Red Dog Mine
Closure and Reclamation Plan

SD D3: Aqqaluk Geochemistry – Supplemental Testing Program

SRK Consulting (Canada) Inc.
Suite 800 -1066 West Hastings Street
Vancouver, B.C. V6E 3X2
Canada

vancouver@srk.com
www.srk.com

Tel: 604.681.4196
Fax: 604.687.5532

Memo

To:	File	**Date:**	March 12, 2007
cc:		**From:**	Madeleine Corriveau and Kelly Sexsmith
Subject:	Aqqaluk Geochemistry – Supplemental Testing Program	**Project #:**	1UT006.004

1 Introduction

In 2003, SRK Inc. consolidated the results of several geochemical characterization studies of waste rock and tailings at TeckCominco Alaska's (TCAK) Red Dog Mine into a single report (SRK, 2003). The report focussed on the geochemistry of the Main Deposit but included samples from the adjacent Aqqaluk Deposit. Due to the strong geological similarities between the two deposits, the Aqqaluk samples were not separated from the Main samples in the presentation of results. A description of the geology is provided in Section 3 of the Environmental Information Document.

Since preparation of the consolidation report, additional samples were collected from the Aqqaluk Deposit by TCAK, and were submitted for acid base accounting tests, bringing the total number of static test samples to over 1000. These samples were distributed over 135 drill holes representing 22 different rock types.

The purpose of this memo is to present the results of the additional testing program. The results for the Aqqaluk samples are compared to results for the Main samples to demonstrate the similarities between the two deposits.

2 Methods

2.1 Sample Selection and Representivity

Samples from each of the major rock types were selected from the available drillcore by TCAK Geologists. The samples were typically comprised of a continuous 20 to 25 foot intervals of drill core.

Table 2.1 provides a summary of the distribution of samples according to seven general rock type groups in the Main and Aqqaluk Deposits. A more detailed breakdown within these major rock type groups is described in SRK (2003). The majority of the samples from the Aqqaluk Deposit were collected from the various silica, sulfur, and barite mineralized forms of the Ikalukrok Shales (37%), and the shales, chert, and barite rock types of the Siksikpuk (21%), with the remaining samples were

relatively evenly distributed between the other rock types. This distribution of samples by rock-type is similar to the Main Deposit, with the exception that there is no Upper Melange unit in the Aqqaluk Deposit.

Table 2.1: Distribution of Samples by Rock Type

Rock Types	Aqqaluk		Main
	Number of Samples	Percentage of Samples	Percentage of Samples
Siliceous, Baritic, and Sulphidic Ikalukrok	376	37%	32%
Siksikpuk Chert, Barite, and Shale	210	21%	24%
Okpikruak Shale	72	7%	9%
Ikalukrok Shale	126	12%	11%
Kivalina Shale	126	12%	11%
Upper Melange	-	-	6%
Basal Melange	103	10%	7%
Totals	1013	100%	100%

Table 2.2 (modified from SRK, 2003) compares the total estimated proportion of rock types at each deposit. The distribution is similar at both sites, with the exception that the Okpikruak Shale in the Aqqaluk Deposit will make up less than one percent of the total tonnage compared to 9% in the Main Deposit. The overall distribution of samples is relatively consistent with expected distribution of waste rock types from Aqqaluk. There is a slightly smaller component of mineralized Ikalukrok and a disproportionately large percentage of samples from the Okpikruak Shale in the database compared to expected tonnages for Aqqaluk.

Table 2.2: Tonnages of Rock by Deposit

Rock Types	Aqqaluk		Main (1989-2004)		Main (2005-2012)	
	Millions of Tonnes	%	Millions of Tonnes	%	Millions of Tonnes	%
Basal Melange	8.6	9%	5.5	11%	1.6	6%
Upper Melange	-	-	8.2	17%	-	-
Okpikruak Shale	0.0035	0.004%	1.7	4%	4.6	18%
Kivalina Shale	5.1	5%	1.7	4%	2.3	9%
Ikalukrok Shale	7.2	8%	3.0	6%	0.13	1%
Siksikpuk	25	27%	9.4	20%	4.9	19%
Siliceous, Baritic, and Sulphidic Ikalukrok (Exhalite)	48	51%	19	39%	12	47%
Totals	93.9	100%	48.1	100%	25.7	100%

Figures 2.1 and 2.2 show the spatial distribution of samples that have been collected from the Aqqaluk Pit. The samples are well distributed throughout the pit.

2.2 Analytical Methods

The static testing methods were consistent with those described in SRK (2003).

3 Results

3.1 Comparison to Main Deposit

3.1.1 Static Test Results

Results of the acid base accounting tests for Aqqaluk are provided in Attachment 1. A summary of results is provided in Table 3.1.

Figures 3.1 to 3.4 present the overall acid generation potential of each of the rock units in terms of the acid generation criteria defined in the consolidation report (SRK 2003). They also provide a comparison of results from the Aqqaluk and Main deposits. A legend has been provided to define the codes used for each of the rock units. The classification boundaries in Figures 3.1 and 3.2 are as follows:

- NP/AP<1: Acid generation very likely, potential increasing as NP/AP decreases.
- NP/AP<0.1: If combined with high S, near-instantaneous onset of acid generation.
- Max AP: Maximum AP possible for sample containing only pyrite and calcium carbonate.
- NP/AP>2: Acid generation very unlikely. Metal release under neutral pH conditions may occur if leachable metals are present. This could be a result of short-term leaching of salts. The rate of release would be controlled by the rate of flushing and the solubility of the salts at neutral pH.
- 1 < NP/AP < 2: Acid generation potential uncertain and likely to be delayed for decades if carbonate is present.
- AP<10 kg $CaCO_3$/t (S_{Fe}<0.3%): Low sulfur content indicates low potential for acid generation regardless of NP/AP. The criterion is arbitrary but since very few samples have NP/AP<2 and AP<10 kg$CaCO_3$/t, the criterion is not critical.

Table 3.1: Summary of ABA Results by Rock Type

Major Unit	Sub-unit	AP (kg/t)				NP (kg/t)				NNP (kg/t)				NP/AP (kg/t)			
		Mean	25th Perc.	50th Perc.	75th Perc.	Mean	25th Perc.	50th Perc.	75th Perc.	Mean	25th Perc.	50th Perc.	75th Perc.	Mean	25th Perc.	50th Perc.	75th Perc.
Melange		80	44	72	98	116	69	108	150	36	0	44	87	1.4	1.0	1.6	3.2
Kivalina	Shale	69	42	56	88	245	190	251	309	175	110	186	263	3.5	2.5	4.5	6.9
Ikalukrok	Mineralized units including ore	138	78	132	169	17	0	3	15	-121	-165	-118	-54	0.1	0.0	0.0	0.2
	Shale	123	54	103	177	73	5	37	119	-50	-165	-46	48	0.6	0.0	0.4	1.9
Siksikpuk	Baritic	73	16	82	114	17	5	15	25	-56	-104	-57	-13	0.2	0.2	0.3	0.4
	Chert	51	30	44	70	53	2	35	62	3	-26	-11	6	1.1	0.2	0.7	1.2
	Shale	55	22	55	82	24	8	20	33	-32	-60	-34	4	0.4	0.1	0.4	1.2
Okpikruak	Shale	12	0	0	9	44	25	34	50	32	22	29	41	3.6	4.2	51	107

Figure 3.1 presents results for the Kivalina (Mlk) and Okpikruak (Ks) shales. The Kivalina shale has a moderate acid potential and a relatively high neutralization potential. Most samples have NP/AP ratios of greater than 2, indicating they have a low potential for ARD generation. A modest number have NP/AP ratios between 1 and 2, indicating an uncertain potential, and only a few samples have NP/AP ratios of <1. The Okpikruak generally has very low acid potential and high NP, indicating this material is likely non-ARD generating. Samples from the Aqqaluk Deposit are similar to those from the Main Deposit.

The basal mélange (Bme) and mélange (ME) units (Figure 3.2) have moderate AP and elevated NP, with nearly half of the samples having NP/AP ratios of greater than 2. Approximately one third of the material would be considered to have uncertain potential for ARD generation with NP/AP ratios between 1 and 2, while the remaining 20% of the samples have NP/AP ratios of <1. The ABA results are similar to results for the basal mélange unit in the Main Deposit.

The sub-units of the Siksikpuk have a wide variation of acid generation potential as they do in the Main Deposit (Figure 3.3). The barite (Pb) unit has fairly consistent AP values of ~ 100 kg$CaCO_3$/t and low NP values as does the barite unit at Main. All barite samples have a NP/AP ratio of less than 1 suggesting that this unit is potentially ARD generating. The chert unit (Pc) has lower AP and greater NP values as it does at the Main Deposit. This unit has an uncertain potential for ARD generation with about half of the samples having NP/AP ratios less than 1 and only a couple of samples with NP/AP ratios greater than 2. The shale units at Aqqaluk (Ps, Psm, Psl, Psu, and Pu) have extremely variable characteristics, from negligible to strong ARD generation potential, as was observed with the shale units of the Main Deposit (Ps, Psm, and Psc).

The barite and vein units of the Ikalukrok in the Aqqaluk Deposit (Lb and LV) have similar, variable but elevated, acid potential and low NP, similar to those at the Main Deposit (Figure 3.4). Nearly all of the samples have NP/AP ratios of less than 1 and about half of these have ratios of less than 0.1 indicating potential for immediate ARD generation. The shale unit (Mls) has slightly higher NP values, similar to the shale unit at Main. Approximately half of the samples from the shale unit have NP/AP ratios less than 1, a few samples have NP/AP ratios between 1 and 2 and about one third of the samples have NP/AP ratios greater than 2 suggesting that this unit has a mixed uncertain potential for ARD generation. The mineralized rock units at Aqqaluk (SI and LS) are also similar to those at Main with moderate to high AP and negligible NP indicative of a potential for immediate ARD generation.

Table 3.2 classifies each rock type according to its acid generation potential.

Table 3.2: Summary of Classification of Rock Types According to Acid Generation Potential

Major Unit	Sub-unit	Overall Classification
Melange		Non-ARD generating, locally uncertain to potentially ARD generating.
Kivalina	Shale	Non-ARD generating, locally uncertain potential for ARD generation.
Ikalukrok	Mineralized units including ore.	Potential for immediate ARD generation.
	Shale	Potential for immediate ARD generation to non-ARD generating
Siksikpuk	Baritic	Potentially ARD generating.
	Chert	Uncertain potential for ARD generation
	Shale	Highly variable (low ARD generation potential to potential for immediate ARD generation)
Okpikruak	Shale	Non-ARD generating

3.1.2 Elemental Analyses

A selection of elemental concentrations is summarized in Table 3.3. Most of the rock types have typical concentrations of zinc and lead for crustal rocks with the exception of the mineralized units of the Ikalukrok and, to a lesser extent, the shale unit of the Ikalukrok. Barite concentrations are obviously greatest in the barite units of the Siksikpuk and the Ikalukrok. Mineralized units and the baritic unit of the Siksikpuk have the highest concentrations of total sulfur. The chemical composition of the various rock types in the Aqqaluk Deposit are comparable to those in the Main Deposit (SRK, 2003).

Table 3.3: Summary of Selected Average Elemental Concentrations by Rock Type

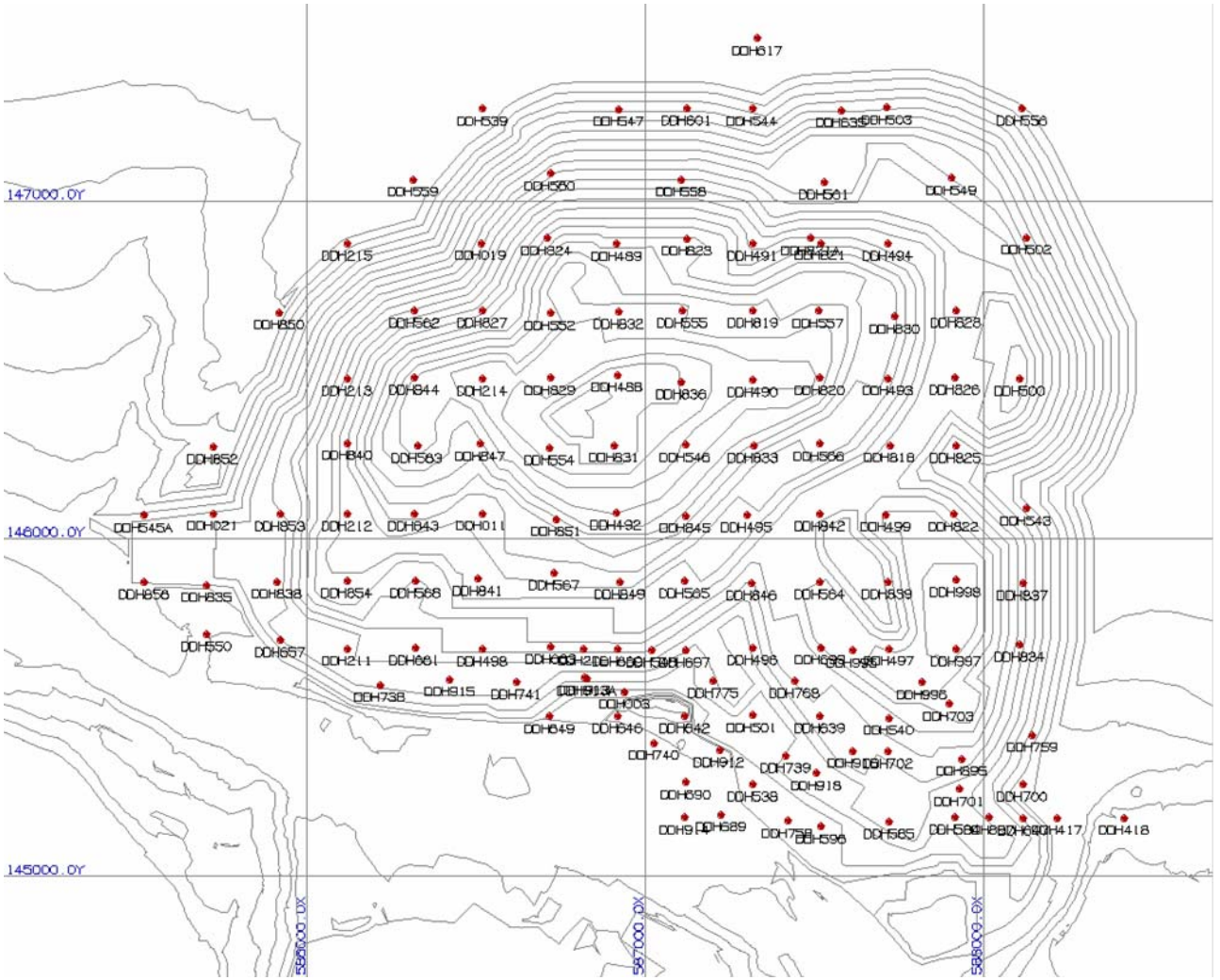
Major Unit	Sub-unit	Zn (%)	Pb (%)	Fe (%)	Ba (%)	TIC (%)	Total S (%)
Melange		0.47	0.14	3.77	1.56	1.39	3.17
Kivalina	Shale	0.27	0.05	2.88	1.05	2.93	2.55
Ikalukrok	Mineralized units including ore.	4.15	2.36	2.55	27.59	0.20	13.24
	Shale	1.51	0.76	4.12	1.22	0.88	5.08
Siksikpuk	Baritic	0.12	0.04	1.53	35.26	0.20	9.96
	Chert	0.07	0.02	2.51	5.76	0.64	3.02
	Shale	0.17	0.06	3.29	5.46	0.29	3.08
Okpikruak	Shale	0.25	0.10	5.27	1.23	0.52	0.72

4 Summary

In general, it can be concluded that the static geochemical characteristics of waste rock units from the Aqqaluk Deposit are similar to geologically comparable waste rock units in the Main Deposit. The relative proportions of each rock type are also similar in the two deposits. Given the geological and geochemical similarities, it is expected that oxidation and metal leaching rates from the Aqqaluk deposit will be comparable to those from the Main deposit.

Additional geochemical data for the Main deposit is presented in the Geochemical Consolidation Report (SRK 2003). This data in combination with data from the ongoing water quality monitoring programs at Red Dog were used as the basis for assessing impacts from the waste rock and pit walls associated with development of the Aqqaluk deposit.

Figures



DDH617 Drill hole sampled for static testing

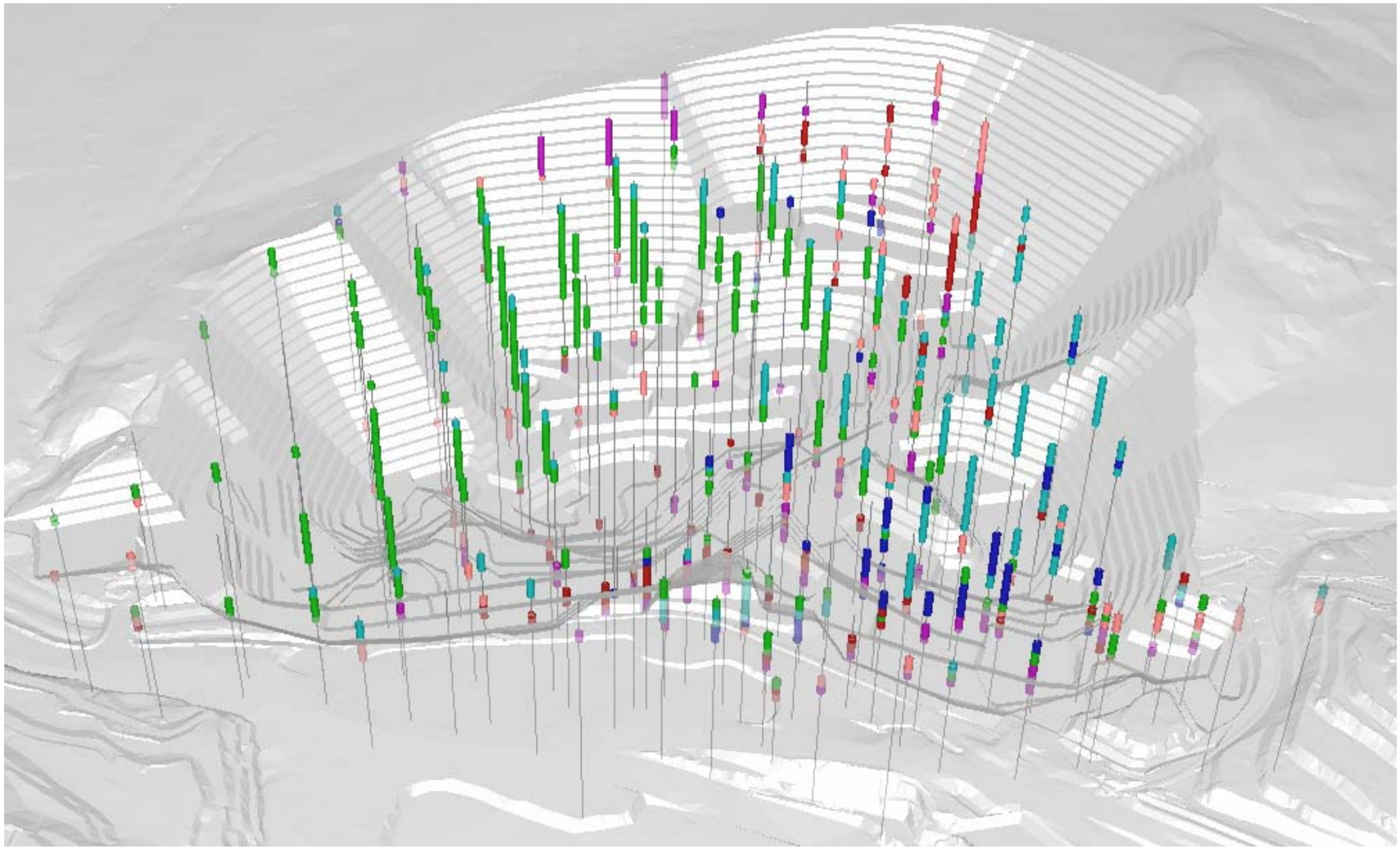
SRK Consulting
Engineers and Scientists

teckcominco

Red Dog Aqqaluk EID

Locations of Drill Holes Sampled for Geochemical Characterization Program

PROJECT:	DATE:	APPROVED:	FIGURE:
1UT006.04	April 2006		**2.1**



Rock Types:

- Siliceous, Baritic, and Sulphidic Ikalukrok
- Siksikpuk Chert, Barite, and Shale
- Okpikruak Shale
- Ikalukrok Shale
- Basal Melange
- Kivalina Shale

SRK Consulting
Engineers and Scientists

teckcominco

Red Dog Aqqaluk EID

Location and Rock Type of Geochemical Test Samples

PROJECT:	DATE:	APPROVED:	FIGURE:
1UT006.04	April 2006		**2.2**

Legend:

Lithology Code	Lithology Make-up
bME	Basal Melange
Me	Melange
Lb	Ikalukrok Barite
Ls	Ikalukrok Shale
Mi	Ikalukrok Shale
Mls	Ikalukrok Shale
Lv	Ikalukrok Vein Unit
Mlk	Kivalina Shale
Si	Mineralized Ikalukrok
Ks	Okpikruak Shale
Pb	Siksikpuk Barite
Pc	Siksikpuk Chert
Ps	Siksikpuk Shale
Psl	Siksikpuk Shale
Psm	Siksikpuk Shale
Pu	Siksikpuk

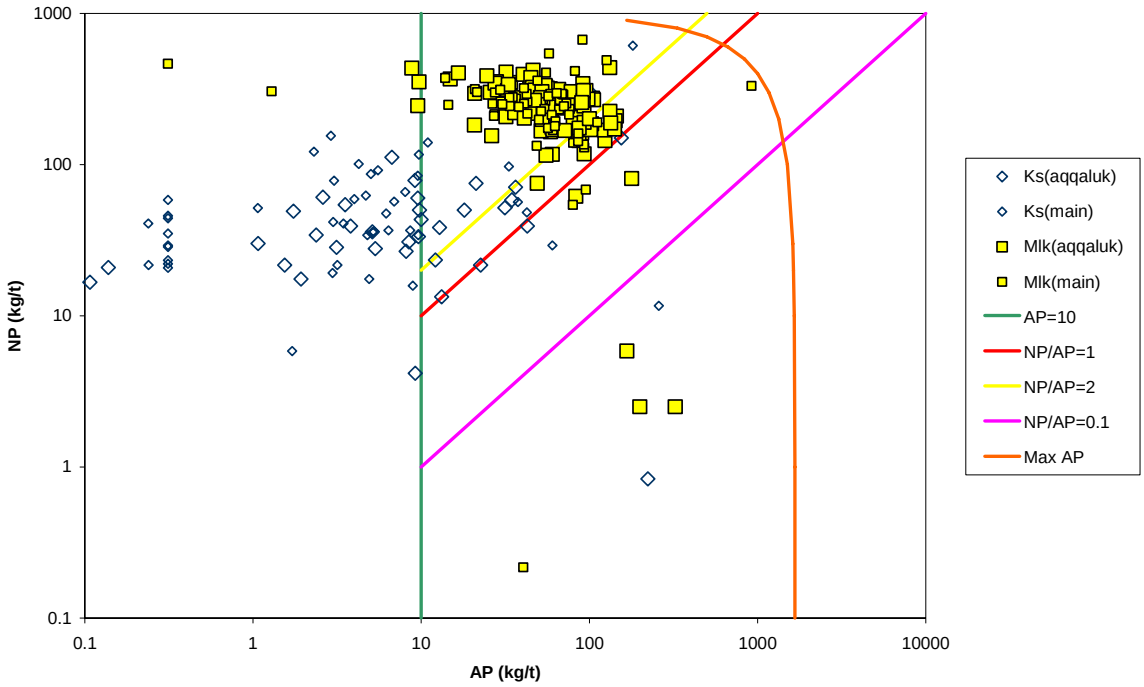


Figure 3.1: NP versus AP for the Potentially Acid Consuming Shales

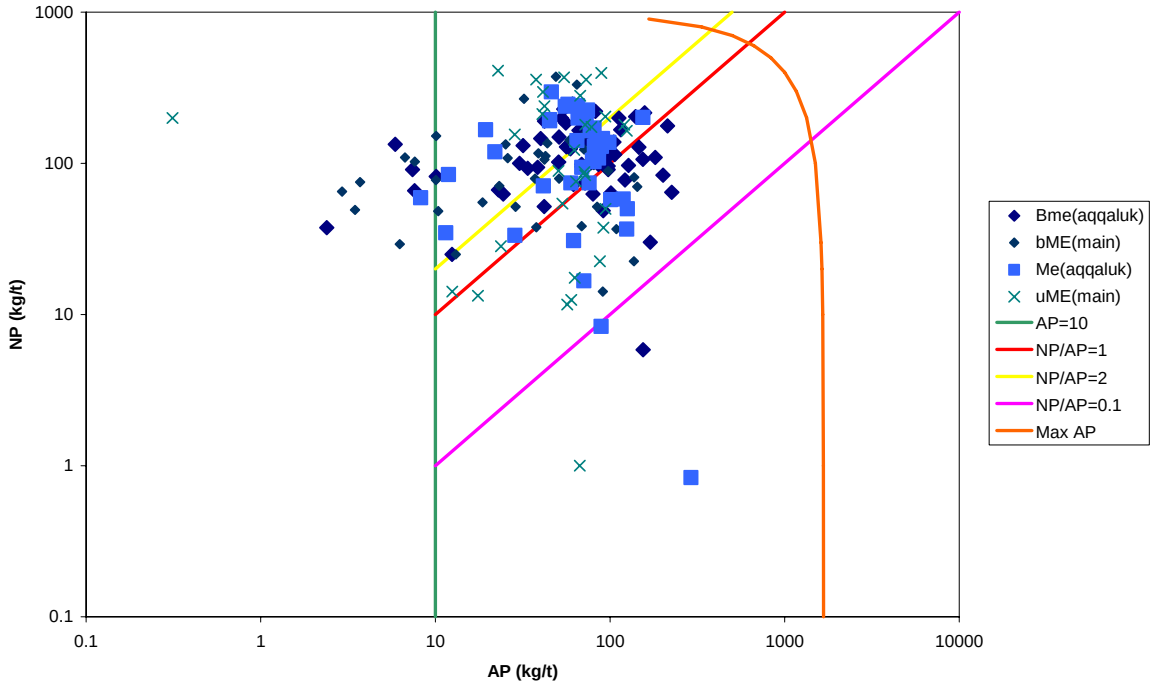


Figure 3.2: NP versus AP for the Melange Units

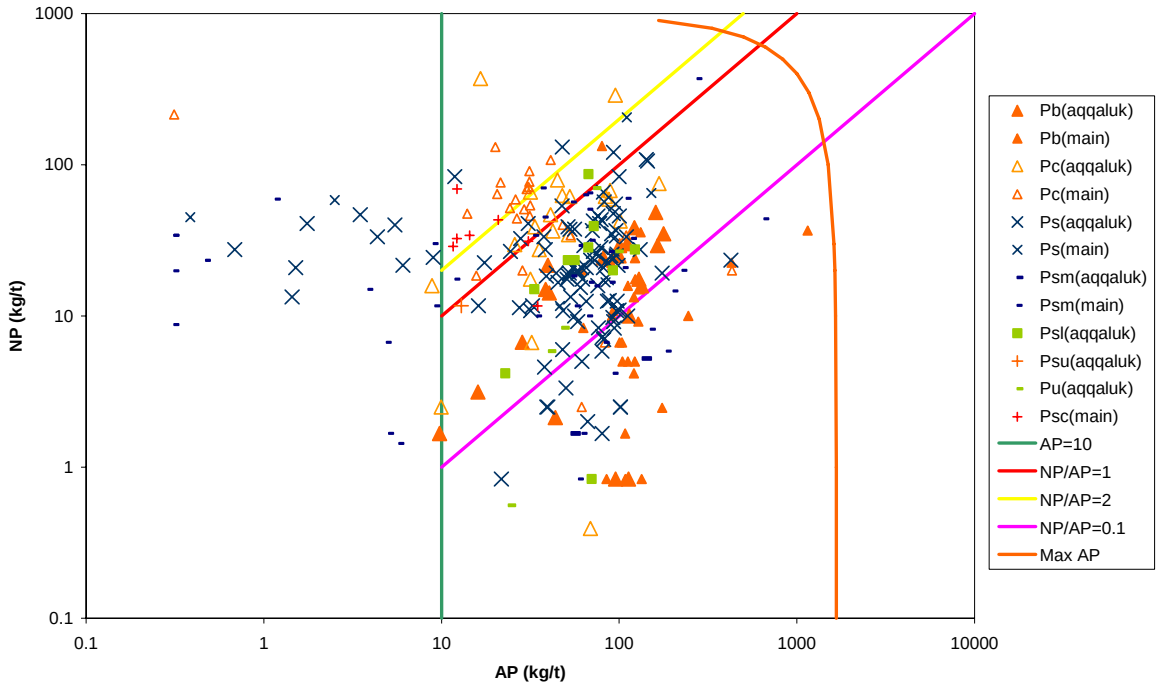


Figure 3.3: NP versus AP for the Siksikpuk Foramation

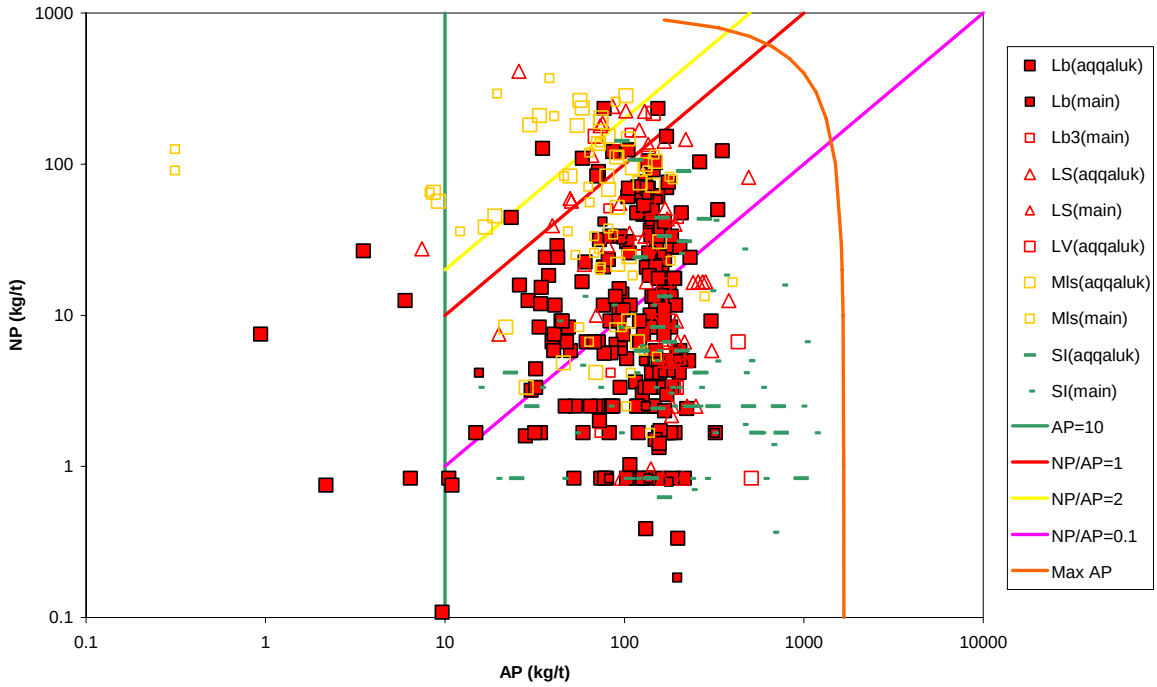


Figure 3.4: NP versus AP for Ikalukrok and Mineralized Rock