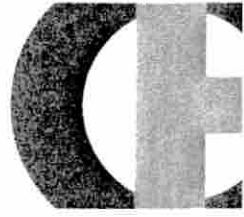


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January 11, 2008

Cindy Megerdigian, P.E.
Senior Engineer
El Dorado Irrigation District
2890 Mosquito Road
Placerville, CA 95667

CARLTON
Engineering Inc.



Re. FERC Project 184, EID Mill Creek to Bull Creek Tunnel
October 2007 Groundwater Inflow Inspection

Dear Ms. Megerdigian,

On August 27, 2007, Carlton Engineering, Inc. (Carlton) was requested by the El Dorado Irrigation District (District) to conduct an inspection of the Mill to Bull Tunnel regarding the effectiveness of groundwater seepage correction measures as described in Condition 65 of the 2006 FERC Relicensing Agreement, and to prepare a summary report documenting the observations. Carlton conducted the tunnel inspection on October 18, 2007 and this report presents the findings of the inspection. The inspection was conducted about two weeks after the canal system shut-down for annual system maintenance and construction.

The inspection included observation and flow rate assessment of tunnel inflow seepage sources identified in the MWH Groundwater Management Plan (Plan) dated September 15, 2003 as well as observation of additional seepage not reported in that Plan. The Plan was prepared for the District in response to the U.S. Forest Service proposal for conditioning the FERC Project License Amendment under Section 4(e) of the Federal Power Act (final 4 (e) conditions, condition No. 13- Groundwater), and considered comments from the US Forest Service received through 2003. The Plan reported approximately 35 rock shear zones that were identified during tunnel construction, with observed seepage ranging from numerous small seeps totaling 1 to 2 gallons per minute, to flows of approximately 10 gallons per minute. Corrective measures including shotcrete lining and steel sets/supports with shotcrete lining were implemented during tunnel construction to limit the water inflow and provide support in weak rock zones encountered in the tunnel as well as to provide erosion protection. The Plan reports lining and support work in 18 locations/segments where seeps and rock shears were encountered.

October 2007 Mill Creek to Bull Creek Tunnel Inspection

This year's inspection observations are summarized on the attached Table 1. Stationing referenced on the table was observed in the tunnel as metal markers placed every 500 feet from the beginning of the Mill to Bull Tunnel on the north rib, and intermediate points marked on the ribs with paint. Low spots in the tunnel were encountered with standing water as much as 2 feet deep following operation of the existing suction pump with its inlet positioned at the lowest point of the tunnel. Where possible, the inflow rate from point or concentrated sources was measured by timing the flow captured in a calibrated container. Where the inflow consisted of multiple drips from the tunnel crown or seeps running down the ribs, estimates of the flow rate were made for the zone described by the stationing references. The length of time between initial tunnel dewatering and the inspection (approximately 2 weeks) was considered to be sufficient to allow the walls of the submerged tunnel to drain and reach near steady-state groundwater inflow conditions.

Groundwater Inflow

Due to the reverse-grade of the tunnel's vertical alignment approximately mid-way through, the District has not been able to gauge the total groundwater inflow as could be accomplished if it were free-draining. The last metered measurement of tunnel inflow was conducted at the end of the tunnel construction activities when the construction dewatering equipment was in use.

The method used to obtain an estimate of the total groundwater inflow to the tunnel for this inspection was to add the estimated flows of the observed segments of inflow as shown on Table 1. Zones of minor seepage ranging from approximately 1 to 120 feet long, characterized by wet ribs with no measurable flows from distinct points of discharge, were considered to yield approximately 0.1 gallons per minute. Summing the estimated and measured flows from the individual seep and wet zone inflows observed during Carlton's inspection yields a total of approximately 5 to 10 gallons per minute (gpm). This total does not consider flows entering the Mill to Bull Tunnel from the El Dorado Tunnel.

Existing Corrective Measures

The MWH Plan identified a cumulative flow of between 48 and 66 gpm from the shear zones and rock fractures mapped during the tunnel boring, prior to tunnel shotcreting. The Plan indicates no grouting was necessary during construction to control groundwater inflow, and that a total of 1,260 lineal feet of shotcrete was installed through the tunnel for stability and erosion protection purposes. Table 1 summarizes the locations of the shotcrete zones constructed in the identified shear zones primarily associated with groundwater inflow. Following completion of the tunnel construction, a total inflow of approximately 40 gpm was measured in the Mill to Bull Tunnel indicating the shotcrete sections had reduced the inflow.

During Carlton's December 2006 inspection, the shotcrete sections in the shear zones reported with groundwater inflow during construction were observed to be in good condition. Point sources of low flows (less than 0.5 gpm) were observed from 2 weep holes in the crown lining. The Plan reported the weep holes were required to reduce hydrostatic back pressure that could collapse the lining.

Observations during Carlton's October 2007 inspection indicate the shotcrete sections in the shear zones reported with groundwater inflow during construction continue to appear in good condition.

Additional Corrective Measures

Considering that the shotcrete sections in the identified inflow zones were observed in good condition, no additional corrective measures are recommended to augment the existing lining.

New Seepage Sources

The seepage observed in areas not previously reported generally consist of seeps and drips characterized in most places by drips from the crown or wet zones on the tunnel ribs ranging in length from 1 foot to 120 feet. The highest inflow estimated from any of these zones is less than 0.5 gpm. Previous mapping by MWH did not report seepage areas with flows less than 1 gpm.

New Seepage Source Corrective Measures

No corrective measures are recommended for the seepage observed outside of the areas previously reported. This conclusion is based on the consideration that the seepage observed is generally not concentrated at point discharges, that the rock appears sound in the seepage zones, and that the flows are low.

Recommendations

Considering the observed good condition of the tunnel shotcrete lining sections, and that the overall estimated groundwater inflow total is likely lower than that measured at the completion of the tunnel, there appears to be no reason to recommend additional corrective measures at this time. The tunnel lining conditions should be re-evaluated during each upcoming annual inspection to determine if deterioration is occurring and if additional corrective measures may be warranted.

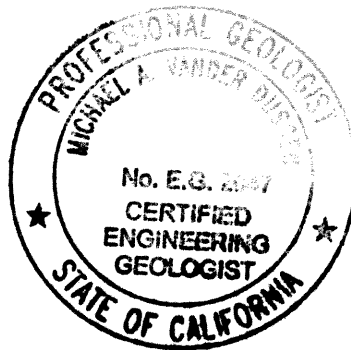
The findings of this inspection combined with the observations and monitoring measurements of flows and water quality of the springs and seeps along the former canal bench continue to support the conclusion that the low volume of groundwater inflow into the tunnel is likely not affecting the near-surface groundwater environment at the ground surface/hillside north of the tunnel.

We appreciate the opportunity to assist the District on this project, and please call me at (530) 677-5515 ext. 136 with any questions you have about the information included in this report.

Sincerely,
Carlton Engineering, Inc.



Michael Vander Dussen, P.G., C.E.G.
Senior Project Engineering Geologist



Attachments: Inspection Summary Table

Table 1
 EID Mill Creek to Bull Creek Tunnel
 October 18, 2007 Annual Groundwater Inspection

Tunnel Stationing* From To	Inflow** 10/18/2007	Inflow Reported by MWH During Construction***	Inflow Structure/Description ¹ (Reported by MWH During Construction***)	Tunnel Lining/Support In Mapped Inflow Zones***	Lining Condition (Re. Groundwater Inflow)
1+10 1+60	scattered drips from crown	1 - 2 gpm	(minor shear)	10' shotcrete	good
2+10 2+60	scattered drips from crown	2 gpm	(major shear)	50' steel sets/shotcrete	good
2+80 2+80	drips (<0.25 gpm)		rock joint ¹		
2+90 3+40		2 gpm	(major shear)	50' steel sets/shotcrete	good
3+05 3+05	0.3 gpm		weep hole in crown lining ¹		
4+10 4+30		dry	(minor shear)		
8+60 8+90	scattered drips from crown at 8+90	1 - 2 gpm	(minor shear)	30' shotcrete	good
9+00 9+00	drips from crown				
10+10 10+40		1 gpm	(minor shear)	30' shotcrete	good
11+45 11+60		1 - 2 gpm	(minor shear)		
11+55 11+55	~0.25 gpm		(minor shear)		
12+70 12+90	seeps on south rib		rock joints ¹		
13+10 13+70	~0.4 gpm	1 - 2 gpm	(minor shear)		
14+10 15+20		1 - 2 gpm	(minor shear)		
14+80 15+20	drips and seeps on north rib		sheared rock joint ¹		
15+55 15+65		1 gpm	(minor shear)	10' shotcrete	good
17+50 17+90		1 - 2 gpm	(minor shear)		
17+50 17+50	drip & seep on south rib (<0.25 gpm)		sheared rock joint ¹		
18+50 18+90	few drips	1 - 2 gpm	(minor shear)		
21+60 21+62		1 gpm	(minor shear)	30' shotcrete	good
24+30 24+47	4 rock bolts and seeps from joints	1 gpm	(minor shear)		
24+70 24+70	drips & seeps (<0.25 gpm)		sheared rock joint ¹		
25+00 25+10		1 gpm	(minor shear)		
27+45 27+70		1 - 2 gpm	(minor shear)		
28+00 29+20	slight seepage		rock joint ¹		
31+00 31+20		dry	(major shear)		
31+85 31+90		1 - 2 gpm	(minor shear)		
33+80 33+80	drips, seeps and stains on ribs		rock joints ¹		
35+50 35+50	seepage		rock joints ¹		
36+00 36+10	seepage <0.25 gpm	1 - 2 gpm	(minor shears)		
39+45 39+55		dry	(minor shear)		
39+85 39+90	very slight seepage		rock joints ¹		
40+40 40+40			rock joints ¹		
40+65 41+10	seep from joint at 40+80	1 gpm	(minor shears)		

* Stationing/location estimated from ref. points marked during tunnel construction

** Estimated or measured where possible

*** From MWH 2003 Groundwater Management Plan Tables 1-1 and 2-5, in italics

¹ Observations on 10/18/07

Table 1
 EID Mill Creek to Bull Creek Tunnel
 October 18, 2007 Annual Groundwater Inspection

Tunnel Stationing* From To	Inflow** 10/18/2007	Inflow Reported by MWH During Construction***	Inflow Structure/Description ¹ (Reported by MWH During Construction***)	Tunnel Lining/Support In Mapped Inflow Zones***	Lining Condition (Re. Groundwater Inflow)
42+05 42+40		1 gpm	(minor shear)	35' shotcrete	good
48+60 52+20		10 - 12 gpm	(minor and major shears)	58' shotcrete	good
50+05 51+30	small stream from drill hole 0.3 gpm drip flow and seepage <0.25 gpm		weep hole in crown lining ¹		
52+00 52+00	seeps from crown				
54+90 55+40		dry	(major shear)	40' shotcrete	good
55+60 55+90		1 gpm	(minor shear)	30' shotcrete	good
65+40 66+12	seeps from N. rib & crown <0.5 gpm	1 - 2 gpm	(minor shear)	47' shotcrete	good
65+40 67+00	seeps total < 1 gpm				
67+78 68+20	very slight seepage	1 - 2 gpm	(minor shear)	37' shotcrete	good
68+20 68+20					
71+00 71+50			(dry)	50' steel sets/shotcrete	good
71+60 72+40	very slight seepage <0.25 gpm		west-dipping 12"-18" dike ¹		
73+00 73+20	few seeps on ribs, mostly dry		rock joints ¹		
74+40 74+60	few seeps on ribs, mostly dry		rock joints ¹		
76+95 77+50		2 gpm	(minor shear)	55' steel sets/shotcrete	good
77+00 77+00	slight seepage		rock joints ¹		
77+80 78+00	slight seepage, moist to wet ribs	1 gpm	rock joints ¹		
78+47 78+48		2 gpm	(minor shear)		
78+55 78+85	seeps <0.5 gpm	1 - 2 gpm	(major shear)	30' steel sets/shotcrete	good
78+85 78+85	steady drip/flow 1 gpm		rock joint ¹		
79+00 79+00	seepage <0.25 gpm from S. rib				
80+48 81+00	seepage < 0.25 gpm	1 gpm	(minor shear)		
82+80 82+90	slight seepage, wet ribs		rock joints ¹		
85+80 85+82	drips < 0.25 gpm from rock bolt	2 gpm	(minor shear)		
86+20 86+20	seeps, wet ribs		mineral deposits from seep ¹		
86+25 86+75		2 - 3 gpm	(major shear)	47' steel sets/shotcrete	good
86+85 87+30	moist below springline	1 gpm	(major shear)	40' shotcrete	good
88+25 88+35	slightly moist ribs	iron stain on ribs	(minor shear)		
88+78 89+20		minor seep	(2 major shears)	42' shotcrete	good
89+50 89+50	slight seepage		rock joint ¹		
93+05 93+22		dry	(minor shear)		
94+60 94+75			(minor shear)	15' shotcrete	good
98+40 100+00	sl. seepage, ribs & crown, 10'-20' zones				good

* Stationing/location estimated from ref. points marked during tunnel construction

** Estimated or measured where possible

*** From MWH 2003 Groundwater Management Plan Tables 1-1 and 2-5, in italics

¹ Observations on 10/18/07

Table 1
 EID Mill Creek to Bull Creek Tunnel
 October 18, 2007 Annual Groundwater Inspection

Tunnel Stationing* From To	Inflow** 10/18/2007	Inflow Reported by MWH During Construction***	Inflow Structure/Description ¹ (Reported by MWH During Construction***)	Tunnel Lining/Support In Mapped Inflow Zones***	Lining Condition (Re. Groundwater Inflow)
102+53 102+55		1 - 2 gpm	(minor shear)		
102+62 102+95	drip, seeps & wet ribs < 0.25 gpm	1 - 2 gpm	(major shear)	33' steel sets/shotcrete	good
103+25 103+45		dry	(minor shear)	16' steel sets/shotcrete	good

* Stationing/location estimated from ref. points marked during tunnel construction

** Estimated or measured where possible

*** From MWH 2003 Groundwater Management Plan Tables 1-1 and 2-5, in italics

¹ Observations on 10/18/07