Denison Environmental Services
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MEMORANDUM

Faro Mine Closure

TO: DES: Jon Bronson, Roy Morrell; YG: Kaori Torigai, John Brodie
DATE: February 8, 2010
FROM: Jay Cherian, Dension Environmental Services (DES)
SUBJECT: Jan 2010 Follow-Up to X3, X10 Review

Background

On December 24, 2009, staining was observed in the Rose Creek Diversion Channel (RCDC) just downstream of the X3 sampling site. The staining was reddish in colour, indicating the possibility of iron precipitating from groundwater seepage into the creek. While iron precipitation from groundwater into creeks is observed in the Yukon, at non-disturbed or natural sites, the proximity of the RCDC to the Faro Mine Complex tailings impoundments review of water quality was undertaken.

On January 7, a preliminary review of water quality in the Rose Creek Diversion was submitted to the Yukon Government (YG), based on existing and historic water quality data (i.e. prior to the observed staining). A follow-up review was recommended, after January 2010 water quality sampling had been undertaken to further review water quality along the RCDC and to verify whether or not an immediate Care and Maintenance response is necessary.

Since the preliminary review, further anecdotal evidence collected indicates that similar staining in the RCDC was observed was observed as early as 1995.[1] Additional anecdotes recount an orange tinge being evident along stretches of the RCDC.[2]

Approximately 25 years ago, the tailings impoundment failed and tailings went into the diversion. The failure was at the secondary impoundment. While this failure was addressed shortly after that time, creek sediments were found to still contain tailings after that time, and approximately five years ago, rock and soils were moved from the RCDC and the area between tailings impoundment and the RCDC. In addition, the tailing impoundments were reinforced. While the tailings impoundment failure occurred downstream of the stained area observed in December of 2009, the impoundment was reinforced along its length.[3]

Water Quality Results and Assessment

The attached Figure 1, illustrates a comparison of select analytes at X3 and X10 from late 1995 to the most recent sampling event of January 11, 2010.

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[1] Wels, Christoph. Roberston GeoConsultants. Telephone conversation with Jay Cherian, DES. January 14, 2010.

[2] Sparling, Paul. White Mountain. Personal communication with Jay Cherian, DES. February 3, 2010.

[3] Ramsay, Kevin. DES. Phone communication relayed from Dan Duivenvorden, DES to Jay Cherian, DES. February 2, 2010.

As in the preliminary review, Figure 1 shows that for all the parameters reviewed (with the possible exception of magnesium, iron and zinc), the concentrations of X3 and X10 are comparable. Statistical analysis would be required to determine whether or not the differences are significant for magnesium, iron and zinc. In addition, the results for all parameters, including zinc show generally that trends at X3 parallel trends at X10, indicating that no increasing trend in concentrations at X10 with respect to X3 is observable.

While detailed statistical analysis of the iron, magnesium and zinc may show that there is some loading to the RCDC within the reach from X3 to X10. A visual review of the graphs on Figure 1 indicates that the concentrations for each of the reviewed parameters are not increasing with respect to historic rates.

Overall, water quality at X3 and X10 is comparable with historic water quality and it is possible that statistical analysis would show improved water quality due to the capture of groundwater in the S-Wells area.

An additional location in the RCDC was sampled on January 11, 2010 at location RCSG#4 (Rose Creek Staff Gauge #4), immediately downstream of the previously observed staining. The results of water quality monitoring at RCGS#4 are shown in Table 1, along with at X3 and X10, for select parameters.

Table 1: Water Quality at X3, RCSG#4 and X10 on January 11, 2010

Monitoring Location	pH	SO_4 (mg/L)	Cu-T (mg/L)	Fe-T (mg/L)	Ni-T (mg/L)	Mg-T (mg/L)	Na-T (mg/L)	Pb-T (mg/L)	Zn-T (mg/L)
X3	7.6	28	0.0004	0.090	0.00065	10.2	3.22	0.000264	0.0219
RCSG#4	7.9	28	0.00084	0.292	0.00080	10.4	3.11	0.00142	0.0381
X10	8.0	26	0.0004	0.104	0.00079	11.5	3.03	0.000145	0.0447

For all parameters except sulphate (SO_4) and sodium (Na), concentrations are slightly higher at RCSG#4 than at X3, located upstream of the previously observed staining.

Follow-Up Conclusions and Recommendations

The follow-up assessment described above does not indicate the need for an immediate Care and Maintenance response to the observed staining. Additionally, no further water quality assessment is recommended within the scope of the Care and Maintenance responsibilities.

As concluded in the preliminary review, the evidence of possible seepage from the tailings to the Rose Creek Diversion Channel does have possible implications with respect to long term site operations and to closure activities.

Therefore, it is recommended that efforts be made to determine the extent and verify the source of the seepage, as part of closure planning. This is especially recommended given the groundwater capture rates put forth in the closure planning process to meet long term water quality targets. DES has taken the preliminary step of adding a sampling location (immediately downstream of the observed stain area) to the monthly water quality monitoring program, however no other monitoring sites have been added, and no other investigations are planned. The water quality monitoring at this additional location is undertaken to start a historic record at this site, with the assumption that further studies will be forthcoming, whether that be through DES or another agency / consultant / contractor, as part of closure planning.

Figure 1a - h: Comparison of X3 and X10 for Select Water Quality Parameters