 has been relocated to Stockpiles CRDA – S1 and S2
(2) For CRDA S1 and S2, the volume to be added will be direct handled or placed in a future stockpile(s)
(3) The volume listed for the 18RT Shaft/Roads is split among four stockpiles, roughly 40/30/15/15 percent beginning at the shaft pad and running back along the access road to the stock-pond location. Locations are shown on Map 29.
(4) The volume listed for the 6MN Shaft, Roads, and Reservoir is split among four stockpiles, roughly 40/30/15/15 percent, beginning at the shaft pad stockpile and running back along the access road to the NW Mains Vent Shaft. Locations are shown on Map 29.

EXHIBIT 6M

NW Mains Vent Shaft

and

7E CE Borehole Pad (TR21-97)

Cultural Resources (CONFIDENTIAL APPENDIX)

EXHIBIT 49FF

7 EAST CROSS ENTRIES BOREHOLE

DESIGN INFORMATION (TR21-97)