Investigation Report - Final

Site Name: Old School
Chevak, Alaska
Hazard ID: NA

Prepared for:

ONE PEOPLE - ONE RIVER

Yukon River Inter-Tribal Watershed Council

Yukon River Inter-Tribal Watershed Council
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November 17, 2015

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LIST OF ACRONYMS

ADEC – Alaska Department of Environmental Conservation
AST – Above-ground Storage Tank
AVEC – Alaska Village Electric Cooperative
bgs – below ground surface
BIA – Bureau of Indian Affairs
COPC – Contaminant of Potential Concern
CRREL – Cold Regions Research and Engineering Laboratory
DRO – Diesel Range Organics
FEMA – Federal Emergency Management Agency
GAO – Government Accountability Office
GPS – Global Positioning System
IDW – Investigation-Derived Waste
PID – Photoionization Detector
RPD – Relative Percent Difference
SB – soil boring
USACE – United States Army Corps of Engineers
YRITWC – Yukon River Inter-Tribal Watershed Council

1.0 INTRODUCTION

The work for this subsurface investigation was based on the contract between the Yukon River Inter-Tribal Watershed Council (Watershed Council) and E3 Environmental, LLC (E3) dated September 15, 2015. E3 subcontracted Cardno to aid in the investigations. The intention of the subsurface investigation was to determine the presence or absence of contamination from crushed lead-acid batteries and transformers near the Old School. The intention of the interviews, site walk through, and records searching was to take a step towards re-use of the school building.

2.0 SITE DESCRIPTION AND BACKGROUND

The area of concern is the Old BIA School building (Site) located in Chevak, Alaska (Figure 1). The Old BIA School building was built over a two year period (1975-1976) to replace a smaller school facility that burned down (CRREL 1980). The facility was abandoned in 2004 when a newer school was built (YRITWC, 2006). Chevak Lake lies immediately to the northwest and the Ninglikfak River is located approximately 240 feet to the southeast. Prior to 2003, the Site was owned by the Kashunamiut School District. During 2003, the City of Chevak assumed ownership of the Site. Total land area of the Site is approximately 5 acres with features including the Old BIA School building, several ancillary buildings, and an abandoned tank farm with 16 above-ground storage tanks (ASTs). The Site is located approximately in the center of Chevak (Figure 2).

2.1. Historical Records Search

2.1.1. Roof Leaks

The Cold Regions Research and Engineering Laboratory (CRREL) cite "many roof leak problems" early in the history of the Old School building (CRREL 1980). Before the Old School building was first occupied in November 1976, serious roof leaks occurred and corrective measures conducted in the following 16 months did not correct the leaks. CRREL describes four types of leaks, two of which were eliminated by Bureau of Indian Affairs (BIA) personnel. In other words, at the time of the 1980 report, there were still leaks occurring approximately 5 years after the school was constructed. The four types of leaks were: leaks by snow infiltration, leaks caused by slush and ice in the valleys, leaks due to a missing section of flashing, and major condensation leaks. CRREL describes many ceiling tiles as being stained by water in many areas. See Appendix A: "Roof Leaks in Cold Regions: School at Chevak, Alaska" for the CRREL report.

2.1.2. Asbestos Inspection Report

A sign posted in the Old School building labels several areas as containing asbestos (Kashunamiut 1991). The date of the asbestos inspection and sampling event is unknown, but the signature date on the sign is November 4, 1991. Several rooms were noted as containing asbestos. See Appendix A for the Kashunamiut School District asbestos notice for the asbestos information.

2.1.3. *Alaska Baseline Erosion Assessment*

In 2008, the United States Army Corps of Engineers (USACE) published an erosion assessment of Chevak (USACE 2008). USACE postulated that the erosion area was eroding at a rate of 5 to 10 feet per year. The erosion area is directly southeast of the Site/Old School Building. See Appendix A: Alaska Baseline Erosion Assessment for a copy of the assessment.

2.1.4. *Relocating Villages Threatened by Flooding and Erosion*

In December of 2003, the Government Accountability Office (GAO) reported that flooding and erosion affect 184 of 213 villages (GAO 2009). Chevak was identified as facing imminent flooding and erosion threats.

2.1.5. *Chevak, Alaska Hazard Mitigation Plan*

The Federal Emergency Management Agency (FEMA) approved a mitigation plan in June 2011 (FEMA 2011). FEMA cited that damage to a non-specific structure in the city of Chevak is expected in less than 10 years: in other words, prior to 2021. Further, FEMA states "The highest risk area is the bluff at the bend in the river to the boat landing area." This area is directly southeast of the Site/Old School building.

2.1.6. *Phase I Environmental Site Assessment Report*

A Phase I Environmental Site Assessment was conducted in 2014 (APC 2014). The Phase I report recommended the following actions:

- The lead batteries in and around the storage shed (S6) should be removed for disposal.
- The school tank farm should be decommissioned and any remaining hydrocarbons removed for disposal.
- The transformers should be examined and a sample of insulating fluid removed for analysis for PCBs.

APC cites that, in 2008, the Foraker Group undertook a feasibility study of re-using the Old School building. Though no written report was written, it was the opinion of the Foraker Group that neglect and vandalism would make the building very expensive to bring back into use. The Phase I report also describes several fuel releases from the tank farm.

3.0 DESCRIPTION OF FIELD WORK

3.1. Soil Borings

On October 8, 2015, E3 collected four soil samples. E3 began soil borings at the Old School on October 8, 2015 at approximately 5:15 pm and finished at approximately 6:25 pm. After soil borings were complete, E3 collected GPS coordinates of sample locations.

Soil borings were advanced using a hand auger. Figure 3 shows locations of soil borings. Appendix B: Laboratory Analytical Report contains soil boring logs. Photoionization Detector (PID) readings were not collected at the locations due to the non-volatile nature of potential contaminants.

The crushed lead-acid batteries were not identified. Therefore, under the suggestion from the Watershed Council, E3 collected two soil samples for lead near the Old School building (Figure 3). Beneath each of the two transformers, E3 collected samples for polychlorinated biphenyls (PCBs).

Soil borings drilled with a hand auger ranged in total depth between 0 and approximately 1 foot below ground surface (bgs). The dominant soil type is peat that exists from near the surface to approximately 1 foot bgs. Soil borings were not constructed for these locations due to the limited depth. Paint chips were noted in the "battery 1" and "battery 2" samples. No obvious signs of impact were present in samples collected for lead or PCBs.

3.2. Sample Locations

Sample locations were documented via global positioning system (GPS) coordinates. Coordinates for the soil sample locations are in Table 1.

3.3. Exterior Conditions of Old School Building

E3 did a site walk-around with the Watershed Council at approximately 1:00 pm on October 8, 2015. Besides missing paint, the exterior of the building itself appears in fair physical condition. Structures immediately adjacent to the building, such as stairways or platforms, appear in overall worse condition than the building itself. There are boards over windows obstructing the view of a potential window pane, but it appears likely most to all of the windows are broken.

The transformers did not show obvious signs of leakage. E3 does not have a trained electrician, but it appears the transformers were not designed to hold liquid. However, samples were collected to be certain of potential impacts. Sample locations for the two soil samples are shown in Figure 3.

Photographs of the exterior began in the western corner near the lake and progressed counter-clockwise around the building. A thorough log of photographs is in Appendix C.

3.4. Interior Conditions of Old School Building

At approximately 2:00 pm on October 8, 2015, E3, the Watershed Council, and Village of Chevak began inspecting the interior of the Old School building. The interior is in significant disarray and of questionable integrity of some areas. Paint is peeling on many walls. There is damaged or discarded equipment in many areas.

During the inspection, a sign proclaimed numerous rooms to contain asbestos (Kashunamiut 1991). Photographs were taken of each room noted on the asbestos map. Most of the rooms noted on the sign as asbestos-containing are near the cafeteria ("Room 31").

Several photographs show stained ceiling tiles: an indication of potential water damage from a leaking roof. Photographs of Room 4 (Photos 9 and 10 in Appendix D) show prevalent black staining on the walls (suspected mold) and stained ceiling tiles.

3.5. Conditions at Old School Tank Farm

E3 inspected the Old School tank farm on October 8, 2015. Condition of the ASTs appears fair to good with no obvious leaks. However, an obvious petroleum odor was noted during windy conditions. This alone suggests likelihood of petroleum impacts. Further, dark staining was noted around the tanks along with some debris. Foundations for the ASTs appear to be in deteriorating condition.

ASTs at the Old School tank farm were apparently not used, but E3 noted a hose leading into one of the tanks (Photos 2 through 4 in Appendix E). The hose appeared to have been recently placed. There was also a ladder leaning against the tank into which the hose lead. The hose was a discharge hose (ie: flexible, non-rigid), suggesting a liquid has not been removed, but rather added to the tank.

3.6. Interviews

Representative members of the city, tribal council, corporation, and community were contacted to request the opportunity to set up an interview. E3 staff was able to conduct fifteen interviews over the course of three days. Each interview consisted of the same thirteen questions. Questions were asked to gather local knowledge of past construction, the present status of the facility including land ownership, and future plans for the site.

Many of the residents do not remember which construction company was used to build the building. However, Harry Ferguson Company and Kelly-Ryan where both named as possibilities. Most believe the construction occurred in the 1970's likely in 1975. It was confirmed that at one time the school burned. The interviewees were unsure about what happened to the debris from the fire, but believe it was buried in the old dump site.

The city of Chevak is the current owner of the land and facility. The building is known to contain asbestos, and in one interview, a moldy smell was mentioned. Safety is a real concern at this location. Children are known to go underneath the building and vandalism has been reported. The play deck off the building is in disrepair. A common desire expressed in the interviews was to have the structure removed. Even after the building was boarded up children still are able to enter parts of the facility.

There is concern of the potential contamination migrating into the water supply. When asked about the drinking water supply everyone was in agreement the community's water is from a well. At this time there are no concerns with the water. No one interviewed was aware of any discussions with federal agencies (BIA or others) or elected officials about the need to address this site. Most would like to see this site reused as a multi-purpose community center.

See Table 2: Summary of Interviews for responses provided in the interviews.

4.0 FIELD QUALITY CONTROL MEASURES FOR SOIL SAMPLING

4.1. Analytical Samples

Quality control samples were collected and based on ADEC-suggested frequencies as prescribed in Table 3 of the Draft Field Sampling Guidance (ADEC 2010). For this project, the following type and quantity of field quality control samples were collected for soil:

- Field duplicate – 2
- Methanol trip blank – 0
- Temperature blanks – 1

Sample preservation for lead and PCB samples consisted of samples being placed in ice-containing coolers in an effort to maintain sample temperatures at 4°C +/- 2°C. The sample duplicate for lead (battery dup 1) had a concentration of the same magnitude as the parent sample. For PCBs, both the parent sample (transformer 1 (soil)) and the duplicate were non-detect. Method blanks for both lead and PCBs were non-detect. Recoveries and relative percent differences (RPDs) for matrix spikes and matrix spike duplicates were within control limits.

4.2. Avoiding Cross-Contamination

The only re-usable sampling equipment was the hand auger. The hand auger was scrubbed clean with an Alconox solution and rinsed with distilled water. To protect workers from contamination, disposable chemical-resistant gloves were used. Gloves were frequently changed, and prior to each sample collection, a fresh set of gloves was used.

5.0 INVESTIGATION DERIVED WASTE MANAGEMENT

Considering the logistical and financial complications of shipping potentially contaminated soil cuttings from a remote site, and since the volume of soil cuttings was low, each soil cutting was placed back into the borehole from which it came. Other investigation-derived waste (IDW) included water from decontamination of the hand auger and miscellaneous solids (nitrile gloves, plastic bags, etc.) Decontamination water was disposed of on-site. Miscellaneous solid wastes were placed in trash bags and disposed of as municipal waste.

6.0 CONTAMINANTS OF POTENTIAL CONCERN COMPARED TO CLEANUP CRITERIA

The Contaminants of Potential Concern (COPC) are lead and PCBs. Lead results were below ADEC criteria and PCB results were non-detect. Refer to Table 3 for a list of the COPCs, associated cleanup levels, and laboratory analytical results. Appendix B contains the laboratory report.

7.0 CONCLUSIONS

Analytical results from the October 2015 soil samples were less than current ADEC cleanup criteria. Consequently, the site does not appear to pose a significant health and environmental risk associated with the COPCs (PCBs and lead).

E3 was tasked with investigating the possible re-use of the Old BIA School building. Based on our investigation we have identified several potential concerns:

- Roof leaks
- Asbestos and lead based paint
- Potential erosion concerns
- Old BIA School Tank Farm
- Safety concerns regarding the Old BIA School.

There is a documented history of serious roof leaks dating back as far as 40 years (CRREL, 2008). E3 was unable to locate any substantial asbestos sampling report, however we were provided with a one page summary report which describes asbestos sampling results which appear to have been conduct in 1991. In addition, the posting of a sign in the facility citing a report indicates a strong likelihood of asbestos in the building. Without the full report and analytical data, it can only be stated that asbestos is suspected to be in linoleum floor coverings and the piping insulation in the northeastern half of the building. Several photographs show stained ceiling tiles and stained walls in the Old BIA School building: an indication of potential water damage from a leaking roof. Structures immediately adjacent to the building, such as stairways or platforms, appear in overall worse condition than the building itself.

The following is a summary of a historical erosion report. Currently, the Old BIA School building is located approximately 240 feet from the river. The United States Army Corps of Engineers has estimated that erosion rates may be as high as 5 - 10 feet per year in the area near the Ninglikfak River and the erosion is impacting the area near the village and the Old BIA School building (USACE 2008). In order for a building as large as the Old BIA School building to be threatened, the riverbank would likely not have to reach all the way to the building itself. Slope stability near a heavy building may require a large distance from the building to the nearest cliff or bluff. Considering the estimated erosion rates and potential slope stability concerns, it seems plausible the Old School building may be at risk from riverbank erosion in approximately 20 years.

Foundations for the Old BIA School ASTs appear to be rotting. Even if the tanks have been determined to be "empty", there is likely to be residual sludge in the bottoms of the ASTs. If the foundations fail, there is potential for the ASTs to be damaged and release potential residual petroleum. However, the berm around the tank farm appears to be in good condition and might contain a potential release from spreading horizontally.

There are two transformers located south of the Old School building (Figure 3). There is no obvious evidence of leakage of fluid and laboratory analytical results of soil samples collected beneath the transformers for polychlorinated biphenyls (PCBs) were non-detect.

The community of Chevak has expressed legitimate concerns regarding safety and hazardous conditions associated with the facility. There is a potential for injury to community members and a very real potential a fire could start in the abandoned facility which would threaten nearby village facilities. Currently the facility is boarded up, however based on E3's site investigation it is apparent that village members are accessing the facility (See Photo Log). The facilities' associated structures, including stairs and platforms are constructed of wood and appear to be severely compromised. This raises concerns about potential injuries for community members who attempt to enter the facility. Currently the facility poses a serious safety and hazard concern, especially to children and possible animals whom may be attracted to the site.

8.0 DISCLAIMER

This report has been prepared for the exclusive use of the client in a manner consistent with generally accepted professional consulting principles and practices for the same locality under similar conditions. No other representations or warranties, expressed or implied, are made. These services were performed consistent with our agreement with our client. This work product is intended solely for the use and information of our client unless otherwise noted. Any reliance on this work product by a third party is at such party's sole risk.

Opinions and recommendations contained in this work product are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. The data reported and the findings, observations, and conclusions expressed are limited by the scope of work. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work product.

The purpose of an environmental assessment is to reasonably evaluate the potential for or actual impact of past practices on a given site area. In performing an environmental assessment, it is understood a balance must be struck between a reasonable inquiry into the environmental issues and an exhaustive analysis of each conceivable issue of potential concern. The following paragraphs discuss the assumptions and parameters under which such an opinion is rendered.

No investigation is thorough enough to exclude the presence of hazardous materials at a given site. If hazardous conditions have not been identified during the assessment, such a finding should not be construed as a guarantee of the absence of such materials on the site, but rather as the result of the services performed within the scope, limitations, and cost of the work performed.

Environmental conditions that cannot be identified by visual observation may exist at the site. Where subsurface work was performed, our professional opinions are based in part on interpretation of data from discrete sampling locations that may not represent actual conditions at unsampled locations.

The passage of time, manifestation of latent conditions, or occurrence of future events may require further study at the site, analysis of the data, and/or reevaluation of the findings, observations, and conclusions in the work product.

This work product presents professional opinions and findings of a scientific and technical nature. The work product shall not be construed to offer legal opinion or representations as to the requirements of, nor the compliance with, environmental laws rules, regulations, or policies of federal, state or local governmental agencies.

9.0 REFERENCES

Alaska Department of Environmental Conservation. *Register 188, Tables B1 and B2*. July 2015.

Alaska Department of Environmental Conservation. *Draft Field Sampling Guidance*. May 2010.

APC Services, LLC. *Phase I Environmental Site Assessment Report Chevak Old School*. August 18, 2014.

CRREL. *Roof Leaks in Cold Regions: School at Chevak, Alaska*. April 1980.

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GAO. *Report to Congressional Requesters. Alaska Native Villages. Limited Progress Has Been Made on*

Kashunamiut School District. *Asbestos Map*. November 4, 1991.

USACE. *Alaska Baseline Erosion Assessment*. Erosion Information Paper – Chevak, Alaska. December 5, 2008.

10.0 SIGNATURES

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Figures

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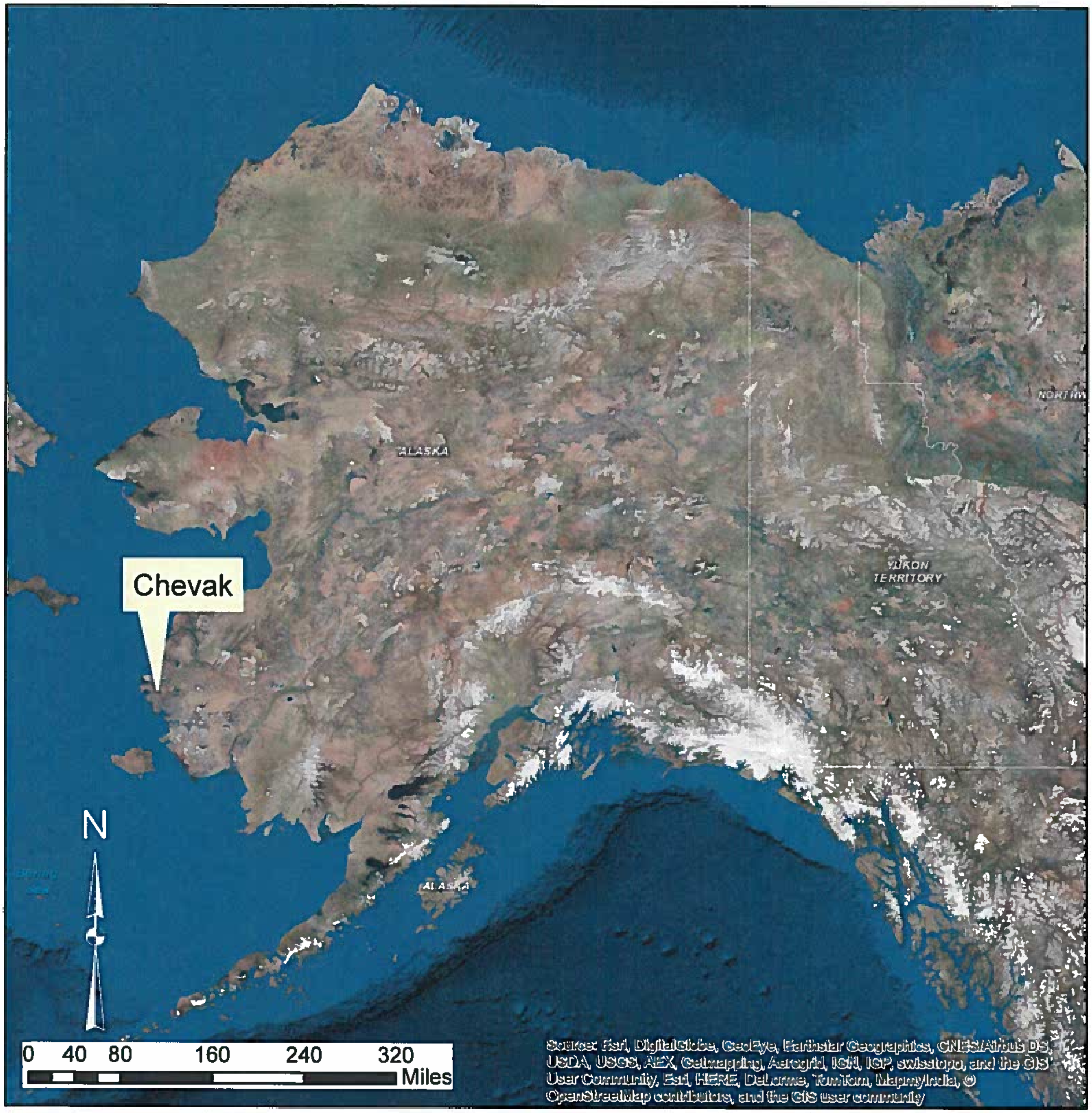

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Figure 1. Site Location Map

Site Name: Old School
Chevak, Alaska
October 2015

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Figure 2. Vicinity Map

Investigation Report
Site Name: Old School
Chevak, Alaska
Hazard ID: NA
October 2015

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Figure 3. Soil Boring Locations

Investigation Report
Site Name: Old School
Chevak, Alaska
Hazard ID: NA
October 2015

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Tables

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Table 1
GPS Coordinates
Old School - Chevak, Alaska
ADEC Hazard ID: NA

Location ID	N	W
Transformer 1 (soil)	61.52795	165.58725
Transformer 2 (soil)	61.52793	165.58719
battery 1	61.52870	165.58646
battery 2	61.52860	165.58624

Coordinates in decimal degrees

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Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/8/2015	10/8/2015	10/7/2015	10/7/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Michael Teve	Andrew Boyscout	Dennis Jones	Leo Pingayak
	Title:	Chevak Co Corp, Hardware Supervisor	Resident	City Administrator	City Maintenance
	Past:				
1	Construction				
1.1	Company	no answer given	no answer given	no answer given	unknown
1.2	Date of Construction	no answer given	Used trailers after burn, 1978- first Grad class approx. 19777	1976	unknown
1.3	List of Construction documents	no answer given	no answer given	no answer given	no answer given
2	Years in use	no answer given	Till 2002, 2003 - new school finished and operating	2003	no answer given
3	Information indicates there was a former school at the Old Chevak School Site which burned down. Can you provide information about when the former school burned and if the debris from the fire was buried in Chevak or shipped out?	no answer given	Approx. 1972, Dumped into a Crevasse near the river, some to dumpsite	no idea, site was cleaned up	probably to dump
	Present:				
4	Current status of facilities/land?	no answer given	no answer given	unused	not used/ city owned land
5	Deed/proof of current ownership?	no answer given	no answer given	city has deed	no answer given
6	Any remediation requirements?	no answer given	no answer given	not my area of knowledge	none known - spill around old maintenance bldg.,
7	Are there community concerns about unsafe conditions at the Old School?	Kids going inside, wrecked outside lights, kids going in underneath Bldg.	Asbestos - not sure about what has been done. No other concerns. Know about plans to do something about it. There has been vandalism before. Every empty building.	none noted, lack of understanding of Bldg. contents	Few areas with asbestos inside school, elbows. Tiles in Kitchen area. Replaced tiles in kitchen area around 1996. Paint peeling, mold forming. Probably used oil based paint.
8	Do children play within the Old School? Have there been any accidents that have occurred at the facility since being boarded up?	none noted	None	nobody goes in since boarded up, aware of none, prior vandalism stated	not sure
9	Where does the community obtain their drinking water?		Well - piped into most homes	underground well, testing; ok- water plant give reports: monthly and quarterly reports	no answer given
10	Is the community in any discussions with federal agencies (BIA or others) or elected officials about the need to address this site?	not aware of any	Not aware	none -don't think so	not known

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/8/2015	10/8/2015	10/7/2015	10/7/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Michael Teve	Andrew Boyscout	Dennis Jones	Leo Pingayak
	Title:	Chevak Co Corp, Hardware Supervisor	Resident	City Administrator	City Maintenance
	Future:				
11	In what ways would the community like to be involved in this project?	was mentioned at a Chevak Co Corp Meeting	no answer given	city has been making an effort to lead the project. Noted as appreciated	not known
12	What are the community's desires/plans for site?	In a meeting there was mention of office space, arts/crafts display. Indecisive in meeting. Sleeping quarters for construction workers, hotel, ecology, bird watchers	They have drafted floor plans with community meeting w/ tribal and corporation entities	multi purpose community center.	multi purpose community center.
13	Does the community have any ideas for re-use of the facility and/or the property?	no answer given	central business office for community, desire of TC to have local hire.	city office, post office	not known. A lot could be reused, i.e. copper tubing/ wiring, air handling in place. All classrooms have baseboard heat, copper tubing above ceiling, 4 in water/heating lines walled and sheet rocked
	Other Comments:	No other comments	1980 - TC took over Old School; idea for a local area resident to obtain Hazmat certification; want to see something done about old school building		

Table 2

Summary of Interviews

Old School

Chevak, Alaska

	Date:	10/7/2015	10/7/2015	10/7/2015	10/7/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Leo Pingayak	Cynthia Friday-Aguchak	Shane Luke	Scott Ulroan
	Title:	TC Environmental Dept.	TC Environmental Dept.	Villiage Police officer	Villiage Police officer
	Past:				
1	Construction				
1.1	Company	no answer given	no answer given	no answer given	no answer given
1.2	Date of Construction	1971/1972	1971/1972	no answer given	no answer given
1.3	List of Construction documents	no answer given	no answer given	no answer given	no answer given
2	Years in use	Till 2003	Till 2003	no answer given	no answer given
3	Information indicates there was a former school at the Old Chevak School Site which burned down. Can you provide information about when the former school burned and if the debris from the fire was buried in Chevak or shipped out?	probably to old dumpsite - don't know	probably to old dumpsite - don't know	no answer given	no answer given
	Present:				
4	Current status of facilities/land?	city owned	city owned	no answer given	no answer given
5	Deed/proof of current ownership?	no answer given	no answer given	no answer given	no answer given
6	Any remediation requirements?	not known	not known	Asbestos, Vandalized inside, boarded up - no concerns	Asbestos, Vandalized inside, boarded up - no concerns
7	Are there community concerns about unsafe conditions at the Old School?	boarded up entries, concerned about rotten stairs in the backside-kids playing there	boarded up entries, concerned about rotten stairs in the backside-kids playing there	no answer given	no answer given
8	Do children play within the Old School? Have there been any accidents that have occurred at the facility since being boarded up?	not aware	not aware	no answer given	no answer given
9	Where does the community obtain their drinking water?	well - water/sewer piped and well. Some are disconnected	well - water/sewer piped and well; some are disconnected	no answer given	no answer given
10	Is the community in any discussions with federal agencies (BIA or others) or elected officials about the need to address this site?	not known	not known	no answer given	no answer given

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/7/2015	10/7/2015	10/7/2015	10/7/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Leo Pingayak	Cynthia Friday-Aguchak	Shane Luke	Scott Ulroan
	Title:	TC Environmental Dept.	TC Environmental Dept.	Villiage Police officer	Villiage Police officer
	Future:				
11	In what ways would the community like to be involved in this project?	participate in planning meetings	participate in planning meetings	no answer given	no answer given
12	What are the community's desires/plans for site?	multi purpose community center.	multi purpose community center.	no answer given	no answer given
13	Does the community have any ideas for re-use of the facility and/or the property?	city/TC/ Corp could move into bldg. for combined use, has kitchen	city/TC/ Corp could move into bldg. for combined use, has kitchen	no answer given	no answer given
	Other Comments:	Community tried to use for dancing - too smelly/ moldy moved to new school; TC tried Food Bank of Alaska, this and other program can happen, old gym good for basketball, old play deck - safety concern, should be removed.	Community tried to use for dancing - too smelly/ moldy moved to new school; TC tried Food Bank of Alaska, this and other program can happen, old gym good for basketball, old play deck - safety concern, should be removed.	* brief interview lack of time	* brief interview lack of time

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/9/2015	10/8/2015	10/8/2015	10/8/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Matthew Ulroan	James Tuluk	Joseph George	Ray Atchak
	Title:	City Police Officer	Heavy Equipment Operator	Resident /Elder	Corporation Manager
	Past:				
1	Construction				
1.1	Company	no answer given	no answer given	no answer given	Don't remember, long ago. Maybe Kelly - Ryan
1.2	Date of Construction	no answer given	no answer given	no answer given	1974/75: Completed school here when it was new
1.3	List of Construction documents	no answer given	no answer given	no answer given	no answer given
2	Years in use	no answer given	no answer given	no answer given	till approximately 2003, 28-30 years
3	Information indicates there was a former school at the Old Chevak School Site which burned down. Can you provide information about when the former school burned and if the debris from the fire was buried in Chevak or shipped out?	no answer given	no answer given	no answer given	Old Dumpsite, possibly
	Present:				
4	Current status of facilities/land?	no answer given	needs total renovation inside	no answer given	no answer given
5	Deed/proof of current ownership?	no answer given	no answer given	no answer given	city of Chevak
6	Any remediation requirements?	no answer given	no answer given	no answer given	not known
7	Are there community concerns about unsafe conditions at the Old School?	none, no concern	no answer given	no concerns	Asbestos. Skirting around old building is a big concern, about children/youth getting under building and starting a fire. Concern about fire affecting and spreading to other structures and near by tanks exploding
8	Do children play within the Old School? Have there been any accidents that have occurred at the facility since being boarded up?	Children play underneath old school. Informed city to board up. They (children) still open up. Kids are very mischievous	children play around, children enter at times; not heard of any accidents	no answer given	concern about liability to city if any one gets hurt in the area. Better to remove the play deck or fix it.
9	Where does the community obtain their drinking water?	no answer given	no answer given	no answer given	Well in town. Concern about odors around old school site. If there is anything leaking toward lake.
10	Is the community in any discussions with federal agencies (BIA or others) or elected officials about the need to address this site?	no answer given	Don't know	no answer given	Earlier discussions about old school use have not gone anywhere, even at Kasunsmiut forum.

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/9/2015	10/8/2015	10/8/2015	10/8/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	Matthew Ulroan	James Tuluk	Joseph George	Ray Atchak
	Title:	City Police Officer	Heavy Equipment Operator	Resident /Elder	Corporation Manager
	Future:				
11	In what ways would the community like to be involved in this project?	no answer given	city and tribe to work together	no answer given	Fix up usable structures, heating will be high, look into energy efficiency options
12	What are the community's desires/plans for site?	no answer given	would be good if old school can become usable for community use	no answer given	no answer given
13	Does the community have any ideas for re-use of the facility and/or the property?	no answer given	Gym is reusable for community use, local games or activities for young people, carnivals, holiday games.	fix up for community use, not just let it sit there.	Place for non profit services, learning center, career center for surrounding villages.
	Other Comments:				Will this help look for bigger funding based on findings?

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/7/2015	10/9/2015	10/8/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	John Pingayak	Henry Smart	Peter Ulroan
	Title:	Resident	AVEC Plant Operator	Radio station
	Past:			
1	Construction			
1.1	Company	Harry Ferguson Co; under BIA	no answer given	no answer given
1.2	Date of Construction	1974/75	1970's	no answer given
1.3	List of Construction documents	no answer given	no answer given	no answer given
2	Years in use	until 1993	no answer given	no answer given
3	Information indicates there was a former school at the Old Chevak School Site which burned down. Can you provide information about when the former school burned and if the debris from the fire was buried in Chevak or shipped out?	1972/73 - School burned, not known what happened to debris Air conditioning not adequate; can be lots of condensation in large gathering	no answer given	no answer given
	Present:			
4	Current status of facilities/land?	City of Chevak	no answer given	no answer given
5	Deed/proof of current ownership?	no answer given	no answer given	no answer given
6	Any remediation requirements?	none known, stated there will be some contaminants soaked	no answer given	no answer given
7	Are there community concerns about unsafe conditions at the Old School?	well constructed - on pilings	Kids might play around with it and burn it down. It is a community hazard, might have asbestos. Old dilapidated sidewalks.	no answer given
8	Do children play within the Old School? Have there been any accidents that have occurred at the facility since being boarded up?	would caution children not to play in area	No idea it was boarded, kids can go underneath bldg. ; No accidents noted.	no answer given
9	Where does the community obtain their drinking water?	community well; needs to be checked quarterly to make sure it is safe; contaminates can seep through; safety of water is main concern	no answer given	no answer given
10	Is the community in any discussions with federal agencies (BIA or others) or elected officials about the need to address this site?	no answer given		no answer given

Table 2
Summary of Interviews
Old School
Chevak, Alaska

	Date:	10/7/2015	10/9/2015	10/8/2015
	Interview conducted by:	Oscar Evon	Oscar Evon	Oscar Evon
	Person interviewed:	John Pingayak	Henry Smart	Peter Ulroan
	Title:	Resident	AVEC Plant Operator	Radio station
	Future:			
11	In what ways would the community like to be involved in this project?	entities need to work together: TC, City, Corp	no answer given	no answer given
12	What are the community's desires/plans for site?	use as a community resource center, cultural craft training, education center; Outside schools are prohibitively expensive. Students can graduate from here.	no answer given	no answer given
13	Does the community have any ideas for re-use of the facility and/or the property?	Need to advance community needs. Try to acess all resources to benefit community residents.	If not going to be used, tear it apart and distribute to village. Restaurant option, kitchen and lobby areas.	no answer given
	Other Comments:	Infrastructure is the answer they are looking for to access all resources.		Mr. Ulroan was willing to share knowledge in the form a written document provide to Oscar Evon.History of Chevak Old School Property

Table 3
Laboratory Analytical Summary
Old School, Chevak, Alaska
ADEC Hazard ID: NA

						Location→	battery 1		battery dup 1		battery 2		transformer 1 (soil)		transformer dup 1 (soil)		transformer 2 (soil)	
						Depth (feet-feet)→	0-1		battery 1		0-1		0-1		transformer 1 (soil)		0-1	
						Date→	10/08/2015		10/08/2015		10/08/2015		10/08/2015		10/08/2015		10/08/2015	
			Under 40-inch Zone [1]															
CAS Number	Hazardous Substance	Units	Direct Contact/ Ingestion	Outdoor Inhalation	Migration to Groundwater [1]	Maximum Allowable Concentration [1]	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
PCBs																		
12674-11-2	Aroclor-1016	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
11104-28-2	Aroclor-1221	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
11141-16-5	Aroclor-1232	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
53469-21-9	Aroclor-1242	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
12672-29-6	Aroclor-1248	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
11097-69-1	Aroclor-1254	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
11096-82-5	Aroclor-1260	ug/kg	-	-	-	-	-		-		-		30.9	U	31.3	U	30.2	U
133-63-63	Polychlorinated biphenyls(PCBs)	ug/kg	1,000	-	-	-	-		-		-		216	U	219	U	211	U
Metals																		
7439-92-1	Lead	mg/kg	400	-	-	-	30.7		11.3		17.8		-		-		-	

Notes:

ADEC = Alaska Department of Environmental Conservation
mg/kg = milligrams/kilogram
ug/kg = micrograms/kilogram
Q = Laboratory analytical data qualifier column

PAH= Polyaromatic hydrocarbon
PCB= Polychlorinated biphenyl
SVOC= Semi-volatile organic compound
VOC= Volatile organic compound

- = No tapplicable/not available (when entire cell content is "-")
[1] = ADEC Criteria from Tables B1 and B2, Register 214, July 2015.
bold = Analytical result exceeds regulatory criteria.

Laboratory Data Qualifiers

U = Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

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Appendix A

Historical Records

CRREL

REPORT 80-11

Roof leaks in cold regions: School at Chevak, Alaska

CRREL Report 80-11

Roof leaks in cold regions: School at Chevak, Alaska

Wayne Tobiasson and Philip R. Johnson

April 1980

Prepared for
U.S. BUREAU OF INDIAN AFFAIRS
By
UNITED STATES ARMY
CORPS OF ENGINEERS
COLD REGIONS RESEARCH AND ENGINEERING LABORATORY
HANOVER, NEW HAMPSHIRE 03755

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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3. RECIPIENT'S CATALOG NUMBER

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Leakage
Roofs
Snow
Subarctic regions

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Four types of roof leaks occurred at a new school building in Chevak, Alaska: 1) blowing snow entered the roof through eave vents and then melted, 2) slush and ice in roof valleys caused meltwater to overflow the valley flashing and run into the building, 3) water entered at a roof/wall intersection and 4) in many areas water entered through gaps in the sloping plywood deck. Sealing the eave vents made it impossible for blowing snow to enter the roof at the eaves. Electric heat tapes eliminated the valley icing problem. Missing flashing was responsible for the roof/wall intersection leaks. The absence of a vapor barrier in the roof was the cause of many leaks. We recommended that the roof be repaired from the exterior by removing component elements down to the plywood deck,

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. Abstract (cont'd).

installing an adhered continuous vapor barrier and reassembling the roof. An alternative roof cladding of composition shingles was discussed as was conversion to a "cold roof." The roof was repaired and modified following our recommendations, and problems appear to have been solved.

PREFACE

This report was prepared by Wayne Tobiasson, Research Civil Engineer, of the Civil Engineering Research Branch, Experimental Engineering Division, and Philip R. Johnson, formerly a Research Civil Engineer at the Alaskan Projects Office, U.S. Army Cold Regions Research and Engineering Laboratory.

This study was conducted for the Division of Facilities Engineering, Bureau of Indian Affairs (BIA), United States Department of the Interior under Letter Agreement W56-566 dated 17 March 1978 and entitled *Condensation Problems, BIA School, Chevak, Alaska.* The on-site inspection was made by Philip Johnson of CRREL and George Morgan, Jim Goddard and Dave Trantham of the Bureau of Indian Affairs. This report was technically reviewed by E. Lobacz, S. Flanders and C. Korhonen of CRREL.

A report to the Bureau of Indian Affairs in May 1978 summarized the CRREL findings and provided recommendations for eliminating roof leaks. This report is a somewhat more comprehensive overview of the many roof leak problems of the Chevak school.

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CONVERSION FACTORS: U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

These conversion factors include all the significant digits given in the conversion tables in the ASTM *Metric Practice Guide* (E 380), which has been approved for use by the Department of Defense. Converted values should be rounded to have the same precision as the original (see E 380).

Multiply	*By*	*To obtain*
inch	25.4*	millimeter
foot	0.3048*	meter
mile	1.609347	kilometer
degrees Fahrenheit	$t_{°C} = (t_{°F} - 32)/1.8$	degrees Celsius

*Exact

ROOF LEAKS IN COLD REGIONS: SCHOOL AT CHEVAK, ALASKA

Wayne Tobiasson and Philip R. Johnson

INTRODUCTION

In 1975-76 the Bureau of Indian Affairs (BIA) built a large school in Chevak, Alaska, to replace a smaller school that had burned. Even before the new building was first occupied in November 1976, serious roof leaks developed and several corrective measures attempted during the next 16 months did not eliminate these leaks. During March 1978 we studied engineering drawings of the school and examined correspondence relative to the roof leaks. On 21-22 March 1978 an on-site inspection was made of the Chevak School.

Chevak is an Eskimo village of about 550 persons on the Yukon–Kuskokwim Delta in western Alaska. It is 140 miles WNW of Bethel and 17 miles east of Hooper Bay (Fig. 1). Transportation to Chevak is by river during the summer and by air from Bethel year-round. The Yukon–Kuskokwim Delta is a flat, treeless, low-lying area covered with innumerable small lakes. The area is snow-covered and essentially featureless during the winter and almost impassable in the summer.

DESCRIPTION OF SCHOOL

The school was being used for its second academic year during the March 1978 on-site inspection. At that time it had an enrollment of 165 pupils ranging in grade level from kindergarten to high school. The professional staff consisted of 14 teachers and 2 teacher's aides, while 3 janitors operated and maintained the building. The school was well furnished and equipped. Quality furniture, carpeting and numerous teaching aids were present. It was the newest and largest BIA rural school in the Bethel area and was generally built and furnished to high standards.

An isometric drawing of the school is shown in Figure 2. Classrooms, offices, a kitchen and a cafeteria are located in the 96- × 209-ft main portion, which we will call the "school." A 33- × 84-ft connecting section, which we will call the "locker rooms," contains the main entries, toilets and locker rooms. It leads to the 57- × 84-ft gymnasium.

The complex is elevated above the ice-rich permafrost on wooden piles. Wooden skirting, open near the ground, is present along the perimeter of the building. Glued laminated wooden floor beams placed on the piles support wood floor trusses. Steel and wooden columns and bearing walls with 2 × 6 studs support the roof which, like the floor, consists of glued laminated roof beams, wooden trusses and the roof itself. Each roof is sloped 3 on 12 and consists of a 1-1/8-in. plywood deck resting on the roof trusses. Above the plywood, 2 × 6 purlins run along the roof, 6 ft—1½ in. on center, parallel to the eaves. Four inches of expanded bead polystyrene insulation is placed between the purlins which support corrugated metal roofing. This roof system is shown in Figure 3. No vapor barrier is indicated on the as-built drawings.

Before modifications were made by BIA personnel, the roof was ventilated by a system consisting of the eave vents shown in Figure 4, the shallow space between the top of the

Figure 1. Location map.

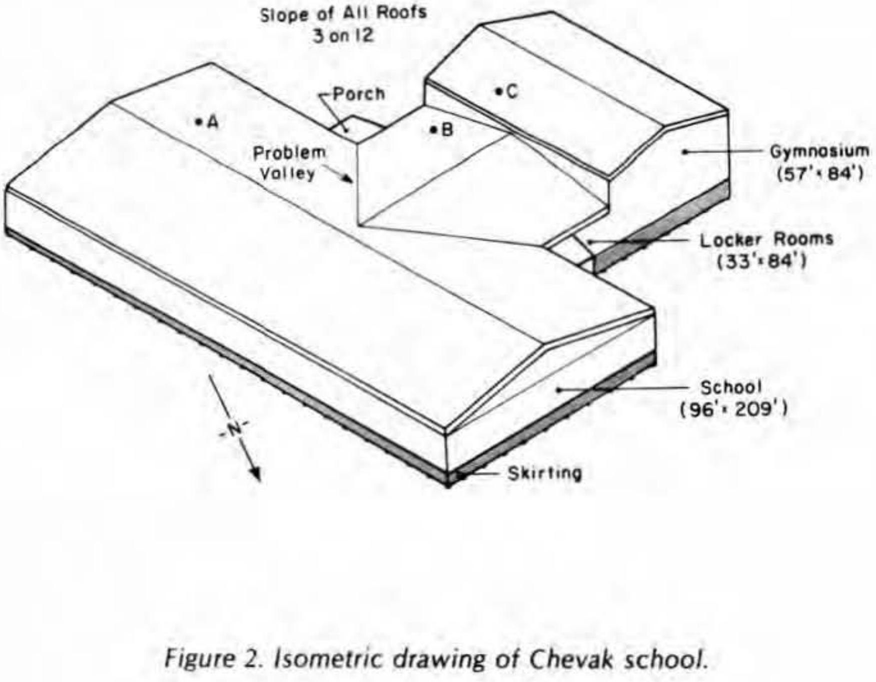


Figure 2. Isometric drawing of Chevak school.

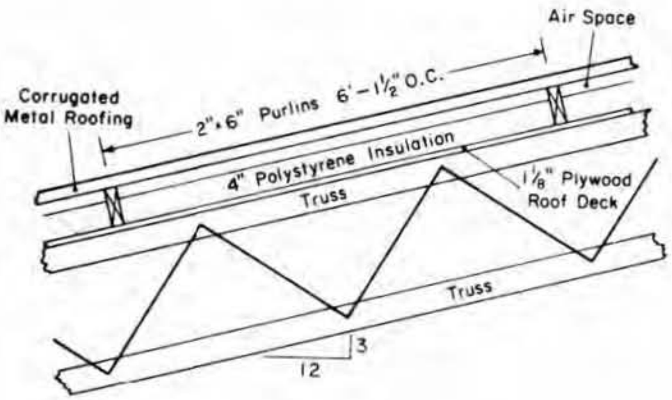


Figure 3. Cross section of roof.

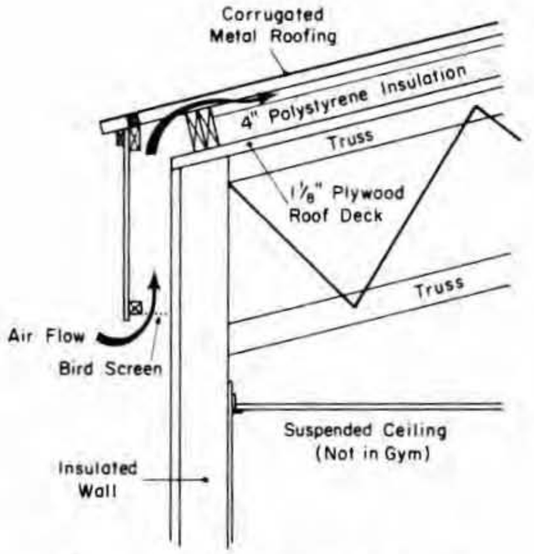


Figure 4. Detail of ventilated eave.

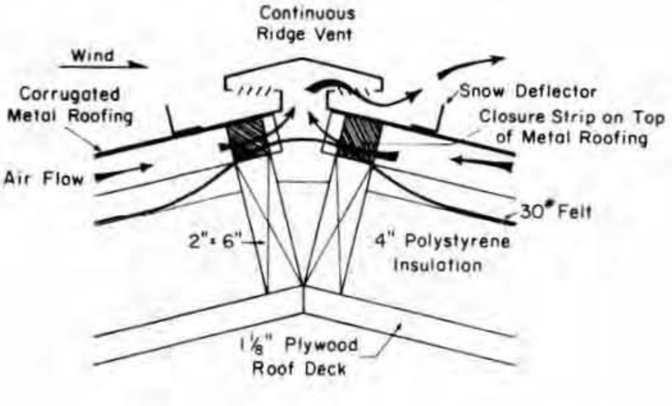


Figure 5. Detail of ventilated ridge.

polystyrene insulation and the metal roofing, and the ridge vent shown in Figure 5. Ventilation was provided to prevent moisture accumulation in the roof. The ability of such a roof to accumulate moisture from within the building is greatest in the winter and the ability of the ventilation system to remove such moisture is greatest in the summer. Ventilation also serves to cool the underside of the corrugated metal, thereby reducing the potential for eave icings. Most of the building has an uninsulated suspended ceiling which in many areas has been badly water stained (Fig. 6). However, some portions including the gymnasium have no ceiling and are open to the underside of the roof deck as shown in Figure 7.

ROOF PROBLEMS

Serious roof leaks, which developed even before construction was completed, have continued to plague this building. The leaks have consisted of four types, two of which have been diagnosed and eliminated by BIA personnel. We have given the four types of leaks the following designations:

1. Snow infiltration leaks
2. Valley leaks
3. Intersection leaks
4. Condensation leaks.

Although many leaks on sloping roofs in cold regions can be traced to eave icings, there have been no serious eave icings reported at the Chevak school except at the valleys.

SNOW INFILTRATION LEAKS

Snow infiltration leaks developed during the late fall and early winter of 1975 while the buildings were closed-in but still being finished. Water entered the building in many areas at seams in the plywood roof deck. Some of the metal roofing was removed and it was found that snow had blown into the roof through the eave vents (Fig. 4) and was packed in the shallow ventilation space between the top of the insulation and the metal roofing. When the building was heated, the snow melted and the meltwater entered the building.

These leaks were easily cured. BIA personnel sealed the vents with plywood, making it impossible for snow to blow into the roof at the eaves.

VALLEY LEAKS

Once the building was occupied, severe leaks developed in the areas of the roof valleys, particularly in the lower portion of the "problem valley" shown in Figure 2. Valley leaks were caused by entry of snow meltwater. These leaks did extensive damage to the suspended ceilings and threatened to ruin the carpet and other inside furnishings.

Strong prevailing winter winds from the north and northeast keep the roofs of this building generally, but not completely, free of snow. Snow does drift into and around the "problem valley" which is on the lee side of the two intersecting roofs. With snow in the valley and on the slopes above the valley, conditions are conducive to ice buildup in the valley. On calm and sunny winter or spring afternoons when the ambient temperature rises toward the freezing point, snow on the roof begins to melt due to additional heat gain from solar radiation. The meltwater runs down into the valley where it wets the snow, forming slush. As the sun goes down, the temperature drops and the slush in the valley freezes. Repetitions of this daily cycle choke the valley with slush and ice so that meltwater draining into it overtops the valley flashing and enters the roof.

The main problem area is the lower half of the valley where snow tends to accumulate and meltwater from a large area of the roof concentrates.

Figure 8 is a cross section of the Chevak school's roof valley. Considering the thermal movements to which the metal is subjected, it must be assumed that the seals between the flashing, closure strip and corrugated metal are not water-tight. As long as the valley is clear, water drains down the valley and off the roof. However, when the valley contains slush and ice, meltwater rises in the valley and gets behind the closure strips (Fig. 8). Since the depth of the channel provided by the valley flashing is only about 2 in., it does not take much ice and slush to cause water to overtop the flashing and enter the roof.

BIA personnel solved the problem of valley leaks by installing electrical heat tapes in the lower half of each valley (Fig. 9). These heat tapes maintain an open channel down each valley which allows drainage of the meltwater.

Many simple corrugated metal roofs (i.e. those without valleys) perform well in cold regions. However, valleys in corrugated metal roofing in

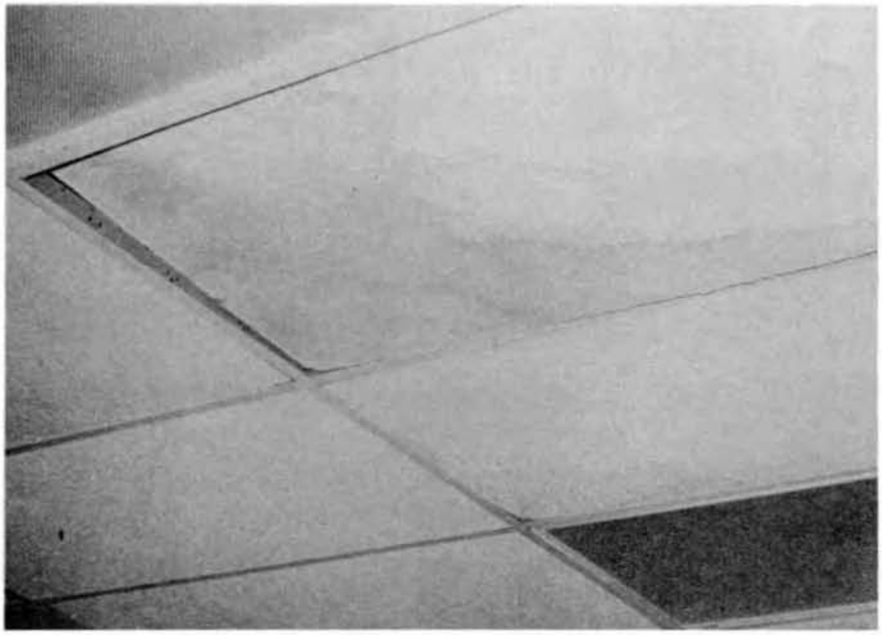


Figure 6. Suspended ceiling stained by water in many areas.

Figure 7. Inside the gymnasium.

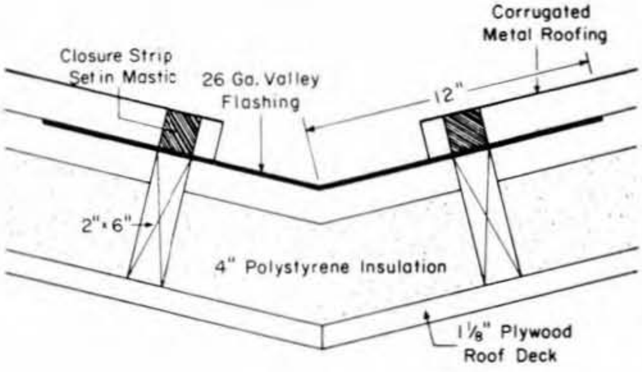


Figure 8. Valley detail.

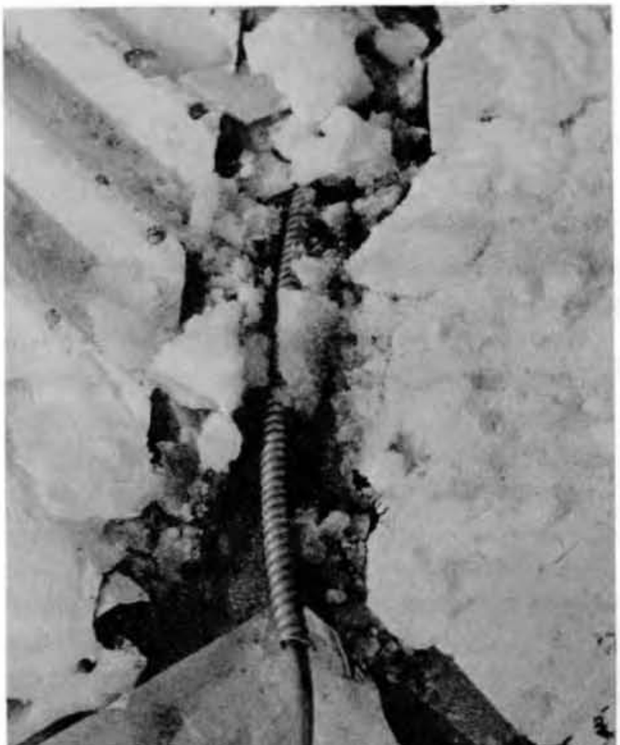


Figure 9. Electrical heat tape that has prevented the formation of slush and ice dams in the valley.

cold regions have significant problems. It is possible to design and build valleys that *shed* water but it is virtually impossible to make a valley in a corrugated metal roof *hold* ponded water.

During the inspection, a localized problem was observed at the eave of the "problem valley." Water draining down this valley falls on the sloped roof of an unheated porch (Fig. 10 and cover). Snow drifts onto this roof, and meltwater from the valley soaks into the snow and may freeze, creating heavy ice loads. During warm weather the ice melts loose and slides off this roof. This introduces a potential danger. A heat tape placed down the porch roof would allow drainage and minimize these problems.

INTERSECTION LEAKS

Leaks also developed at the intersection of the locker room roof and the gymnasium wall (Fig. 11). Water from these leaks damaged walls in the boys' and girls' locker rooms.

We did not investigate the leaks at the intersection of the gymnasium wall and the locker room roof. BIA personnel speculated that meltwater from the gymnasium roof was entering the ridge vent of the locker room roof where that roof intersects the wall of the gymnasium (Figs. 2 and 11).

We speculated that meltwater may have also entered the building along the joint between the gymnasium wall and the locker room roof in a manner similar to that described for valley leaks. If this had been the cause, electrical heat tapes could have prevented meltwater from backing up in this area.

When the roof was opened for repair and modification in 1979, the actual cause of this problem was found to be a missing piece of flashing along the gymnasium wall. This finding emphasized the difficulty of determining the cause of roof problems by visual examination only.

CONDENSATION LEAKS

Condensation leaks have occurred in most areas of the building complex. Water drips into the building through seams in the roof deck, particularly during warm weather following a cold spell. At times these leaks yield sufficient water to disrupt school activities, particularly in the gymnasium.

Before the on-site inspection, BIA personnel reported to us that the Chevak school roof did not have a vapor barrier. They suspected that the condensation leaks were related in some way to this factor. The absence of a vapor barrier was confirmed by drilling through the roof deck and insulation from below.

The 1-1/8-in. plywood roof deck rests directly on the roof trusses. The 4-×8-ft sheets are tongue-and-grooved on the 8-ft sides but only butt jointed at their ends. The butt joints occur above the trusses. Gaps between the sheets suggest that some shrinkage has occurred since the deck was installed. The gaps appear to be larger on the gymnasium roof deck than on that of the rest of the building.

Tests to verify the cause of condensation leaks

Air flow directions were determined by observing the movement of smoke and the ease by which doors would open or close. With all entry doors closed, the gymnasium was under a significant negative air pressure. Even with the fresh air intake of the forced hot air heating system opened and the oil burner operating, the negative pressure remained. Since such heating systems are designed to create positive pressure in heated spaces, the negative pressure observed here indicates that a significant amount of warm air was leaving the building through the roof deck.

Similar tests were conducted in other areas of the school. With the heating system operating and the fresh air intake blocked, these areas were also under negative pressure. When the fresh air system was activated, a slight positive pressure was generated. This indicated that the roofs of the "school" and "locker rooms" leaked air somewhat less than the gymnasium roof.

Roof leaks were observed in the gymnasium on 21 March 1978. The outside air temperature was around 20°F, the wind was almost calm, and the sun was shining. During the afternoon several roof leaks developed in the gymnasium near the ridge on the west-facing (sunlit) slope that persisted until late in the day. This was the warmest portion of that roof. Since there was no snow or ice on the roof at that time, it appeared that frost and ice *within* the roof was melted.

To verify that moisture was present within the roof, panels of the corrugated metal roofing

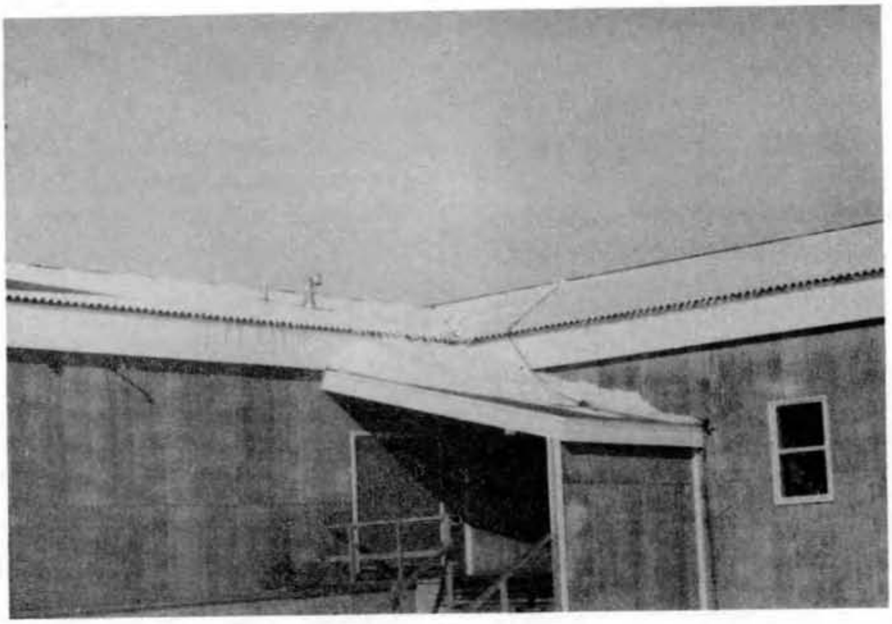


Figure 10. Porch roof on which snow and ice accumulates below the "problem valley."

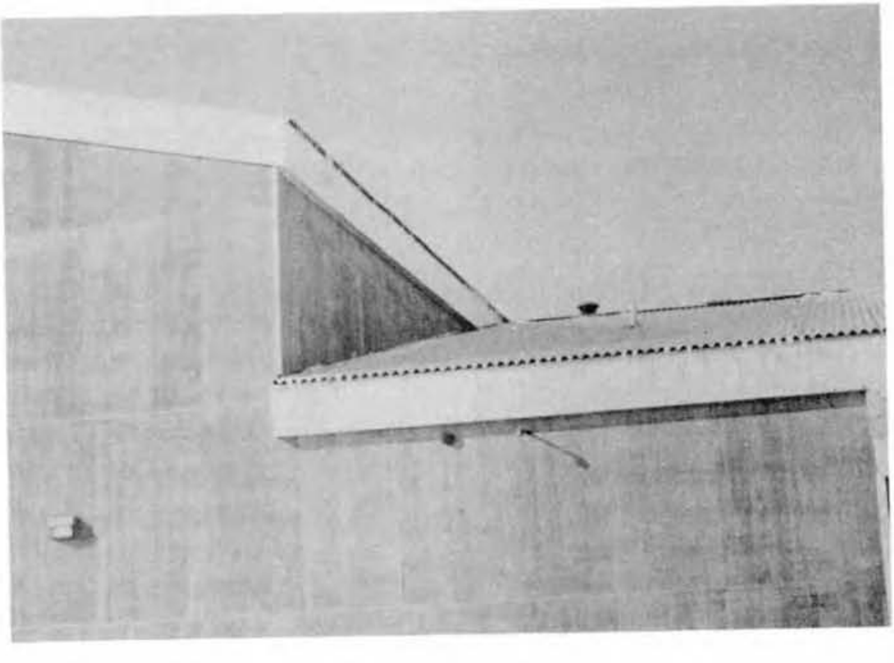


Figure 11. Intersection of gymnasium wall and locker room roof.

were lifted at points A, B and C in Figure 2. A small amount of frost was present on the underside of the roofing at point A. A quarter-inch of frost was present at B and 3/8 in. was present at C where some ice was observed on the insulation. These observations convinced all concerned that large quantities of warm moist air from within the building passed into the roof through gaps in the plywood deck and others in the insulation above. The underside of the cold corrugated metal roofing was an excellent condenser and, as the warm moist air passed up through the roof sandwich, frost formed on the metal. Warmer weather and sunshine warmed the frosted underside of the corrugated metal roofing. At some point it was warm enough to melt the frost and meltwater dripped onto the insulation where it either refroze, or in warmer weather flowed downslope. At a gap or seam in the insulation, the water flowed down to the deck. Since there were many gaps in the plywood deck, the water leaked into the building.

The purpose of a vapor barrier is to retard water vapor movement from the heated space both by diffusion and by air leakage. The absence of a vapor barrier was directly responsible for the condensation leaks experienced in this building. Without it moist air could leave the building and meltwater could return in many areas.

Eliminating the condensation leaks

To solve the condensation leak problem it would be necessary to greatly reduce the amount of moisture that enters the roof from within the building. Since the internal relative humidity was not excessive, reducing it would not solve the problem.

Some opportunities were present to lower the underside temperature of the roof by insulating the heating ducts located in the space above the suspended ceiling. Although lowering the temperature of the roof would be beneficial, it would not cause enough change to eliminate this problem. However, reductions in the magnitude, frequency and time of occurrence of roof leaks might be achieved.

Shortly after the CRREL-BIA inspection of this building, heating ducts above the suspended ceiling were insulated and modifications were made to draw return air for the forced hot air heating system from the area between the roof deck and the ceiling. These changes noticeably decreased the temperature in that area.

The direct way of preventing moisture within the building from entering the roof would be to vapor seal the plywood roof deck. Since the most problematic gaps in the plywood deck were between the chord members of the trusses, and essentially inaccessible, it did not appear possible to seal the roof effectively from within the building. Consequently we recommended an external fix. Although this would be an expensive, time-consuming task, it appeared to be the only way that roof leaks caused by air exfiltration could be eliminated if the existing warm roof were to be retained.

RECOMMENDATIONS FOR ELIMINATING CONDENSATION LEAKS

Repairing existing roof

The recommendations for repairing the BIA school roof are summarized below.

The air leakage-vapor seal must be located on the warm side of the roof insulation. To place it there, the corrugated metal roofing, the insulation and the purlins must come off temporarily. All gaps between sheets of plywood and all roof penetrations should then be primed and sealed. Since the plywood has a relatively low permeability, sealing the joints should create an effective vapor seal. However, we consider it prudent to also install a continuous vapor barrier over the entire roof. An adhered continuous vapor barrier would not only reduce vapor flow by diffusion through the plywood but, more importantly, would prevent air leakage in the likely event that all gaps between sheets of plywood and at penetrations are not totally sealed. A loose-laid vapor barrier would permit lateral moisture migration and would be inappropriate.

Four alternative vapor barriers are recommended:

1. A spray or brush applied liquid.
2. Two layers of no. 15 asphaltic felt imbedded in cold applied asphalt.
3. A coated base sheet bonded to the plywood and lap sealed with a rubberized adhesive.
4. A kraft paper-asphalt composite bonded to the plywood and lap-sealed with a rubberized adhesive.

If solvent-based adhesives are used with the vapor barrier, a separation layer should be placed between it and the polystyrene insulation to prevent damage to the insulation from the solvents.

With the vapor barrier in place and the purlins reinstalled, the original 4-in.-thick polystyrene insulation should be reinstalled. We expect that most of the existing insulation would not be damaged during removal since it is not bonded to the plywood but held in place by friction at the purlins. However, some replacement insulation should be purchased to replace any that is damaged. When reinstalling the insulation, any gaps or holes caused by damage or misfit should be stuffed full of glass fiber insulation. To conserve energy, an additional inch of polystyrene insulation should be added to the roof. This insulation should be installed so that its seams mismatch the seams of the 4-in.-thick existing insulation. Space exists for this insulation without interfering with roof ventilation.

With the corrugated metal roofing temporarily removed, the valley flashing should be widened. The existing width of 2 ft may be adequate near the ridge, but a width of 4 ft or more seems necessary at the eaves. A quality sealant should be used when placing the new valley closure strips. Permanent electrical heating cables should be installed in each valley.

The corrugated metal roofing is in very good condition and with a little care in handling and numbering should be easy to reinstall.

The ridge is the only safe place for maintenance personnel to walk along these roofs, particularly when there is snow on them. Accordingly, the ridges have been used as foot paths and the ridge vents (Fig. 5) have been flattened against the ridges. Although crushed, some air can still pass through them. The flattened ridge vents should be removed and replaced with elastomeric closure strips and a solid galvanized cap, robust enough to sustain foot traffic. Every 20-ft, the ridge cap should be penetrated with a 2-½-to 3-in.-diam, 24-in.-high black-painted vent stack (upside-down J). The eaves should remain blocked to preclude snow infiltration. If the roof is vapor-sealed as recommended above, we expect that the combination of local winds, air leaks in the metal roofing, and the modified ridge ventilation system will provide enough air movement to facilitate the small amount of summer drying required by the roof.

An alternative roof cladding

The above solution to the roof leak problem will be expensive and the metal roofing will continue to be susceptible to leakage caused by slush and ice in the valleys. Electrical heat cables will still be required in the valleys and perhaps on the locker room roof at the gymnasium wall. There is also a question as to how effective the corrugated metal roofing will be after removal and reuse.

If the corrugated metal roofing cannot be reused it is suggested that it be replaced with a composition shingle roof. Wind-tab composition shingles, which are designed for use in windy areas such as Chevak, would clad the roof. The shingles would be embedded in roofing cement at eaves, valleys, roof ends and penetrations for increased resistance to winds and meltwater. Such a roof can be made water-tight along valleys and at roof-wall intersections, thereby avoiding the dependency on electrical heat cables which can be problematic.

A composition shingle roof could be built on the existing deck and insulation after a vapor seal is applied as discussed previously, the insulation and purlins are restored and insulation is added. Two-by-four rafters 24-in. on center on the purlins would support a new plywood deck. Before installing the composition shingles on the plywood, roofing cement and no. 15 felt would be used to seal all plywood joints. Cement and felts would also be used to create a waterproof layer on the deck at the valleys and eaves where some slush and ice might accumulate. The plywood deck would be covered with loose-laid no. 15 felt placed shingle-fashion with a 50% overlap. New flashings would be installed in valleys and at roof/wall intersections. Eaves would remain blocked and the ridge cap would be reconfigured as discussed previously.

The "cold roof" alternative

During the on-site inspection, the alternative of changing the warm roofs of this building to cold roofs was discussed. A cold roof permits a significant amount of cold air to flow above the insulation and keeps the roof cladding relatively cold, thereby minimizing problems caused by meltwater, slush and ice. A building with insulation in the ceiling and a cold ventilated attic above has a cold roof. Air flow in the narrow space above the insulation in the Chevak school roof (Fig. 3) is not enough to cool the roof cladding significantly. In this building a cold roof could be created by installing a vapor barrier and insulation along the bottom of the roof trusses or at the level of the suspended ceiling, and then opening the gable ends and the ridge of each roof to allow cold outside air to cool this area. With appropriate baffling of air intakes, snow infiltration into this space could be minimized.

For the gymnasium, this approach seemed worth considering. It would have involved removal and replacement of the lights and heating system ducts attached to the lower chord of the trusses, but this did not appear to be a complex undertaking. The use of urea formaldehyde (UF) foamed-in-place insulation was considered for this application. UF foam is not normally recommended for attics because of expense and possible degradation by excessive summer heat. However, it would have been an effective way to insulate this roof in among the lower chord members of the trusses. Because the upper roof is reflective metal and contains insulation, and because this attic space would be ventilated, it would not have become warm enough to deteriorate the UF foam.

The ingredients of UF foam insulation are shipped to a job as liquids, thereby providing some logistical advantages for remote areas over other insulations that leave the factory in rather bulky forms. However, the cost of transporting a skilled UF foam applicator to Chevak might have outweighed such logistical advantages.

For the "school" and "locker rooms," a cold roof seemed difficult to install because of the equipment suspended from the lower chord of the trusses and the location of the warm air heating ducts above the suspended ceiling.

REPAIRS AND MODIFICATIONS

During the summer of 1979 a crew of Eskimos from the village repaired and modified the heating system and the roofs of the Chevak school under the direction of James Goddard of the Bureau of Indian Affairs. The roofs were repaired and modified from the exterior. Once the plywood deck was exposed by removing the corrugated metal roofing, insulation and purlins, a multilayer vapor barrier was installed. First, all joints in the plywood deck were sealed, and then a layer of kraft paper-backed aluminum foil was *adhered* to the deck. This was then covered with a coating of asphalt emulsion, a layer of 40-lb roofing felt and a second coating of asphalt emulsion. The original purlins and insulation were then reinstalled. An extra 1-½ in. of polystyrene insulation was added to the existing insulation before the original metal roofing was reinstalled.

New 4 ft-wide valley flashing was installed, with extra effort devoted to sealing between the flashing, the new closure strips and the corrugated metal using silicone sealant. Heat tapes were then installed in the valleys.

When the corrugated metal roofing was removed it was found that flashing had not been installed along the upper 4 ft of the roof at the gymnasium wall/locker room roof intersection. Water draining from the gymnasium roof found easy entry into the building because of this construction deficiency. Flashing was installed.

The ventilated ridge cap was replaced with a solid ridge cap vented every 20 ft with an inverted J.

The exterior work proved to be simple and effective. It was easily handled by a crew of construction laborers. By working from the exterior they avoided complications of dealing with internal equipment such as electrical, plumbing, heating and ventilating systems.

The repairs and modifications have been effective in eliminating the roof leaks at the school.

SUMMARY AND CONCLUSIONS

Four types of roof leaks occurred at the BIA school in Chevak, Alaska.

1. *Leaks by snow infiltration*, which were eliminated by blocking eave ventilation features.

2. *Leaks caused by slush and ice in the valleys*, which resulted from meltwater overtopping the valley flashing.

3. *Leaks due to a missing section of flashing* at the locker room/gymnasium intersection, which were solved with new flashing. Although simple construction deficiencies (e.g. the missing section of roof-wall flashing on this roof) explain some problems, it was often difficult to establish their existence until portions of the structure were opened for repair.

4. *Major condensation leaks*, which occurred in many areas of the building, were caused by the absence of a vapor barrier in the roof. Without it, vast quantities of warm moist air

from within the building entered the roof and the water vapor condensed as frost on the inside of the corrugated metal roofing. During warmer periods, the frost melted and subsequently leaked back into the building. To eliminate these leaks, the roof was disassembled from the exterior down to the plywood deck, a multilayer vapor barrier was adhered to the plywood, and the roof was reassembled. In the process, insulation was added, valley flashings were widened and a new robust ventilated ridge cap was installed. Collectively, the above actions appear to have solved the roof leak problems.

The Chevak study supports the following general conclusions about sloping roofs in cold regions:

1. In cold areas that experience significant amounts of blowing snow, the snow infiltration problems associated with conventionally-designed warm roof ventilation systems can be significant.

2. Valleys in corrugated metal roofs in cold regions should be avoided. Where valleys occur, designers and maintenance people must ensure a clear passage for meltwater down the valley during all seasons.

3. When the valley of a warm roof drains onto a cold roof, significant icing problems should be expected.

4. Air exfiltration through gaps in wooden roof decks can cause significant moisture problems in very cold regions if no separate air leakage barrier is present on the warm side of the insulation.

5. Roofs in cold regions require warm-side moisture barriers to retard outward movement of water vapor by diffusion and by air leakage. Air leakage at seams and gaps in the barrier can transmit vast quantities of moisture past a barrier with an otherwise low permeability.

This was found inside the Old School on October 8, 2015.

KASHUNAMIUT SCHOOL DISTRICT
985 KSD Way
Chevak, Alaska 99563
(907) 858-7713 FAX (907) 858-7328

NOTICE

THIS SPACE CONTAINS

ASBESTOS

AS NOTED ON THE ATTACHMENT

* * * * * * *

IF THIS ASBESTOS IS DISTURBED, DAMAGED, OR BECOMES AIRBORNE--
NOTIFY THE PRINCIPAL OR SUPERINTENDENT IMMEDIATELY

* * * * * * *

THIS NOTICE IS TO BE POSTED IN A CONSPICUOUS PLACE IN THE AREA INDICATED ON THE ATTACHED AS CONTAINING ASBESTOS

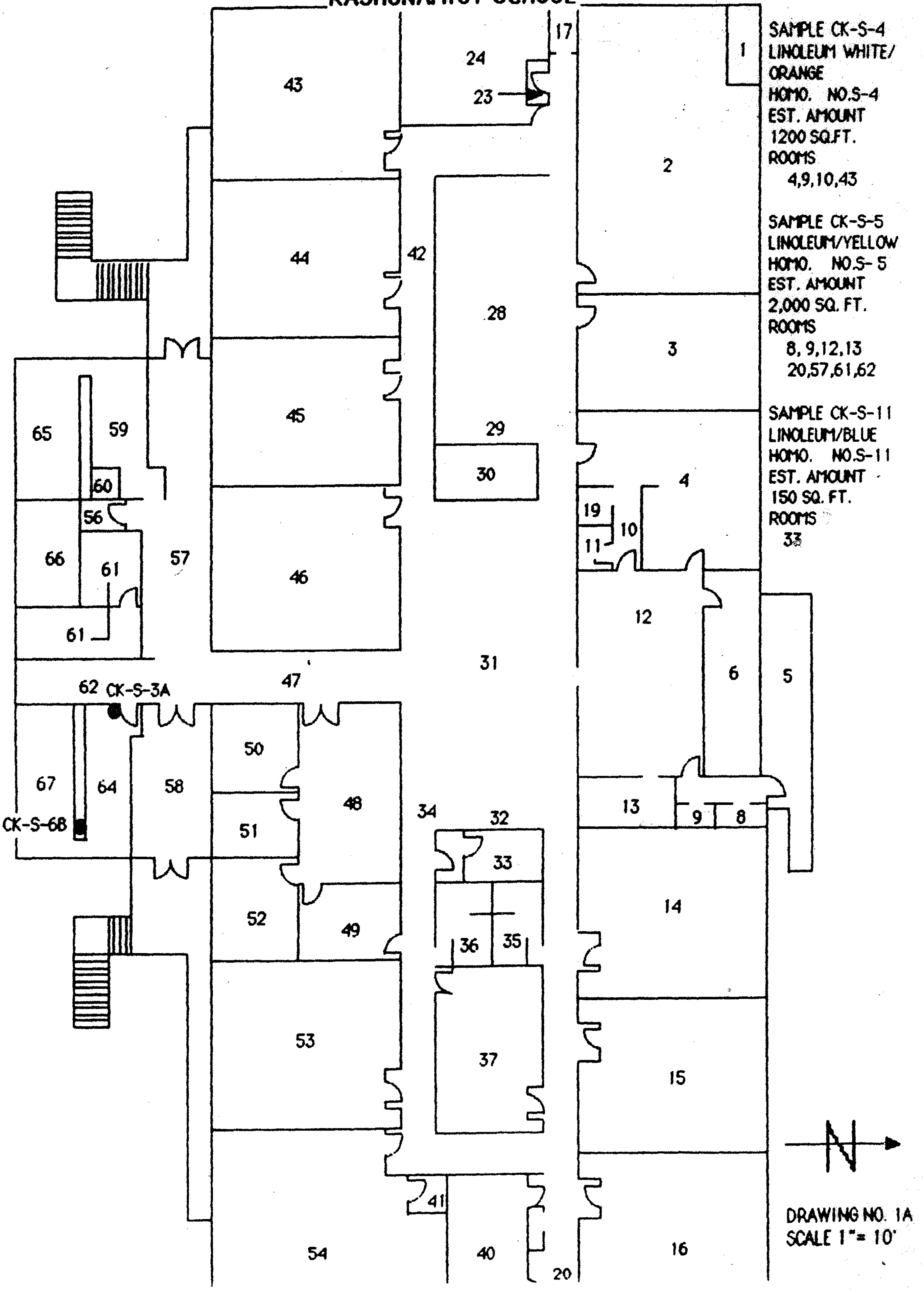
* * * * * * *

B. A. WEINBERG, SUPERINTENDENT
KASHUNAMIUT SCHOOL DISTRICT

NOVEMBER 4, 1991

A COMPLETE COPY OF THE DISTRICT'S ASBESTOS INSPECTION REPORT IS AVAILABLE FOR REVIEW IN THE SUPERINTENDENT'S OFFICE

KASHUNAMIUT SCHOOL



SAMPLE CK-S-4
LINOLEUM WHITE/
ORANGE
HOMO. NO.S-4
EST. AMOUNT
1200 SQ.FT.
ROOMS
4,9,10,43

SAMPLE CK-S-5
LINOLEUM/YELLOW
HOMO. NO.S- 5
EST. AMOUNT
2,000 SQ. FT.
ROOMS
8, 9,12,13
20,57,61,62

SAMPLE CK-S-11
LINOLEUM/BLUE
HOMO. NO.S-11
EST. AMOUNT
150 SQ. FT.
ROOMS
33

DRAWING NO. 1A
SCALE 1"= 10'

ALASKA BASELINE EROSION ASSESSMENT

U.S. Army Corps
of Engineers
Alaska District

Erosion Information Paper - Chevak, Alaska

Current as of December 5, 2008

Community Information

Chevak (CHEE-vack), a.k.a. Kashunamiut, population 908, is along the banks of Ninglikfak River, 17 miles east of Hooper Bay in the Yukon-Kuskokwim River Delta, and approximately 500 miles northwest of Anchorage. The community is incorporated as a 2nd class city in the unorganized borough. The riverbank is used for a variety of community activities including boating, snow machining, ATV access, barge access, boat storage, fishing, hunting, storage, boat access, and parking.

Description of Erosion Problem

Conditions causing and contributing to erosion reportedly include natural river flow, water level fluctuations, flooding, ice jams, spring break up, melting permafrost, vehicle traffic, boat traffic, pedestrian traffic, and vehicle traffic along the beach and bank of the Ninglikfak River. The riverbank has an estimated erosion rate of 5 to 10 feet per year. The erosion area presently measures a quarter mile to a mile horizontally and 50 to 75 feet vertically at the southeast end of the community.

A Corps *Project Management Plan* prepared for Chevak in 2002, under Section 14 of the 1946 Flood Control Act, identified erosion along the banks of the Ninglikfak River and stated the barge docking area was continuously eroding, making it difficult for barges to dock and unload.

Since September 2008 the community had updated that the conditions of the riverfront have worsened from the initial interview in January 2008.

Potential Damages

Ongoing bank erosion has made it difficult for barges to dock and is threatening the only road that links the village to the docking area. The road could potentially be destroyed, making it necessary to detour halfway around Chevak. The east side of road that connects to the current barge landing area and the community has blocked off the area to traffic due to the erosion. Structures along the riverside including boat storage sheds, residences, outbuildings, water tanks and lines, fuel tanks, food storage structures, the retail store, utility poles, power lines, boardwalks, pathways, and sites of significant cultural and archeological value are also threatened. The cliff areas also continuously erode and are threatening the homes which are just north and east of them. There is a historical building that are also threatened which are close the edge of the cliffs.

Protection measures used in the recent past to help reduce erosion damage have included placing sandbags and installing fencing. These structures were constructed by the Chevak Traditional Council at an estimated cost of $50,000 and have been successful in slowing down the erosion process. No repairs or maintenance have been done to date and no additional protection measures have been attempted. The community initiated a “waterfront roads” application to get funding from the Denali Commission for erosion damage, but the application was not completed by the deadline or submitted**.**

Photos and Diagrams

Photos of erosion have been provided by the Chevak Native Village. A diagram depicting the linear extent of erosion in the community is attached.

References

USACE. 2001. *Section 14 Project Management Plan (PMP), 17 August 2001*. Alaska District, U.S. Army Corps of Engineers.

USACE. 2002. *Trip Report: Chevak, 27th & 28th of June, 2002.* Alaska District, U.S. Army Corps of Engineers.

USACE. 2008. *Alaska Community Erosion Survey*, *OMB approved number 07100001*, expires September 30, 2009, completed by RB Slats, Chevak tribal administrator, submitted January 14, 2008.

Additional Information

This information paper, as well as those for other communities, can be accessed on the internet at www.alaskaerosion.com. For more information please contact the Corps of Engineers, project manager at (907) 753-5694 or email Alaska.Erosion.POA@usace.army.mil

Date of Aerial Photo: 18 June 01

NOTE: The extent of erosion shown on this figure is based on interviews with the community. This data has not been field verified. This figure is only intended to show areas of erosion, not rates or severity of erosion

Alaska District
Corps of Engineers
Civil Works Branch

- - - - Linear Extent of Erosion

N

Alaska Baseline Erosion

Chevak, Alaska

Appendix B

Laboratory Analytical Report

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Laboratory Report of Analysis

To: E3 Environmental, LLC
219 E. International Road, Ste
Anchorage, AK 99518
(907)565-4218

Report Number: **1156052**

Client Project: **Chevak Pb/PCBs**

Dear Johanna Dreher,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Victoria at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Victoria Pennick Date
Project Manager
Victoria.Pennick@sgs.com

Case Narrative

SGS Client: **E3 Environmental, LLC**
SGS Project: **1156052**
Project Name/Site: **Chevak Pb/PCBs**
Project Contact: **Johanna Dreher**

Refer to sample receipt form for information on sample condition.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Report of Manual Integrations

Laboratory ID	Client Sample ID	Analytical Batch	Analyte	Reason
SW8082A				
1298084	1155990011MS	XGC9135	Aroclor-1260	RP
1298085	1155990011MSD	XGC9135	Aroclor-1260	RP

Manual Integration Reason Code Descriptions

Code	Description
O	Original Chromatogram
M	Modified Chromatogram
SS	Skimmed surrogate
BLG	Closed baseline gap
RP	Reassign peak name
PIR	Pattern integration required
IT	Included tail
SP	Split peak
RSP	Removed split peak
FPS	Forced peak start/stop
BLC	Baseline correction
PNF	Peak not found by software

All DRO/RRO analysis are integrated per SOP.

Print Date: 10/28/2015 6:26:58PM

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indenmification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.
All DRO/RRO analyses are integrated per SOP.

Print Date: 10/28/2015 6:27:00PM

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
Battery 1	1156052001	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Battery 2	1156052002	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Battery 2 MS	1156052003	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Battery 2 MSD	1156052004	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Battery Dup 1	1156052005	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Transformer 1	1156052006	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Transformer 2	1156052007	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Transformer Dup 1	1156052008	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Transformer Dup 1 MS	1156052009	10/08/2015	10/12/2015	Soil/Solid (dry weight)
Transformer Dup 1 MSD	1156052010	10/08/2015	10/12/2015	Soil/Solid (dry weight)

Method	Method Description
SW6020A	Metals by ICP-MS (S)
SM21 2540G	Percent Solids SM2540G
SW8082A	SW8082 PCB's

Detectable Results Summary

Client Sample ID: **Battery 1**
Lab Sample ID: 1156052001

Metals by ICP/MS	Parameter	Result	Units
	Lead	30.7	mg/Kg

Client Sample ID: **Battery 2**
Lab Sample ID: 1156052002

Metals by ICP/MS	Parameter	Result	Units
	Lead	17.8	mg/Kg

Client Sample ID: **Battery Dup 1**
Lab Sample ID: 1156052005

Metals by ICP/MS	Parameter	Result	Units
	Lead	11.3	mg/Kg

Results of **Battery 1**

Client Sample ID: **Battery 1**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052001
Lab Project ID: 1156052

Collection Date: 10/08/15 17:40
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):39.5
Location:

Results by **Metals by ICP/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Lead	30.7	2.19	0.679	mg/Kg	50		10/23/15 16:07

Batch Information

Analytical Batch: MMS9145
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 10/23/15 16:07
Container ID: 1156052001-A

Prep Batch: MXX29234
Prep Method: SW3050B
Prep Date/Time: 10/16/15 13:55
Prep Initial Wt./Vol.: 1.155 g
Prep Extract Vol: 50 mL

Results of **Battery 2**

Client Sample ID: **Battery 2**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052002
Lab Project ID: 1156052

Collection Date: 10/08/15 17:45
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):49.2
Location:

Results by **Metals by ICP/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Lead	17.8	1.91	0.591	mg/Kg	50		10/23/15 12:49

Batch Information

Analytical Batch: MMS9144
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 10/23/15 12:49
Container ID: 1156052002-A

Prep Batch: MXX29234
Prep Method: SW3050B
Prep Date/Time: 10/16/15 13:55
Prep Initial Wt./Vol.: 1.066 g
Prep Extract Vol: 50 mL

Results of **Battery Dup 1**

Client Sample ID: **Battery Dup 1**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052005
Lab Project ID: 1156052

Collection Date: 10/08/15 08:00
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):42.3
Location:

Results by **Metals by ICP/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Lead	11.3		1.99	0.616	mg/Kg	50		10/23/15 16:09

Batch Information

Analytical Batch: MMS9145
Analytical Method: SW6020A
Analyst: EAB
Analytical Date/Time: 10/23/15 16:09
Container ID: 1156052005-A

Prep Batch: MXX29234
Prep Method: SW3050B
Prep Date/Time: 10/16/15 13:55
Prep Initial Wt./Vol.: 1.189 g
Prep Extract Vol: 50 mL

Print Date: 10/28/2015 6:27:04PM

J flagging is activated

Results of **Transformer 1**

Client Sample ID: **Transformer 1**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052006
Lab Project ID: 1156052

Collection Date: 10/08/15 18:15
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):79.6
Location:

Results by **Polychlorinated Biphenyls**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Aroclor-1016	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1221	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1232	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1242	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1248	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1254	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Aroclor-1260	30.9 U	61.7	18.5	ug/Kg	1		10/19/15 19:21
Surrogates							
Decachlorobiphenyl (surr)	70	60-125		%	1		10/19/15 19:21

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Analyst: NLL
Analytical Date/Time: 10/19/15 19:21
Container ID: 1156052006-A

Prep Batch: XXX34421
Prep Method: SW3550C
Prep Date/Time: 10/15/15 14:27
Prep Initial Wt./Vol.: 22.899 g
Prep Extract Vol: 5 mL

Results of **Transformer 2**

Client Sample ID: **Transformer 2**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052007
Lab Project ID: 1156052

Collection Date: 10/08/15 18:25
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):81.6
Location:

Results by **Polychlorinated Biphenyls**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Aroclor-1016	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1221	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1232	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1242	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1248	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1254	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Aroclor-1260	30.2	U	60.4	18.1	ug/Kg	1		10/19/15 19:35
Surrogates								
Decachlorobiphenyl (surr)	71		60-125		%	1		10/19/15 19:35

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Analyst: NLL
Analytical Date/Time: 10/19/15 19:35
Container ID: 1156052007-A

Prep Batch: XXX34421
Prep Method: SW3550C
Prep Date/Time: 10/15/15 14:27
Prep Initial Wt./Vol.: 22.815 g
Prep Extract Vol: 5 mL

J flagging is activated

Results of **Transformer Dup 1**

Client Sample ID: **Transformer Dup 1**
Client Project ID: **Chevak Pb/PCBs**
Lab Sample ID: 1156052008
Lab Project ID: 1156052

Collection Date: 10/08/15 08:00
Received Date: 10/12/15 08:46
Matrix: Soil/Solid (dry weight)
Solids (%):79.2
Location:

Results by **Polychlorinated Biphenyls**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Aroclor-1016	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1221	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1232	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1242	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1248	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1254	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Aroclor-1260	31.3 U	62.6	18.8	ug/Kg	1		10/19/15 19:49
Surrogates							
Decachlorobiphenyl (surr)	75	60-125		%	1		10/19/15 19:49

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Analyst: NLL
Analytical Date/Time: 10/19/15 19:49
Container ID: 1156052008-A

Prep Batch: XXX34421
Prep Method: SW3550C
Prep Date/Time: 10/15/15 14:27
Prep Initial Wt./Vol.: 22.711 g
Prep Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1722804 [MXX/29234]
Blank Lab ID: 1298309

Matrix: Soil/Solid (dry weight)

QC for Samples:
1156052001, 1156052002, 1156052005

Results by **SW6020A**

Parameter	Results	LOQ/CL	DL	Units
Lead	0.120J	0.200	0.0620	mg/Kg

Batch Information

Analytical Batch: MMS9144
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 10/23/2015 12:33:19PM

Prep Batch: MXX29234
Prep Method: SW3050B
Prep Date/Time: 10/16/2015 1:55:43PM
Prep Initial Wt./Vol.: 1 g
Prep Extract Vol: 50 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1156052 [MXX29234]
Blank Spike Lab ID: 1298310
Date Analyzed: 10/23/2015 12:35

Matrix: Soil/Solid (dry weight)

QC for Samples: 1156052001, 1156052002, 1156052005

Results by **SW6020A**

	Blank Spike (mg/Kg)			
Parameter	Spike	Result	Rec (%)	CL
Lead	50	55.5	111	(84-118)

Batch Information

Analytical Batch: **MMS9144**
Analytical Method: **SW6020A**
Instrument: **Perkin Elmer Sciex ICP-MS P3**
Analyst: **EAB**

Prep Batch: **MXX29234**
Prep Method: **SW3050B**
Prep Date/Time: **10/16/2015 13:55**
Spike Init Wt./Vol.: 50 mg/Kg Extract Vol: 50 mL
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 10/28/2015 6:27:09PM

Matrix Spike Summary

Original Sample ID: 1299208
MS Sample ID: 1298311 MS
MSD Sample ID: 1298312 MSD

Analysis Date: 10/23/2015 12:49
Analysis Date: 10/23/2015 12:52
Analysis Date: 10/23/2015 12:54
Matrix: Soil/Solid (dry weight)

QC for Samples: 1156052001, 1156052002, 1156052005

Results by **SW6020A**

		Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Lead	8.76	46.9	58.8	107	48.8	61.3	108	84-118	4.11	(< 20)

Batch Information

Analytical Batch: MMS9144
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 10/23/2015 12:52:16PM

Prep Batch: MXX29234
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 10/16/2015 1:55:43PM
Prep Initial Wt./Vol.: 1.07g
Prep Extract Vol: 50.00mL

Billable Matrix Spike Summary

Original Sample ID: 1156052002
MS Sample ID: 1156052003 BMS
MSD Sample ID: 1156052004 BMSD

Analysis Date: 10/23/2015 12:49
Analysis Date: 10/23/2015 12:52
Analysis Date: 10/23/2015 12:54
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **SW6020A**

		Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Lead	17.8	95.3	120	107	99.2	125	108	84-118	4.11	(< 20)

Batch Information

Analytical Batch: MMS9144
Analytical Method: SW6020A
Instrument: Perkin Elmer Sciex ICP-MS P3
Analyst: EAB
Analytical Date/Time: 10/23/2015 12:52:16PM

Prep Batch: MXX29234
Prep Method: Soils/Solids Digest for Metals by ICP-MS
Prep Date/Time: 10/16/2015 1:55:43PM
Prep Initial Wt./Vol.: 1.07g
Prep Extract Vol: 50.00mL

Print Date: 10/28/2015 6:27:10PM

Method Blank

Blank ID: MB for HBN 1722741 [SPT/9770]
Blank Lab ID: 1297932

Matrix: Soil/Solid (dry weight)

QC for Samples:
1156052001, 1156052002, 1156052005, 1156052006, 1156052007, 1156052008

Results by **SM21 2540G**

Parameter	Results	LOQ/CL	DL	Units
Total Solids	100			%

Batch Information

Analytical Batch: SPT9770
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R
Analytical Date/Time: 10/14/2015 5:14:00PM

Duplicate Sample Summary

Original Sample ID: 1156012006
Duplicate Sample ID: 1297934

Analysis Date: 10/14/2015 17:14
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	92.8	92.9	%	0.17	(< 15)

Batch Information

Analytical Batch: SPT9770
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Duplicate Sample Summary

Original Sample ID: 1156046008
Duplicate Sample ID: 1297935

Analysis Date: 10/14/2015 17:14
Matrix: Soil/Solid (dry weight)

QC for Samples:

1156052001, 1156052002, 1156052005, 1156052006, 1156052007

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	85.3	85.2	%	0.07	(< 15)

Batch Information

Analytical Batch: SPT9770
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 10/28/2015 6:27:12PM

Duplicate Sample Summary

Original Sample ID: 1156052007
Duplicate Sample ID: 1297936

Analysis Date: 10/14/2015 17:14
Matrix: Soil/Solid (dry weight)

QC for Samples:

1156052001, 1156052002, 1156052005, 1156052006, 1156052007, 1156052008

Results by **SM21 2540G**

NAME	Original	Duplicate	Units	RPD (%)	RPD CL
Total Solids	81.6	84.3	%	3.20	(< 15)

Batch Information

Analytical Batch: SPT9770
Analytical Method: SM21 2540G
Instrument:
Analyst: A.R

Print Date: 10/28/2015 6:27:12PM

Method Blank

Blank ID: MB for HBN 1722765 [XXX/34421]
Blank Lab ID: 1298082

Matrix: Soil/Solid (dry weight)

QC for Samples:
1156052006, 1156052007, 1156052008

Results by **SW8082A**

Parameter	Results	LOQ/CL	DL	Units
Aroclor-1016	25.0U	50.0	15.0	ug/Kg
Aroclor-1221	25.0U	50.0	15.0	ug/Kg
Aroclor-1232	25.0U	50.0	15.0	ug/Kg
Aroclor-1242	25.0U	50.0	15.0	ug/Kg
Aroclor-1248	25.0U	50.0	15.0	ug/Kg
Aroclor-1254	25.0U	50.0	15.0	ug/Kg
Aroclor-1260	25.0U	50.0	15.0	ug/Kg
Surrogates				
Decachlorobiphenyl (surr)	90	60-125		%

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Instrument: HP 6890 Series II ECD SV H F
Analyst: NLL
Analytical Date/Time: 10/19/2015 11:35:00AM

Prep Batch: XXX34421
Prep Method: SW3550C
Prep Date/Time: 10/15/2015 2:27:27PM
Prep Initial Wt./Vol.: 22.5 g
Prep Extract Vol: 5 mL

Print Date: 10/28/2015 6:27:14PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1156052 [XXX34421]
Blank Spike Lab ID: 1298083
Date Analyzed: 10/19/2015 11:50

Matrix: Soil/Solid (dry weight)

QC for Samples: 1156052006, 1156052007, 1156052008

Results by **SW8082A**

Blank Spike (ug/Kg)

Parameter	Spike	Result	Rec (%)	CL
Aroclor-1016	222	116	52	(47-134)
Aroclor-1260	222	204	92	(53-140)
Surrogates				
Decachlorobiphenyl (surr)	222	89	89	(60-125)

Batch Information

Analytical Batch: **XGC9135**
Analytical Method: **SW8082A**
Instrument: **HP 6890 Series II ECD SV H F**
Analyst: **NLL**

Prep Batch: **XXX34421**
Prep Method: **SW3550C**
Prep Date/Time: **10/15/2015 14:27**
Spike Init Wt./Vol.: 222 ug/Kg Extract Vol: 5 mL
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 10/28/2015 6:27:16PM

Matrix Spike Summary

Original Sample ID: 1155990011
MS Sample ID: 1298084 MS
MSD Sample ID: 1298085 MSD

Analysis Date: 10/19/2015 17:58
Analysis Date: 10/19/2015 18:25
Analysis Date: 10/19/2015 18:52
Matrix: Soil/Solid (dry weight)

QC for Samples: 1156052006, 1156052007, 1156052008

Results by **SW8082A**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Aroclor-1016	58.2U	258	199	77	258	199	77	47-134	0.26	(< 30)
Aroclor-1260	58.2U	258	209	81	258	265	103	53-140	23.70	(< 30)
Surrogates										
Decachlorobiphenyl (surr)		258	186	72	258	173	67	60-125	7.45	

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Instrument: HP 6890 Series II ECD SV H F
Analyst: NLL
Analytical Date/Time: 10/19/2015 6:25:00PM

Prep Batch: XXX34421
Prep Method: Sonication Extraction Soil SW8080 PCB
Prep Date/Time: 10/15/2015 2:27:27PM
Prep Initial Wt./Vol.: 22.60g
Prep Extract Vol: 5.00mL

Billable Matrix Spike Summary

Original Sample ID: 1156052008
MS Sample ID: 1156052009 BMS
MSD Sample ID: 1156052010 BMSD

Analysis Date: 10/19/2015 19:49
Analysis Date: 10/19/2015 20:04
Analysis Date: 10/19/2015 20:18
Matrix: Soil/Solid (dry weight)

QC for Samples:

Results by **SW8082A**

		Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Aroclor-1016	31.3U	275	254	92	275	273	99	47-134	7.27	(< 30)
Aroclor-1260	31.3U	275	210	76	275	207	75	53-140	1.38	(< 30)
Surrogates										
Decachlorobiphenyl (surr)		275	210	76	275	215	78	60-125	2.54	

Batch Information

Analytical Batch: XGC9135
Analytical Method: SW8082A
Instrument: HP 6890 Series II ECD SV H F
Analyst: NLL
Analytical Date/Time: 10/19/2015 8:04:00PM

Prep Batch: XXX34421
Prep Method: Sonication Extraction Soil SW8080 PCB
Prep Date/Time: 10/15/2015 2:27:27PM
Prep Initial Wt./Vol.: 22.92g
Prep Extract Vol: 5.00mL

Print Date: 10/28/2015 6:27:17PM

SGS

SGS North America Inc.
CHAIN OF CUSTODY RECOR

1156052

Locations Nationwide

laska	Maryland
lew Jersey	New York
lorth Carolina	Indiana
Vest Virgina	Kentucky

www.us.sgs.com

Instructions: Sections 1 - 5 must be filled out. Omissions may delay the onset of analysis.

Page 3 of 3

Section 1

CLIENT: E3 Environmental

CONTACT: Kurt Carlson **PHONE #:** 907-565-4218

PROJECT NAME: Chevak Pb/PCBs **Project/ PWSID/ PERMIT#:**

REPORTS TO: ~~Kcarlson~~ Kurt Carlson **E-MAIL:** Kcarlson@e3alaska.com

INVOICE TO: E3 Environmental **QUOTE #:**

P.O. #:

Section 3

Preservative

Section 2

RESERVED for lab use	SAMPLE IDENTIFICATION	DATE mm/dd/yy	TIME HH:MM	MATRIX/ MATRIX CODE	# CONTAINERS	Pres: Type: Comp Grab MI (Multi-incre-mental)	None Lead (6020)	None PCBs (8082A)									REMARKS/ LOC ID
①A	battery1	10/8/15	17:40	soil	1	grab	X										if enough volume, please run MS/MSD on one sample
MS/D * ②③④A	battery2		17:45		1		X										
⑤A	battery dup1		08:00		1		X										
⑥A	transformer 1 (soil)		18:15		1			X									if enough volume, please run MS/MSD on one sample
⑦A	transformer 2 (soil)		18:25		1			X									
MS/D * ⑧A	transformer dup 1 (soil)		08:00		1			X									
⑨⑩																	

Kurt Carlson

Section 5

Relinquished By: (1) Kurt M Carlson	**Date** 10/9/15	**Time** 10:00	
Relinquished By: (2)	**Date**	**Time**	**Received By:** Grant Aviation - Chevak
Relinquished By: (3) Grant Aviation - Chevak	**Date**	**Time**	**Received By:** Alaska Air - Goldstreak
Relinquished By: (4)	**Date** 10/12/15	**Time** 8:46	**Received For Laboratory By:**

Section 4 **DOD Project?** Yes [✓ No]

Cooler ID: ____________

Data Deliverable Requirements: QC2/DV

Requested Turnaround Time and/or Special Instructions:

Temp Blank °C: 2.1 f 2.4

or Ambient [ ]

(See attached Sample Receipt Form)

Chain of Custody Seal: (Circle)

INTACT [✓ BROKEN] ABSENT QP

(See attached Sample Receipt Form)

[ ] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301
[ ] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557

http://www.sgs.com/terms-and-conditions

SGS

Returned Bottles Inventory

Name of individual returning bottles: —

Date Received: 10/12/2015

Client Name: E3 Env

Received by: D. C

Project Name: Chevak Pb/PCBs

SGS PM: VLP

HDPE/Nalgene:	1-L					
	500-ml					
	250-ml or 8-oz					
	125-ml or 4-oz					
	60-ml or 2-oz					
	other					
amber glass:	1-L					
	500-ml					
	250-ml or 8-oz					
	125-ml or [✓ 4-oz] with or ~~without~~ septa	2				
	40-ml VOA vial					
	other					
Subtotal:	2					

Note: Returned bottles (regardless of size/pres.) are billed back at $4/bottle ***unless otherwise quoted*****.**

Amount to Invoice Client $: 8 $

WO#: 1156052

1156052

1 1 5 6 0 5 2

SAMPLE RECEIPT FORM

Review Criteria:	Yes	N/A	No	Comments/Action Taken:
Were **custody seals** intact? Note # & location, if applicable.	☐	☐	☑	***Exemption permitted if sampler hand carries/delivers.***
COC accompanied samples?	☑	☐	☐	2F - Hand Delivered
Temperature blank compliant* (i.e., 0-6°C after CF)?	☑	☐	☐	***Exemption permitted if chilled & collected <8 hrs ago.***
If >6°C, were samples collected <8 hours ago?	☐	☑	☐	
If <0°C, were all sample containers ice free?	☐	☑	☐	
Cooler ID: 1 @ 2.1 w/ Therm.ID: 241 Cooler ID: ______ @ ______ w/ Therm.ID: ______ Cooler ID: ______ @ ______ w/ Therm.ID: ______ Cooler ID: ______ @ ______ w/ Therm.ID: ______ Cooler ID: ______ @ ______ w/ Therm.ID: ______ If samples are received <u>without</u> a temperature blank, the “cooler temperature” will be documented in lieu of the temperature blank & “**COOLER TEMP**” will be noted to the right. In cases where neither a temp blank <u>nor</u> cooler temp can be obtained, note “ambient” or “chilled.”				***Note: Identify containers received at non-compliant temperature. Use form FS-0029 if more space is needed.***
Delivery method (specify all that apply): ☑Client (hand carried) ☐USPS ☐Lynden ☐AK Air ☐Alert Courier ☐UPS ☐FedEx ☐RAVN ☐C&D Delivery ☐Carlile ☐Pen Air ☐Warp Speed ☐Other: _____				
→ *For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?*	☐	☑	☐	
	Yes	N/A	No	
Were samples received within hold time?	☑	☐	☐	***Note: Refer to form F-083 “Sample Guide” for hold times.***
Do samples **match COC*** (i.e., sample IDs, dates/times collected)?	☑	☐	☐	***Note: If times differ <1hr, record details and login per COC.***
Were analyses requested unambiguous?	☑	☐	☐	
Were samples in **good condition** (no leaks/cracks/breakage)?	☑	☐	☐	
Packing material used (specify all that apply): ☐Bubble Wrap ☐Separate plastic bags ☐Vermiculite ☐Other:				
Were **proper containers** (type/mass/volume/preservative*) used?	☑	☐	☐	☐***Exemption permitted for metals (e.g., 200.8/6020A).***
Were **Trip Blanks** (i.e., VOAs, LL-Hg) in cooler with samples?	☐	☑	☐	
Were all VOA vials **free of headspace** (i.e., bubbles <u><</u>6 mm)?	☐	☑	☐	
Were all soil VOAs **field extracted** with MeOH+BFB?	☐	☑	☐	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was **pH verified and compliant**?	☐	☑	☐	
If pH was adjusted, were bottles flagged (i.e., stickers)?	☐	☑	☐	
For **special handling** (e.g., “MI” soils, foreign soils, lab filter for dissolved…, lab extract for volatiles, Ref Lab, limited volume), were bottles/paperwork flagged (e.g., sticker)?	☐	☑	☐	
For **RUSH/SHORT Hold Time**, were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	☐	☑	☐	
For **SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP**, were containers / paperwork flagged accordingly?	☑	☐	☐	Sample 2,3 and 4 MS/MSD and 8,9,10
For any question answered “No,” has the PM been notified and the problem resolved (or paperwork put in their bin)?	☐	☑	☐	SRF Completed by: D.C 10/12/2015 PM notified:
Was **PEER REVIEW** of ***sample numbering/labeling completed?***	☑	☐	☐	Peer Reviewed by: KPV
Additional notes (if applicable):				

Note to Client: *Any “no” answer above indicates non-compliance with standard procedures and may impact data quality.*

F102_eSRF_2015_03_31

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1156052001-A	No Preservative Required	OK			
1156052002-A	No Preservative Required	OK			
1156052003-A	No Preservative Required	OK			
1156052004-A	No Preservative Required	OK			
1156052005-A	No Preservative Required	OK			
1156052006-A	No Preservative Required	OK			
1156052007-A	No Preservative Required	OK			
1156052008-A	No Preservative Required	OK			
1156052009-A	No Preservative Required	OK			
1156052010-A	No Preservative Required	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.
PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.
BU - The container was received with headspace greater than 6mm.

Appendix C

Photographs - Old School Exterior

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Photo 1. Northwest corner of school. Looking approximately east. October 8, 2015.

Photo 2. Northwest corner of school. Looking approximately east. October 8, 2015.

Photo 3. Northwest corner of school. Looking approximately east. October 8, 2015.

Photo 4. Northwest corner of school. Looking approximately east. October 8, 2015.

Photo 5. Southwest edge of school. Looking approximately northeast. October 8, 2015.

Photo 6. Southwest edge of school. Looking approximately northeast. October 8, 2015.

Photo 7. Southwest edge of school. Looking approximately northeast. October 8, 2015.

Photo 8. Southwest edge of school. Looking approximately northeast. October 8, 2015.

Photo 9. South corner of school. Looking approximately north. October 8, 2015.

Photo 10. South corner of school. Looking approximately north. October 8, 2015.

Photo 11. South corner of school. Looking approximately north. October 8, 2015.

Photo 12. South corner of school. Looking approximately north. October 8, 2015.

Photo 13. Southeast edge of school. Looking approximately northwest. October 8, 2015.

Photo 14. Southeast edge of school. Looking approximately northwest. October 8, 2015.

Photo 15. Southeast edge of school. Looking approximately northwest. October 8, 2015.

Photo 16. Southeast edge of school. Looking approximately northwest. October 8, 2015.

Photo 17. Southeast corner of school. Looking approximately northwest. October 8, 2015.

Photo 18. Southeast corner of school. Looking approximately northwest. October 8, 2015.

Photo 19. Northeast edge of school. Looking approximately southwest. The picture below is taken where the arrow points. October 8, 2015.

Photo 20. Northeast edge of school. Looking approximately southwest. This picture was taken where the arrow points in the above picture. October 8, 2015.

Photo 21. Northeast edge of school. Looking approximately southwest. October 8, 2015.

Photo 22. Northeast edge of school. Looking approximately southwest. October 8, 2015.

Photo 23. Northeast corner of school. Looking approximately south. October 8, 2015.

Photo 24. Northeast corner of school. Looking approximately south. October 8, 2015.

Photo 25. Northeast corner of school. Looking approximately south. October 8, 2015.

Photo 26. Northeast corner of school. Looking approximately south. October 8, 2015.

Photo 27. Northwest edge of school. Looking approximately southeast. October 8, 2015.

Photo 28. Northwest edge of school. Looking approximately southeast. October 8, 2015.

Photo 29. Northwest edge of school. Looking approximately southeast. October 8, 2015.

Photo 30. Northwest edge of school. Looking approximately southeast. October 8, 2015.

Photo 31. Transformer 1 on left, Transformer 2 on right. October 8, 2015.

Photo 32. Transformer 1. October 8, 2015.

Photo 33. Transformer 1. October 8, 2015.

Photo 34. Transformer 2. October 8, 2015.

Photo 35. Transformer 2. October 8, 2015.

Photo 36. Location of soil sample Battery 2: note hand auger. October 8, 2015.

Photo 37. Location of soil sample Battery 1 in middle foreground. October 8, 2015.

Photo 38. Location of soil sample Transformer 1: note hand auger. October 8, 2015.

Photo 39. Location of soil sample Transformer 2: note hand auger. October 8, 2015.

Appendix D

Photographs - Old School Interior

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Photo 1. General interior conditions. Gymnasium. October 8, 2015.

Photo 2. General interior conditions. Gymnasium. October 8, 2015.

Photo 3. Possible asbestos-containing material on pipes in hallway between gymnasium and cafeteria. October 8, 2015.

Photo 4. Possible asbestos-containing material on pipes in hallway between gymnasium and cafeteria. October 8, 2015.

Photo 5. Asbestos-containing linoleum of Room 13. October 8, 2015.

Photo 6. Asbestos-containing linoleum of Room 9 on right, Room 8 on left.
October 8, 2015.

Photo 7. Asbestos-containing linoleum of Room 12. October 8, 2015.

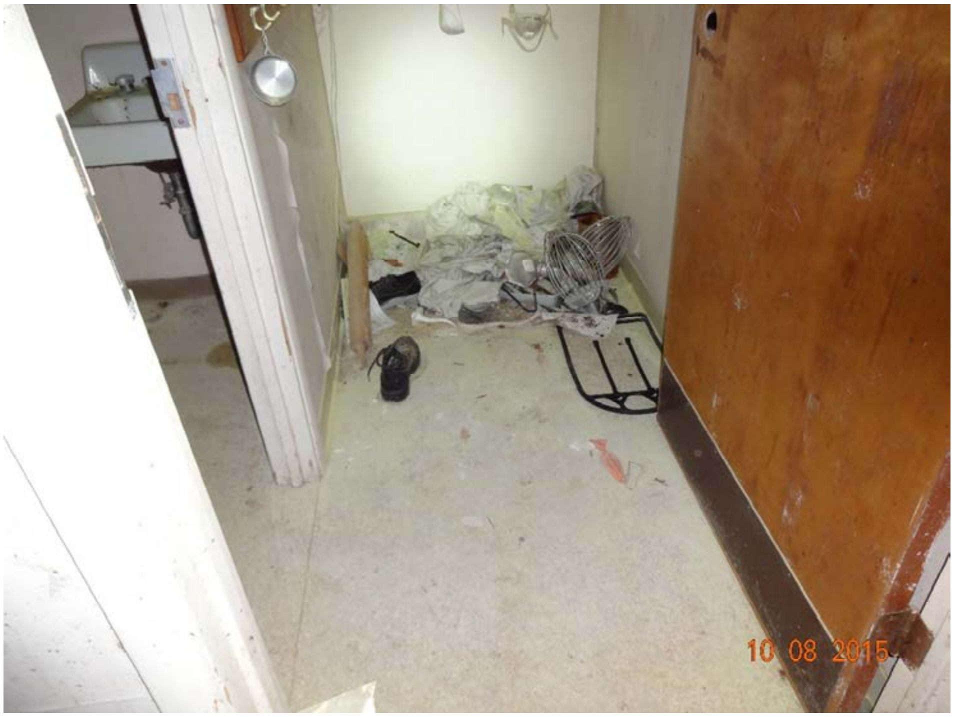

Photo 8. Asbestos-containing linoleum linoleum in Room 10. October 8, 2015.

Photo 9. Asbestos-containing linoleum in Room 4. October 8, 2015.

Photo 10. General interior conditions. Ceiling in Room 4. October 8, 2015.

Photo 11. General interior conditions. Room 29 on left, Room 3 door just past corkboard on right. October 8, 2015.

Photo 12. General interior conditions. Room 28 on left, Room 3 on right in foreground, Room 2 just past Room 3 on right.. October 8, 2015.

Photo 13. Asbestos-containing linoleum in Room 33 (based on map) but “13” on door. October 8, 2015.

Photo 14. Asbestos-containing linoleum in Room 43. October 8, 2015.

Photo 15. Asbestos-containing linoleum of Room 57. October 8, 2015.

Photo 16. Asbestos-containing linoleum of Room 61. October 8, 2015.

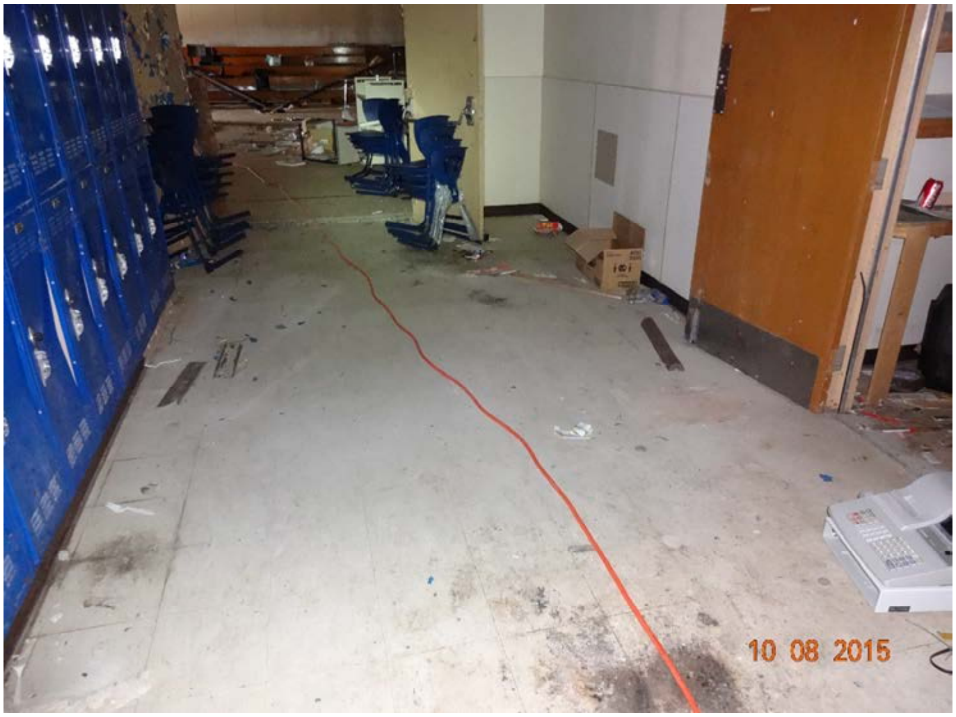

Photo 17. Asbestos-containing linoleum in Room 62. Gymnasium in background, Room 57 on right. October 8, 2015.

Photo 18. Room 56. Not cited on the November 4, 1991 notice as asbestos-containing but appears to be same linoleum as asbestos-containing rooms. October 8, 2015.

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Appendix E

Photographs - Old School Tank Farm

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Photo 1. Taken from east corner of Old School Tank Farm. Looking southwest.
October 8, 2015.

Photo 2. Stained soil. Taken from southeast edge of tank farm. Looking southwest. October 8, 2015.

Photo 3. Hose leading to tank next to ladder. Picture taken while standing on southeast edge of tank farm. Looking northwest. October 8, 2015.

Photo 4. Same hose from Photo 3. Picture taken while standing along southeast edge of tank farm. Looking northeast. October 8, 2015.

Photo 5. Stained soil along southwest edge of tank farm. Facing northwest. October 8, 2015.

Photo 6. Stained soil and debris along northeast edge of tank farm. Looking southeast. October 8, 2015.