R&M ENGINEERING-KETCHIKAN, INC.
ENGINEERS GEOLOGISTS SURVEYORS
355 CARLANNA LAKE ROAD, SUITE 200, KETCHIKAN, ALASKA 99901
PHONE (907) 225-7917 FAX (907) 225-3441 EMAIL: RNMMain@rmketchikan.com

Water Sampling Field Report

Client: Michael Lattin **Date:** 2/22/15

Project: Moth Bay Mine Water Sampling

Time In: 8:30 am

Weather: Cloudy; 45 degrees

Time Out: 2:00 pm

Site Location

The historic Moth Bay Mine site is located approximately 12 miles Southeast of the city of Ketchikan on the Thorne Arm at 55°17'52" N, 131°20'39" W, in the Ketchikan Gateway Borough. The area surrounding the site if managed by the United States Forest Service (USFS).

Site Access

Currently the site can only be accessed by travelling approximately 10 miles from Ketchikan by boat to the head of Moth Bay and hiking approximately one (1) mile upgrade following Moth Stream, which flows into Moth Bay. The trail to the site consists

of a steep (20-30%), undeveloped and unmaintained walking path with steep side slopes winding through a heavily timbered section of USFS land for approximately ½ mile before cresting a ridge and revealing open muskeg. Multiple rock outcrops were observed along the path.

Sampling Locations

Field pH readings were taken at multiple locations including waters affected (adjacent to or downstream of the site) and unaffected (background) by historic mining activity at the site.

Photographs

Photograph No. 1

Location
Pt 2

Description
Moth Stream outfall at Moth Bay
pH 6.17

	**Photograph No. 2** **<u>Location</u>** Pt 3 **<u>Description</u>** Small stream near property line unaffected by waste rock. pH 4.8-4.75
	**Photograph No. 3** **<u>Location</u>** Pt 4 **<u>Description</u>** Moth Stream near property corner pH 5.75

	**Photograph No. 4** **Location** Pt 5 **Description** Tributary stream up slope from historic adit. pH 5.92
	**Photograph No. 5** **Location** Pt 6 **Description** Standing water in muskeg in front of historic adit #1. pH 5.19
	**Photograph No. 6** **Location** Pt 7 **Description** Soil sampling site

	**Photograph No. 7** **<u>Location</u>** Pt 8 **<u>Description</u>** Standing water downstream of waste rock pile pH 3.17
	**Photograph No. 8** **<u>Location</u>** Pt 9 **<u>Description</u>** Standing water adjacent to waste rock pile pH 3.52

	**Photograph No. 9** **<u>Location</u>** Pt 10 **<u>Description</u>** Standing water unaffected by waste rock pile pH 4.95
	**Photograph No. 10** **<u>Location</u>** Pt 11 **<u>Description</u>** Standing water in front of adit #2 pH 6.17

	**Photograph No. 11** **<u>Location</u>** Pt 13 **<u>Description</u>** Stream adjacent to adit #2 pH 5.45
	Photograph No. 12 **<u>Location</u>** Pt 14 **<u>Description</u>** Cut pH 3.95
	**Photograph No. 13** **<u>Location</u>** Pt 15 **<u>Description</u>** Standing water in muskeg directly below waste rock pile from adit #2 pH 4.17

	**Photograph No. 14** **Location** Pt 16 **Description** Inlet to Lake No. 1 pH 4.6
	**Photograph No. 14** **Location** Pt 16 **Description** Outlet from Lake No. 1 pH 4.98

Conclusions

This report was conducted to investigate areas at and around the site considered potential contamination sources or affected by potential contamination sources. Water quality samples revealed above background pH levels in areas directly affected by, or immediately downslope from, historic mining activity. Visual inspection also revealed natural attenuation of potential contamination through surface water pathways of the surrounding muskeg and wetlands environments. Waters entering Moth Bay revealed neutral levels and no apparent contamination from uplands activity.

Attempts to remediate or remove the waste rock piles associated with historic mining activity would disturb the material and increase the potential for escaped leachate before natural reclamation can occur. As there is no current developed access to the site, any

attempts to reclaim the site or removal material would have a greater environmental impact through USFS lands than allowing the site to recover naturally.

A 2006 report submitted by the Environmental Protection Agency (EPA) determined no further action is required at the site, and this field report supports that conclusion. There is no evidence of new information necessitating further action. Samples and visual inspection taken during this report, show similar or improved results since 2006.

Pursuant to Alaska Administrative Code, Title 11, Section 97, Subsection 100 on Applicability (11 AAC 97.100), chapter (d) (3) states, "an area disturbed by a mining operation before October 15, 1991; however, if a mining operation disturbs a previously mined area after October 14, 1991, a miner must reclaim to the standards of AS 27.19 and this chapter; if only a portion of the previously mined area is disturbed after October 14, 1991, this chapter applies only to that disturbed portion." There has been no areas disturbed by mining activity at the site after October 14, 1991.

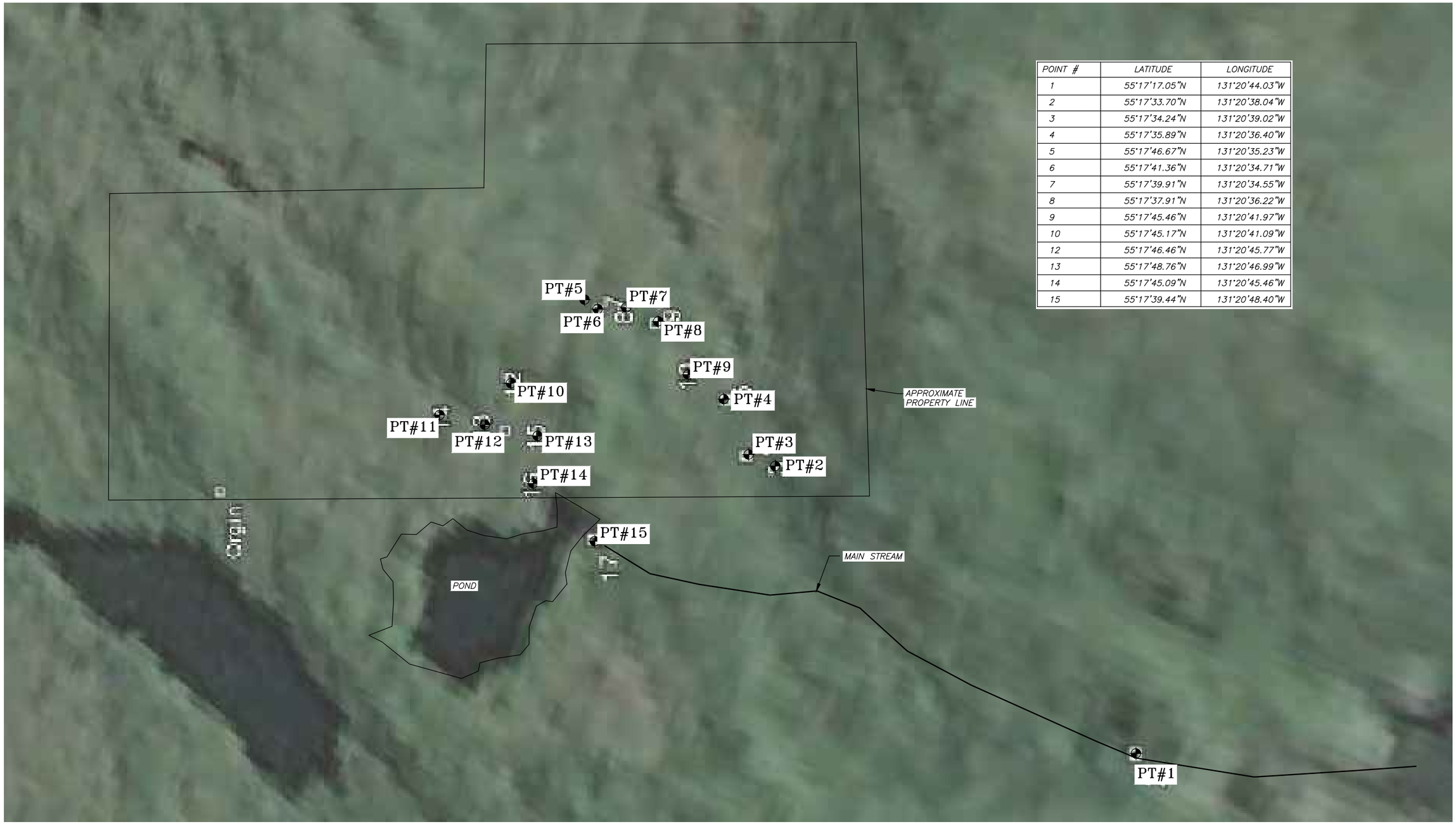
Based on our observations currently Audit #1 is sheet flowing into an existing muskeg which is filtering the leachate from the mine tailings pipe and balancing the PH prior to the surface drainage leaving the property. Therefore it is our opinion that no further action should take place on the tailing pipe in front of Audit #1 since the surface runoff is filtered by the existing muskeg prior to leaving the property.

Finally prior to planning any mine reclamation work on the tailings pile in front of Audit #2 it is our recommendation that the potiential environmental impacts of performing this work should be evaluated with the respect to the current impacts this historic tailings pipe has on the environment and a detailed review of the State of Alaska Statues should be performed.

Sincerely,
R&M Engineering-Ketchikan, Inc.

Robert Badgett

Robert K. Badgett, P.E.



POINT #	LATITUDE	LONGITUDE
1	55°17'17.05"N	131°20'44.03"W
2	55°17'33.70"N	131°20'38.04"W
3	55°17'34.24"N	131°20'39.02"W
4	55°17'35.89"N	131°20'36.40"W
5	55°17'46.67"N	131°20'35.23"W
6	55°17'41.36"N	131°20'34.71"W
7	55°17'39.91"N	131°20'34.55"W
8	55°17'37.91"N	131°20'36.22"W
9	55°17'45.46"N	131°20'41.97"W
10	55°17'45.17"N	131°20'41.09"W
12	55°17'46.46"N	131°20'45.77"W
13	55°17'48.76"N	131°20'46.99"W
14	55°17'45.09"N	131°20'45.46"W
15	55°17'39.44"N	131°20'48.40"W