FINAL SUBMITTAL

MATERIAL SITE INVESTIGATION

AMBLER AIRPORT REHABILITATION

AKSAS PROJECT NO. 61303

AMBLER, ALASKA

ALASKA DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
Northern Region
2301 Peger Road
Fairbanks, Alaska 99709

MARCH 2005

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MATERIAL SITE REPORT
AMBLER AIRPORT REHABILITATION
AMBLER, ALASKA

EXECUTIVE SUMMARY

The Alaska Department of Transportation and Public Facilities (DOT&PF) is planning several projects at Ambler, Alaska to improve the airport and access road. The DOT&PF has determined the existing borrow source, located at the airport, is no longer acceptable due to naturally occurring asbestos and limited remaining materials. Accordingly, the DOT&PF contracted R&M Consultants, Inc. to locate and explore a new source that contained at least 500,000 cubic yards of material suitable for constructing airport and road embankments, and with levels of asbestos deemed to be acceptable.

Using existing information, eight candidate material source areas were selected for reconnaissance; which then consisted of drilling 27 test holes, and testing soil samples collected from each site for asbestos. The results of the reconnaissance were then used to rank each candidate area, considering a number of criteria including cultural resources, wetlands, asbestos content, overburden, permafrost, borrow classification, gravel content, and site access. Based on this ranking, candidate Area “B”, situated along the Ambler River about two miles northeast of the airport, scored the highest. Subsequently, design explorations were conducted at Area “B”, which included drilling 24 test borings, as well as additional laboratory soil and asbestos testing.

Briefly, material source Area “B” is undisturbed, generally flat, and covered by a variable white spruce forest with a thick willow understory. The shallow soil column consisted of three general units, including overburden, alluvial sands and fine gravels, and glacial silt; the thickness of each unit varied widely across the site. The alluvial sand and gravel deposit appeared to be suitable for constructing the airport and access road embankments. Further, the gravel particles appeared suitable for producing aggregate surface and base course; although, the material was generally gap-graded, predominately comprised of fine sand and small gravel. Groundwater was observed in all test borings drilled at the site, and local reports indicate that the area is subject to flooding. Permafrost was not encountered in any test holes.

Asbestos was identified in some of the soil samples tested from each of the candidate material source areas; including area “B” where trace amounts of less than one percent were measured. While asbestos is regulated by at least five Federal and Alaska State agencies, we are not aware of any that administer specific regulations pertaining to asbestos occurring naturally in undisturbed soil or rock. R&M’s scope did not include defining what level of asbestos would be acceptable in the undisturbed soil. However, the EPA uses a level of one percent to define an “asbestos containing material”, while most regulated safety standards define human exposure levels based the airborne concentration.

In conclusion, Area “B” appeared to contain sufficient quantity and quality of materials to support the DOT&PF’s planned improvements at the Amber airport. Further, it appeared that a road could ultimately be built to the site for year-round access.

MATERIAL SITE INVESTIGATION
AMBLER AIRPORT REHABILITATION
AMBLER, ALASKA

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLES

FIGURES

APPENDIX A - MAPS

APPENDIX B - LOGS OF TEST BORINGS

APPENDIX C – LABORATORY TEST DATA (SOILS)

APPENDIX D – RECONNAISSANCE INVESTIGATION

TABLE OF CONTENTS (CONTINUED)

MATERIAL SITE REPORT
AMBLER AIRPORT REHABILITATION
AMBLER, ALASKA

PART 1: INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) is planning several projects at Ambler, Alaska (Figure 1; Drawing A-01) to improve the existing airport and access road. It is understood that the DOT&PF had determined the existing borrow source, located at the airport, was no longer acceptable, in part due to naturally occurring asbestos[1] and limited remaining materials. Accordingly, the DOT&PF contracted R&M Consultants, Inc. (R&M), under Professional Services Agreement (hereafter the PSA) No. 368-4-1-016 (dated 7 April 2004), to locate and explore a new borrow site that contained at least 500,000 cubic yards of material i) suitable for constructing airport and road embankments, and ii) with levels of asbestos deemed to be acceptable. R&M has completed this material site investigation, as reported herein.

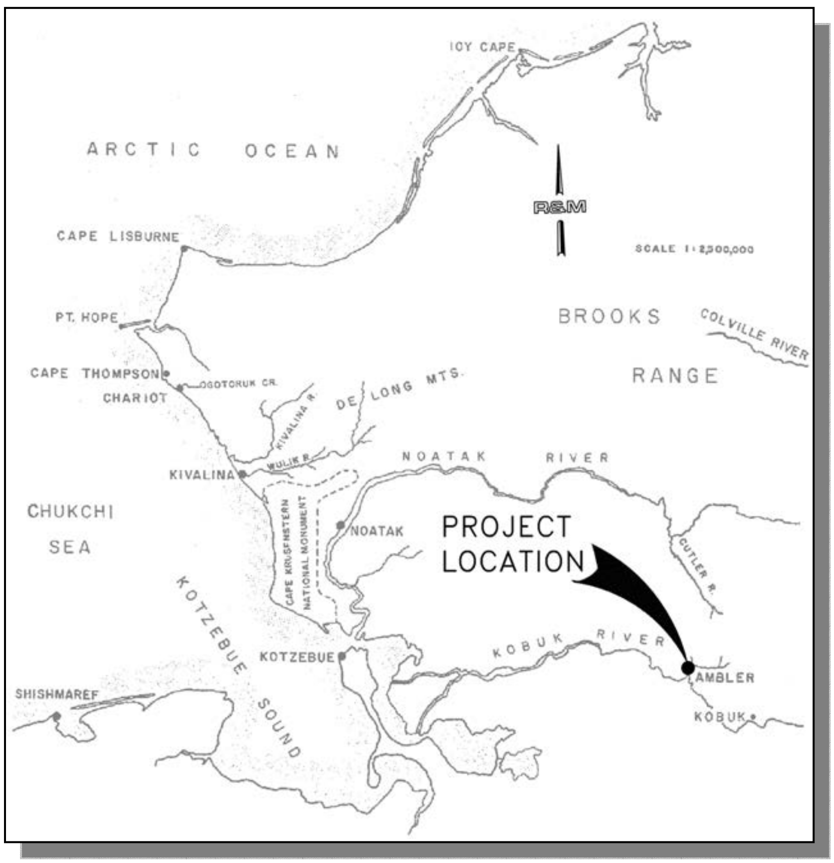

FIGURE 1: AMBLER LOCATION MAP

[1] Asbestos, as used in this report, refers to naturally occurring fibrous minerals (e.g. amosite, chrysotile, tremolite, actinolite, anthophyllite, crocidolite, and most commonly chrysotile) found in ultramafic and serpentine rocks.

The scope of R&M's services pertaining to the subject material site investigation, authorized under Notice-To-Proceed (NTP) No. 2 and Amendment No. 1 (both dated 15 September 2004), were divided into three general tasks:

- *Material Source Study* - Identify candidate material site areas in the vicinity of Ambler based on a review of existing geologic land status, cultural and habitat information, and aerial photography; and prepare a plan for geotechnical "reconnaissance" explorations.

- *Material Source Reconnaissance* - Conduct field explorations (i.e. test holes) to qualify the general shallow soil, groundwater and permafrost conditions at each of the candidate material site areas; test soil samples collected from each candidate material site area for asbestos; and select the preferred material site area, also considering the cultural and habitat information from above, for geotechnical "design" explorations.

- *Material Source Investigation* – Conduct design level field explorations (i.e. test holes) to better delineate the subsurface conditions and materials within the preferred material site area; test select soil samples to measure the range of gradation and asbestos content in materials at the preferred material site area; perform field inspections to survey and map cultural resources and wetlands {reported separately}; identify and qualify potential access routes to the selected material site area; and reporting.

Note that R&M's scope did not include any exploration or testing of materials from the existing airport borrow pit, or existing airport[2] runway and access road embankments. Further, our scope did not include defining what levels of asbestos would be acceptable in undisturbed soil (see Part 5.2).

The following presents the results of R&M's material site investigation. Part 2 provides general background information on the local setting, regional geology and existing material sources at Ambler. Part 3 summarizes the methods of investigation (e.g. to identify, rank and explore each area; soils testing, and environmental studies). Part 4 presents our interpretations of the surface and subsurface conditions at the preferred material site area ("B"). And Part 5 presents general mining guidelines and considerations for developing Material Site Area "B". All measurements and weights are reported in U.S. Customary Units; with the exception of the borehole coordinates (see Part 3.5).

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[2] However, NTP No. 2 did authorized R&M to drill and sample a total of four geotechnical test holes at the Ambler airport, located beyond the runway safety areas, in two areas that may be cut for compliance with FAA air space requirements. The results of that task, previously submitted separately, are provided in Appendix G.

PART 2: BACKGROUND

2.1 Local Setting

Ambler is a Second-Class City located in northwest Alaska (Figure 1, Drawing A-01), about 40 miles north of the Arctic Circle, 130 miles east of Kotzebue, and 320 miles northwest of Fairbanks. The village is situated on the north bank of the Kobuk River, about one mile downriver of its confluence with the Ambler River, and about 30 miles downriver of Shugnak, the next closest community. The current residential population of Ambler (2003 demographics) is about 291.

Transportation to Ambler is by plane, barge, small boat and snowmachine; there are no roads linking the community with other parts of the State. The existing airport has two runways, one 3,000-foot long by 60-foot wide and the other (crosswind) 2,400-foot long by 60-foot wide. There is local airplane passenger service to Kotzebue and Fairbanks. However, we understand that the existing runway surface becomes “soft” through spring breakup and after periods of heavy rain, during which times air service may be intermittent until the surface dries. Small boats, ATVs and snowmachines are used for inter-village travel. The Kobuk River is generally navigable from early July to mid-October, depending on water levels. The Ambler River has numerous shoals and large rocks in its channel and is generally navigable only by small boats.

Ambler lies within the continental climate zone (Hartman & Johnson, 1984); characterized by great diurnal and annual temperature variations, low precipitation, low cloudiness, low humidity, and generally light surface winds. However, Ambler lies close enough to the maritime zone that it can also be directly impacted by large storms along the west coast of Alaska, during which extended periods of warm winter weather with rain and/or heavy snows and high winds may occur. Winds reportedly create large snow drifts 10 to 15 feet in height. Selected climatic data for the area is summarized in Table 1.

2.2 Regional Geology

Ambler lies within the Ambler-Chandalar Ridge and Lowland physiographic province (Wahrhaftig, 1965). This region consists of east-west trending lines of lowlands and low passes, bordered on the north by the abrupt front of the Brooks Range. This portion of Alaska was covered with glacial ice in the early to middle Pleistocene age (Coulter, et al, 1965), and has been mapped as being underlain by discontinuous permafrost (Ferrains, Jr., 1965).

Ambler is situated between the Jade Mountains and the Cosmos Hills; small ranges of mountains paralleling the southern slopes of the Brooks Range (See Drawing A-01). The rocks in these mountains are mineral-rich and contain large ore deposits. Bornite, reportedly one of the world's richest copper deposits, lies on the north side of the Cosmos Hills. Major jade deposits are found in the Jade Mountains. Serpentine rocks, commonly containing asbestos, have been mapped in both these ranges (Patton, Jr. et al, 1968, and Hamilton, 1984). An asbestos mine was temporarily operated at Asbestos Mountain in the Cosmos Hills near Kobuk. The asbestos has apparently been eroded from these rocks and transported throughout the area by glaciers, water and wind. Sedimentary deposits have been found with varying concentrations of asbestos throughout the area. Metasedimentary rocks, consisting primarily of phyllite and quartz-mica schist underlie the drainage basin of the Ambler River in the Schwatka Mountains (Patton, Jr., et al, 1968). Much of the fine gravel in the Ambler River appeared to be quartz-mica schist.

The surficial geology at Ambler is complex, and reflects multiple glacial advances, with formation of glacial lakes and extensive eolian (wind-blown) dunes (Hamilton, 1984). Glacial tills, glaciolacustrine (lake) silt deposits, eolian silt and sand deposits, and fluvial sand and gravel deposits are found in the vicinity of Ambler. The glacial tills contain large erratics (boulders).

The fluvial deposits found along the Kobuk River near Ambler consist almost entirely of sand with only minor amounts of fine gravel. Fluvial deposits along the lower Ambler River also consist primarily of sand with fine gravel. Note that only limited amounts of coarse gravel were observed along the lower reaches of the Ambler River during our field program, primarily in thin veneers (armor layers) on the surface of exposed bars. This condition extended up the Ambler River to Area “D”, approximately five miles from the airport. Significant amounts of coarse gravel were not observed, until the confluence with the Redstone was reached, about eight miles from the airport. A local resident indicated that gravel bars are not observed along the Kobuk River until reaching the Shungnak River, approximately 20 to 25 miles upriver from Ambler. Fernald (1964) reported that significant gravel deposits occurred on the Kobuk River upstream of the Kollioksok River.

Many of the creeks near Ambler appear to flow year-round due to groundwater in-flow and small springs. Ice conditions on lakes and rivers can be influenced by this warmer flow throughout the winter.

2.3 Existing Material Sites

Presently, we are aware of only one active borrow source at Ambler, located just east of the airport (Drawings A-02 and A-03). The DOT&PF has performed several investigations at this source, as well as at a small gravel bar near the village (DOT&PF, 1973 and 1986); although this latter area apparently has never been mined. The existing airport borrow pit lies in the uplands and is interpreted to be an alluvial-terrace deposit consisting of materials that possibly washed downslope from the Jade Mountains or Cosmos Hills (Hamilton, 1984).

We understand that the DOT&PF recently determined the existing borrow site at the airport is no longer acceptable, in part due to naturally occurring asbestos (which likely originated from the nearby Jade Mountains and Cosmos Hills); where levels of asbestos ranging from about two to 10 percent were measured in the undisturbed soils (DOT&PF, 10 September 2003 and 10 October 2003). Further, the DOT&PF determined the existing pit had limited amounts of alluvial gravel remaining (approximately 35,000 cubic yards) (DOT&PF, 10 September 2003).

PART 3: METHODS OF INVESTIGATION

3.1 Candidate Material Source Areas

Using existing geological data, aerial photos of the area, and land status maps, eight candidate material source areas (designated "A" thru "H") were selected based on their likelihood for containing suitable material with minimal levels of asbestos. Areas containing native allotments were excluded from the program. The location of these eight candidate areas are illustrated in Drawing D-01.

The upland areas around Ambler lie on the slopes of the Jade Mountains, and while local geologic mapping suggests this terrain may contain deposits of sand and gravel, we considered it likely that unacceptable levels of asbestos would be encountered, possibly similar to the existing pit. Therefore, we restricted the reconnaissance areas to the floodplains along the Ambler and Kobuk Rivers; based on an assumption that the levels of asbestos would be lower as a result of mixing with fluvial deposits originating upstream from non-asbestos bearing rock. Figure 2 contains photographs illustrating the general surface conditions encountered at the candidate material source areas.

3.2 Reconnaissance Explorations

The reconnaissance explorations were completed between 9 and 16 June 2004, during which time 27 test probes (designated "P-Area Letter and hole number"; e.g. RM-P-A2; see Table 2) were drilled within seven of the candidate areas ("A" thru "G"); Area "H" was deleted by inspection due to the lack of sand and gravel exposed on the river bar, and the greater distance from the airport. The test probes ranged from 9.1 to 12.1 feet in depth, with a total of about 307 lineal feet drilled. The reconnaissance test probe locations (see also Part 3.5) and logs (see also Part 3.6) are presented in Appendix D.

The reconnaissance explorations were supervised by Peter Hardcastle, Senior Engineering Geologist, of R&M Consultants. The test probes were drilled using a small Acker Soil Mechanics drill equipped with three-inch O.D. continuous-flight solid auger. The drill was transported from area to area by boat, and moved between probe locations with an all-terrain vehicle (4-wheeler). Aaron Banks, an R&M Field Geologist served as the driller. John Kelly of Ambler provided the boat and 4-wheeler. Mr. Kelly and Tuluk Hanks of Ambler cleared the trails and assisted with the drilling.

Disturbed soil samples were collected at roughly three-foot intervals, using a 1.4-inch (I.D.) split-spoon sampler advanced by a non-standard 140-pound hammer with approximately an 8-inch free-fall. Drive samples were obtained until the holes began to cave in. Grab samples were also collected from the auger cuttings. All recovered soil samples were visually described and logged in the field. Selected soil samples were then shipped, for testing, to R&M (see Part 3.7) and Analytica Solutions in Thornton, Colorado (see Part 3.8).

FIGURE 2

GENERAL SURFACE CONDITIONS AT THE CANDIDATE MATERIAL SOURCE AREAS
(Photographs from the Reconnaissance Explorations)

Area "A" (near RM-P-A4)

Area "C"

FIGURE 2 (Continued)

Typical gravel bar on Ambler River (Area “D”)

Area “G”

3.3 Site Selection Process

Subsequent to the reconnaissance explorations, each of the candidate sites was ranked considering a number of criteria, divided under four general headings including land issues, asbestos, mining and access, as described below. Each criterion was assigned a “weight factor” (WF) ranging from 1 to 5; 5 being considered of most significant importance. The candidate areas were then graded, for each criterion, on a scale from 0 to 5; 5 being considered most favorable for site development. A total score was then determined for each candidate area by summing the products of the criterion WF and grade (Table 3). Based on this subjective process, candidate Area “B” (Drawings A-02 and A-03) had the highest score and was selected for further investigation.

Land Issues

The potential for archeological sites and “high value” wetlands were considered very important criteria, and given a WF of 5 and 4, respectively. Northern Land Use Research, of Fairbanks, performed a preliminary study, using existing information, to identify the known or suspected cultural resources in the Ambler region. Based on that review, NLUR characterized the potential for cultural resources within each of the candidate material source areas (NLUR, 15 April 2004). Additionally, ABR, Inc., of Fairbanks, performed a similar preliminary study using aerial photography to characterize the potential for high value wetlands within each of the candidate areas (ABR, 20 April 2004). A grade of five was considered for areas with a low potential for archeological sites, or no high value wetlands; a grade of one was given when there was considered to be a high potential for an archeological site, or high value wetlands across at least 20 to 25 percent of the area.

Asbestos

Each area was ranked considering asbestos in the overburden and suitable soil separately. We used a WF of 2 for asbestos in the overburden; assuming the overburden would likely be disposed on site, quickly re-vegetated and kept wet or encapsulated, thereby minimizing the potential release of asbestos into the air. However, we used a WF of 5 for asbestos in the suitable borrow assuming there would be a much greater potential for generating airborne asbestos while the borrow is handled, screened, crushed, transported and placed; and assuming that the borrow may also be placed in areas where more potential human exposure would occur if the material was disturbed (e.g. road and airport embankments). The grade for asbestos was determined based on the laboratory test results; 5 was given when no asbestos was detected, and 0 was given when the asbestos content was greater than about 10 percent (arbitrary level selected based on the DOT&PF decision not to use the existing airport borrow source).

Mining

The mining criteria included overburden thickness, presence of permafrost, type of borrow material available, and volume of gravel-sized particles. The type of borrow was given a WF of 4, while a lower WF of 2 was given to the overburden and permafrost criterion since these were considered to be more manageable factors. Note that since none of our reconnaissance test probes encountered permafrost, its potential was determined using aerial photos. A WF of 2 was also given to the potential volume of gravel-sized particles (to produce aggregate surface or base course materials); although a higher WF (e.g. 3) would not have changed the overall ranking of the candidate sites. A grade of 5 was given when the borrow was classified as "gravel" (following the *Unified Soil Classification* System); the average overburden was less than about two feet; there was little chance of permafrost within about 25 to 30 feet of the surface; or when there appeared to be a significant volume of gravel-sized particles. A grade of 0 was given when the borrow was not classified as either a "gravel" or "sand" (i.e. greater than 50 percent of the particles, by weight, would pass the No. 200 U.S. sieve, or the soil contained organic matter); or the average overburden was greater than about 10 feet thick. And a grade of 1 was given when permafrost was expected within several feet of the surface; or when there appeared to be very little gravel-sized particles.

Access

Access to the candidate sites via a potential all-season (i.e. earthen road) and winter (i.e. snow or ice road) route where considered separately. An all-season access was considered the most important (WF=4); while access only via winter snow roads was considered to be less desirable (WF=3) due to the unpredictability of ice thickness, which may preclude access during some winters. Barge access was not considered as it was assumed not to be cost effective. The grade values were based on approximate distance between the site and the airport; ranging from 5 when the distance was less than one mile, to 2 for distances greater than five miles. A grade of 0 applied when the criterion did not apply (e.g. no possibility of an all-season route).

3.4 Design Field Explorations, Area "B"

The design geotechnical explorations were completed between 4 October and 6 November 2004, during which time 24 test borings (designated RM-01 thru RM-24) were drilled at the proposed material site (Table 4). The test borings ranged from 22 to 27 feet in depth for a total of about 630 lineal feet drilled. The locations (see Part 3.5) of the test borings at Area "B" are illustrated on Drawing A-04. Logs of each test boring (see Part 3.6) are provided in Appendix B.

The field explorations were supervised by Peter Hardcastle. Discovery Drilling, Inc. of Anchorage was subcontracted to drill the borings. Alex Cardenas and Darrin Van Dehey were the driller and drill helper, respectively. The test borings were drilled using a skid-mounted CME-45 drill rig equipped with eight-inch O.D. continuous-flight hollow-stem auger. The drill was towed with a Caterpillar D-4C dozer provided by the Alaska Native Tribal Health Consortium.

Disturbed soil samples were collected at roughly five-foot intervals, using a 2.5-inch (I.D.) split-spoon sampler advanced by a 340-pound hammer with a 30-inch free-fall. Grab samples were also collected from the auger cuttings. The actual sampler penetration resistance and percent recovery are recorded on the logs in Appendix B. All recovered soil samples were visually described and logged in the field. All soil samples were then returned to R&M's laboratory in Anchorage for further evaluation and testing.

3.5 Field Positioning and Mapping

The scope of this project did not include any instrumented surveying. The R&M geologist measured the location of all reconnaissance test probes and design test borings in the field using Garmin Etrex Summit and Vista, hand-held Global Positioning System (GPS) units. These units have a manufacturer reported accuracy of about 15 meters (49 feet) “RMS”, subject to accuracy degradation to 100 meters “2DRMS” under the United States Department of Defense-imposed Selective Availability Program. All coordinates listed in this report are in “UTM UPS Zone 4W” (metric), “WGS84” map datum. In order to expedite the direct use of test hole coordinates in hand-held GPS units, all UTM coordinates are given in meters. Thus the coordinates given can be directly input into hand-held GPS units without conversion.

The schematic mapping we prepared for this project (provided in Appendices A and D) was also based on field (UTM) coordinates measured for natural features, evident on aerial photographs, using the above hand-held GPS units. Based on these field measurements, the existing aerial photographs were then scaled, registered and combined to produce the photo-mosaic maps presented herein. R&M used these photo-mosaics to layout the borehole program at the proposed sites, and to provide GPS coordinates for staking borings in the field and direction for the NLUR and ABR crews. However, it is important to note that distortion, inherent to the aerial photographic process, was neither quantified nor removed from these photo-mosaics. Therefore, all of the photo-mosaic mapping included in this report should be considered approximate.

3.6 Test Hole Logs

While drilling, the field geologist maintained a log for each test boring that contained information concerning the boring method, samples attempted and recovered, and descriptions of the various soil conditions encountered. This field log also contained the field geologist’s interpretation of the conditions in intervals between recovered samples. Therefore, the field logs contained both factual and interpretive information.

The final logs, provided in Appendices B and D of this report, contain additional interpretation of the field logs, based on further visual inspection of the samples, combined with the results of our laboratory testing. Further, the final logs included herein serve two primary functions: first as a format to present some of the significant raw field and laboratory data; and second to illustrate our interpretation of this data in terms of delineating the different soil strata, groundwater, and thermal conditions encountered during our subsurface explorations. Note that this latter function required a good understanding of soil mechanics, field soil sampling techniques and geomorphic processes, especially those of the northern environment.

3.7 Laboratory Soils Testing

Select soil samples were tested to measure index properties and aggregate quality, following the procedures listed below. The test results are provided in Appendix C. The index test results are also provided on the individual boring logs in Appendix B.

SOIL INDEX AND QUALITY TESTS

TEST	ASTM (2004) DESIGNATION
Moisture Content	ASTM D-2216
Particle Size Distribution	ASTM D-422
Moisture-Density Relationship (Modified Proctor)	ASTM D-1557
Specific Gravity	ASTM D-854
Classification of Soils	ASTM D-2487
Degradation of Aggregate	ATM 313
Sodium Sulfate Loss	ASTM D-5240
LA Abrasion	ASTM C-131

3.8 Asbestos Testing

Soil samples collected from each of the candidate material source areas, during the reconnaissance and design explorations, were tested for asbestos by Analytica Solutions, Inc., in Thornton, Colorado. These samples were collected from both drive samplers and auger cuttings. All total, 40 soil samples were tested from Area "B", and six samples were tested from each of the other five candidate areas probed during the reconnaissance explorations. Each test consisted of measuring, by visual estimation, the percent of area comprised content of asbestos fibers, following EPA Test Method 600/R-93/116, "Method for the Determination of Asbestos in Bulk Building Materials" (also referred to as Polarized Light Microscopy). The results of all these asbestos tests, are summarized in Table 5 (Area "B") and Table 6 (all of the other candidate material source areas), and are also included on the individual boring logs in Appendices B and D. A description of the test method as well as the actual laboratory reports are provided in Appendix E.

3.9 Environmental Studies

ABR, Inc. surveyed the habitats within Area "B" during August 2004. The results of ABR's survey, and wetland mapping were provided to the DOT&PF under separate cover (ABR, October 2004). Note ABR also mapped the wetlands along Alternate Access Route 3.

Northern Land Use Research performed a field survey of Area "B" to search for evidence of cultural resources. The results of that work were provided to the DOT&PF under separate cover (NLUR, July 2004). There were no significant cultural resources identified within Area "B".

PART 4: SITE CONDITIONS, AREA "B"

Our field explorations revealed variable conditions at the proposed material site (Area "B"). The following present our interpretations of the geotechnical conditions we considered relevant to developing the Area "B" as a borrow source.

> **NOTE:** The R&M test borings drilled across Area "B" were generally spaced from roughly 300 to 450 feet apart; wider than the ±200-foot spacing DOT&PF (1993) considered appropriate for a material site investigation. Therefore, a greater variation in conditions (e.g. overburden thickness; and presence and depth to permafrost and groundwater) and material properties (e.g. moisture content and gradation) should be expected within this, relative to the ranges and magnitudes described below.

4.1 General Surface Conditions

At the time of our explorations, Area "B" was primarily covered by a lowland, needleleaf forest (ABR, October 2004), comprised of white spruce to about 25 feet high and a thick willow understory and discontinuous mossy ground cover (similar to that in the photograph of Area "C" in Figure 2). Two abandoned high-water channels were covered with thick willow scrub to about four feet high. There was an area covered with birch-willow scrub between borings RM-13 and RM-20.

The topography across the area was generally flat, with evidence of relict river channels and natural levees. While no topographic surveying was performed, surface elevations across the area appeared to vary on the order of about ten feet. What was interpreted to be naturally formed levees, up to eight feet high, were also observed between the proposed site and the Ambler River, adjacent to borings RM-14, RM-16 and RM-21 and along the northwest side of the site.

Surface water on the site appeared to drain to the west and southwest along abandoned river channels. Ambler residents also reported that this area is subject to flooding; particularly due to ice jams in the spring and heavy rains during the summer and fall. The levee heights indicate water levels up to 10 feet or more above existing ground should be anticipated in this area.

4.2 General Soil Column

The soil column consisted of three general units, including overburden, alluvial and glacial deposits; although the thickness and particle grading within each unit varied across the site. The overburden was composed of alluvial silt, layered fluvial fine sandy silts and silty sands, and organic matter. The thickness of overburden varied widely, ranging from about three to 12.5 feet, with an apparent average of about seven feet in the test holes drilled within the site limits. The glacial deposits are interpreted to underlie the entire site; although they were only encountered (between depths of 17.5 and 22.5 feet) in seven of the 24 borings in this area.

Generally, the alluvial deposits were composed of poorly graded sand with gravel, sand with silt and gravel, and some layers of silty sand. The ranges of the grain-sizes measured in the alluvial deposits are tabulated below. Note that much of the material tested from this general unit was gap-graded, with the "bench" in the gradation falling in the medium sand-size range (i.e. there was excessive fine sand). Additionally, there was a notable increase in the percent fine sand (particles passing the No. 40 U.S. sieve; P40) and silt measured in samples collected from below a depth of about 20 feet. Moisture contents in the alluvial deposits varied from about 2.5 to 12 percent above the water table, and from 9.2 to 24 percent below the water table. There appeared to be a minor, direct relationship between the moisture content and P40 contents measured in samples taken below the water table. Two moisture-density (*Modified Proctor*) tests, on samples of material combined from several of the test borings, had optimum moistures of approximately six percent. As such, much of the material, even above the groundwater table, apparently has moisture contents above optimum, and may require draining and/or drying prior to use.

SUMMARY OF BORROW MATERIAL GRAIN-SIZE TESTING(1)

GRADATION RESULTS FOR TESTED SAMPLES OF ALLUVIAL MATERIAL (% Passing, by Weight)

U.S. Sieve	1"	3/4"	1/2	3/8"	#4	#10	#20	#40	#60	#100	#200
Count	24	31	31	32	32	32	32	32	32	32	35
Average(2)	100	98	93	88	74	60	50	40	26	15	8
Minimum	96	92	85	76	55	35	77	14	8	6	4
Maximum	100	100	100	100	99	97	95	91	78	55	16
Stand. Dev(2)	1	2	4	7	12	16	17	16	14	9	3

(1) The cut-off used for this table was set to include the most generally desirable materials for construction. Samples containing in excessive of 16% passing the No. 200 U.S. sieve were excluded.

(2) Results were rounded to the nearest one percent.

The fraction of gravel-sized particles (retained on the No. 4 U.S. sieve), measured by weight in samples of the alluvial deposits ranged from one to 45 percent. These gravel particles were generally rounded to subangular, and less than three-quarters inch in diameter; although several samples contained material up to 1.5 inches in diameter, and material in auger cuttings was noted up to about two inches in diameter. Much of the gravel appeared to be quartz-mica schist. Based on three tests each, the Degradation values measured on samples of gravel ranged from 44 to 62 (average of 49); and the Los Angeles Abrasion ranged from 33 to 69 percent (average of 45 percent). The Sodium sulfate soundness loss measured on two samples of gravel was 1.4 and 3.8 percent. The apparent specific gravity was approximately 2.67, with absorption in the coarse material ranging from 0.9 to 1.3 percent. (See test reports in Appendix C).

4.3 Groundwater

Groundwater was observed in all 24 test holes drilled during the design explorations at this site; at depths (measured while drilling) typically ranging from approximately 7.5 to 14.1 feet. After drilling, borings RM-04, RM-12 and RM-18 were completed with slotted PVC pipe for the purpose of observing groundwater levels, as illustrated in Figure 3. All of our groundwater measurements are summarized in Table 4. Note that the site lies in the floodplain of the Ambler River, and the depth to groundwater is expected to fluctuate with the water level in the river.

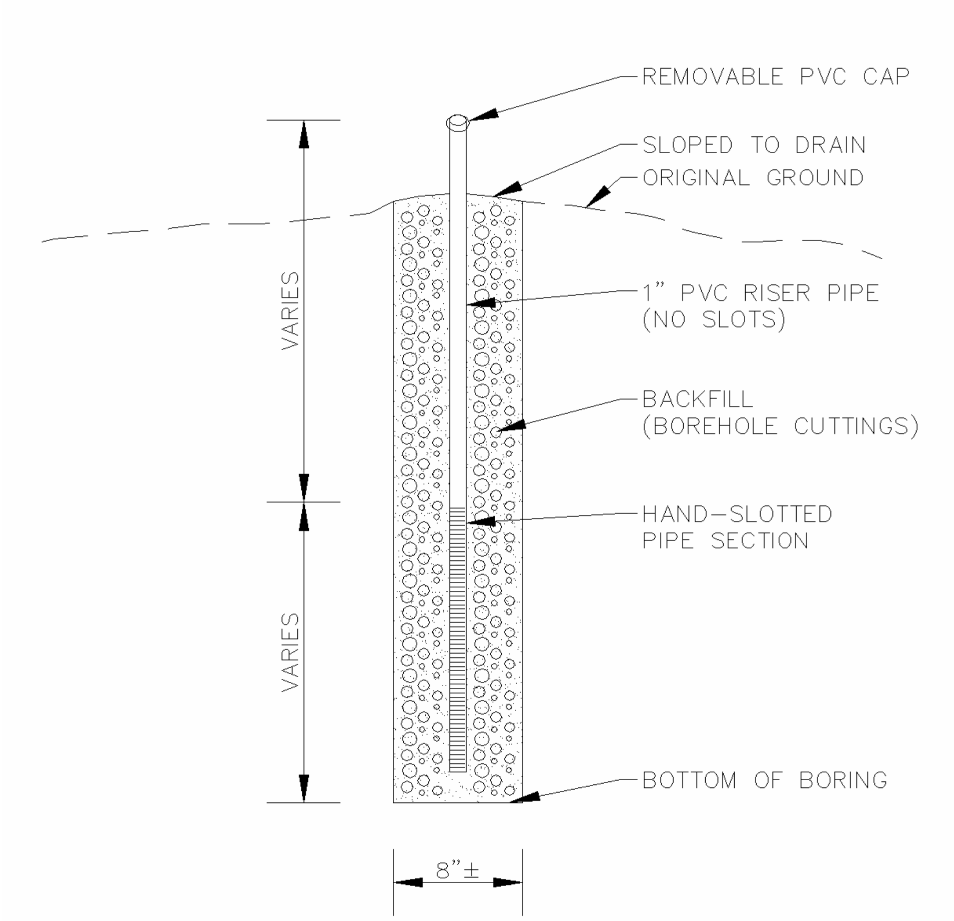

FIGURE 3
TYPICAL GROUNDWATER OBSERVATION WELL

4.4 Frozen Ground

Permafrost was not encountered in any of the total 51 test holes drilled during our reconnaissance and design explorations. However, all of the candidate material source areas, including the proposed site, Area "B", lie within a region of known discontinuous permafrost, so areas of perennially frozen ground may still be expected. Seasonal frost was encountered within six of the reconnaissance borings located within proposed material source areas "A" and "B".

PART 5: GENERAL MINING GUIDELINES AND CONSIDERATIONS

Plans to develop a material site in Area "B" should be prepared in compliance with the following general guidelines and considerations. As a minimum, these plans should address overburden and borrow mining procedures; handling, treatment, and disposal of any water encountered during excavation, as well as water used to process and produce the desired products; and closeout and rehabilitation. Further, it is presumed that this potential material site would be used by multiple users over an extended period of time. Therefore, particular attention should be taken to prevent the operations of early users from hindering those by others in the future.

5.1 Land Status

We understand that the proposed borrow site lies entirely within property owned or controlled by NANA Regional Corporation.

5.2 Asbestos

Naturally occurring asbestos was measured in samples of the general overburden and alluvial soil units collected from Area "B" (see Table 5, the boring logs in Appendix B, and the laboratory test reports in Appendix E).

Asbestos is a known human carcinogen, with inhalation of airborne fibers as the primary route of human exposure. To our knowledge, naturally occurring asbestos in undisturbed soil or rock is not specifically regulated by any Federal agency; although some states, but not Alaska, apparently have adopted regulations and policies governing earthwork using materials otherwise naturally containing asbestos. However, we understand that asbestos-bearing products are regulated by no less than five government agencies: the U.S. Environmental Protection Agency (EPA); Alaska Department of Environmental Conservation (ADEC); both State and Federal Occupational Safety and Health Agencies (OSHA); and the Mine Safety and Health Agency (MSHA), as summarized in Appendix F. Briefly, asbestos is generally regulated based on its concentration in friable material and in air. The EPA defines any material with over one percent asbestos as an "asbestos containing material" (ACM). Classification of ACM is further separated into friable and non-friable material (materials from which asbestos can and cannot likely be released into the air, respectively). Alternatively, most Federal health and safety standards for asbestos are based on its concentration in air (e.g. EPA, OSHA, and MSHA depending on whom, when and where the exposure might potentially occur).

Handling and transporting of asbestos containing material may cause the asbestos to become airborne. Crushing and screening the material for aggregate production may present the highest potential risk. However, we are not aware of any methods available to predict air concentrations of asbestos based on the background level in a soil or rock (e.g. State of Alaska, 24 November 2003); a prediction that would certainly also depend on the construction equipment and operating procedures, as well as season and weather. As such, it is presently not known if the level of asbestos naturally occurring at this site, in the overburden and borrow materials, would produce airborne concentrations of asbestos during mining and construction that exceed regulatory limitations. Therefore, all contractors planning to obtain materials from Area "B" should first perform a risk analysis to evaluate the health hazard, and determine if special safety procedures are required, prior to commencing any mining operations.

5.3 Clearing and Stripping

Vegetative cover must be cleared from the site prior to mining operations. Firewood is an important source of fuel in Ambler and it may be desirable to allow firewood cutters to remove as much wood as possible prior to clearing the site.

5.4 Overburden

Overburden covering Area "B" will include vegetative mat (roots and topsoil), alluvial silt, layered fluvial fine sandy silts and silty sands, and organic matter. Based on the R&M borings, the thickness of overburden varied widely across this area, ranging from about three to plus 12 feet (see Table 4), with an apparent average on the order of seven feet.

Initially, the overburden can be stockpiled around the edge of the existing pit. After all of the recoverable material has been mined from an area, the overburden can be backfilled into the excavation. However, given the range in soil types lumped within this general soil unit, the organic soil, silt and silty sand materials, as well as waste generated while producing specific product items (see below) should be stockpiled separately. These stockpiles should also be protected from surface runoff.

5.5 Borrow Materials

The quantity of borrow material that can be produced from Area "B" will depended on a number of factors, all unknown at this time, particularly the ultimate disposition, intended use and project specifications for a specific product item; the season during which the material is mined; and the capacity of the mining equipment. Therefore, the contractor should verify that sufficient suitable materials are available in the area to be developed, prior to commencing mining operations.

The R&M borings in Area "B" were spread across an area of at least 50 acres. Within this area, the R&M borings delineated at least 1,000,000 cubic yards (including a volumetric safety factor of 1.5) of soil comprised predominately of coarse-grained particles; typically ranging in classification (Drawing C-01) from "Poorly-graded Sand" (*group symbol* SP), to "Poorly-graded Sand with Gravel and/or nonplastic Silt (SP-SM, SM). Based on present DOT&PF highway and airport standard specifications, these soils appeared to be suitable as classified fill for constructing road and airfield embankments. For planning quantities, assume on the order of 10 percent shrinkage between bank and compacted volume, when these materials are used to construct embankments.

Some of the gravel-sized particles also appeared to be suitable, in terms of durability, for use in aggregate surface, base and subbase course. However, the portions of the general alluvial soil unit that contained more substantial concentrations of gravel-sized particles (albeit still of limited volume) typically appeared to be gap-graded, and predominately comprised of fine sand and small gravel particles. Therefore, it should be anticipated that screening, washing, crushing and/or blending would be required to produce these items in conformance with present DOT&PF highway and airport specifications.

Material stockpiles must be protected from surface water, as well as contamination with other overburden and wastes.

5.6 Excavations

Depths of excavation will be limited by shallow groundwater and the underlying glacial silt. The depth of overburden, depth to silt, percent gravel in the material and maximum size of gravel present are expected to vary significantly over the site. The R&M test borings encountered sand and gravel to depths ranging from 17.5 to more than 27 feet.

Excavation above the groundwater table may be possible using conventional methods. Dewatering may also be used to extend the depth of excavation by these conventional methods, subject to the capacity of the pumps and the size of the work area. Excavations below the groundwater level may require bailing operations, using equipment such as excavators or draglines. Heated or specially lined truck beds may also be needed for winter operations to reduce the potential of the borrow freezing to the transport equipment.

Cut slopes in the materials near or below the groundwater, or otherwise exposed to surface drainage, will likely tend to slough to a grade on the order of 3:1 to 4:1 (horizontal to vertical). The borrow excavation cut slopes and waste areas should be groomed and dressed at the completion of mining as directed by the project engineer. Finished side slopes should be shaped at grades no steeper than 4:1.

Boulders, up to 10 feet in diameter, were noted along the Ambler River during our reconnaissance explorations. These boulders were interpreted to be glacial erratics; rock fragments carried by glacial ice and deposited at some distance from the outcrop from which they were derived (Jackson, 1997). These boulders appeared to have eroded out of the glacial till along the river. Similar glacial erratics should be anticipated in any excavation within the proposed material site.

5.7 Flooding

The borrow site lies on the floodplain of the Ambler River, and is subject to flooding during spring breakup and periods of heavy rain. It is not known how often flooding occurs or what the maximum elevation of floodwaters may be. Water levels may become high enough to prevent work at the site or to interrupt access. Contractors working at the site should be cognizant of river levels at all times.

Petroleum products and hazardous materials should not be stored on-site for extended periods of time. Equipment or structures that could be damaged by rising water should be removed from the site at completion of mining operations. Material stockpiles may be subject to erosion during flooding and long-term storage should be avoided.

5.8 Site Access

Four (4) potential routes, described below and shown on Drawing A-03, were considered to access the proposed material site; Alternate Routes 1 and 2 include one or more variants. Note that there have been no instrumented surveys, geotechnical explorations, civil engineering, nor economic analysis comparing construction, haul and maintenance costs performed along any of these alternate routes. The following general considerations and discussions of the alternate routes are based entirely on our interpretations of existing aerial photography, U.S. Geological Survey 1:63,360 quadrangle mapping (with 50-foot contour intervals), and limited field reconnaissance. Some wetland mapping has been performed along route 3 (ABR, October 2004) and a cultural resource survey was performed along portions of route 2 (NLUR, July 2004).

- The access route should be selected to minimize cuts, thus reducing the potential for encountering asbestos containing material, exposing ice-rich frozen soils and minimizing slope instability. Portions of any route will cross wetlands, and the Ambler River floodplain may be subject to periodic flooding.

- The access road will likely have to be built using material mined from the proposed borrow site, since there is no known suitable material in Ambler that does not contain potentially hazardous levels of asbestos.

- Upland routes (e.g. Alternatives 1 and 2) will cross at least two small drainages: Airport Creek and Clearwater Creek, which both flow into Horseshoe Lake (Drawing A-03). Each of these creeks is comprised of several channels; the main channels are about two to four feet wide and three to five feet deep with nearly vertical banks. Both creeks appear to be partially fed by groundwater and may flow all winter. Icing, similar to that found at Grizzly Creek on the existing airport road, may occur at these two crossing and large drainage structures may be required.

- The existing airport access road was constructed out of potentially “asbestos containing material” that may be hazardous if dust is created. A new road may need to be built out of non-hazardous material and the old road abandoned if this problem cannot be mitigated. If the existing road is used, methods may be required to mitigate the potential of asbestos becoming airborne.

The following includes a brief description of some of the advantages and disadvantages for each potential route.

Alternate Route 1 is the longest upland alignment considered (~3.7 miles new construction); swinging farthest west in an attempt to minimize steep grades. The route appears to minimize major drainage crossings and side-hill cuts/fills. Discontinuous permafrost may be present under all the upland portions of the route. The route descends off the uplands near a private parcel (U.S. Survey 5791) through the same small drainage swale used for moving the drill to the site. Other than its length, the route does not appear to have any major disadvantages.

Variant route 1A is a shorter version of Alternate 1 (~3.2 miles new construction), but with more side-hill cuts/fills, more major drainage crossings, and steeper grades, especially at Clearwater Creek. Maintenance along this variant may also be more expensive if significant areas of fine-grained soils or ice-rich permafrost are encountered.

Alternate Route 2 generally follows the lower edge of a bluff and appears to be the shortest upland alignment (~2.5 miles new construction), although this route may cross debris and steep banks along the edge of Horseshoe Lake. Observations of the bluffs across the river indicate the debris fans may consist of thixotropic silts and silty clays which could be unstable and prone to erosion if disturbed. Thus, an alignment around the lake may require placing fill in the lake. The depths of water and lake bottom conditions are not known. Aerial photo interpretation indicates the route may also cross an old landslide nearer the airport, and other areas of instability may be found.

Variant route 2A may be slightly shorter than Alternate 2 (~2.3 miles new construction) and the foundation soil conditions may be more favorable (i.e. it avoids areas that may contain peat bogs along the edge of the uplands), but the grades could be steeper between the two creeks, and it has the same problems mentioned above getting around Horseshoe Lake.

Variant route 2B avoids the potential difficulty of getting around Horseshoe Lake, but it is longer than Alternate 2 (~3.1 miles new construction), and it appears to involve a steep grade on the north side of Clearwater Creek.

Alternate Route 3 is the shortest all-season route (~2.2 miles, 1.7 miles of new construction) and appears to involve the gentlest grades. However, this route crosses the most wetlands (see ABR, [October] 2004), it is subject to flooding over most of its length, and erosion may be a problem. In particular, there may be significant high-water flow at the slough crossing along roughly 500 feet of the road. It should be noted that the local borrow materials are comprised of relatively small particles (typically less than 1.5 inches) and there is no known local source of riprap. Fish passage may also be a concern. The slough channel may be incised and large drainage structures, possibly including a bridge, may be required here. It was reported that small boats sometimes access Horseshoe Lake from the Ambler River using the slough and navigability for this use may also be an issue.

Alternate Route 4 would only be used in the winter (~2.3 miles of temporary snow road), crossing as much lake and pond ice as to minimize impact to the natural terrain. This is the simplest and probably least expensive route to construct initially. However, it would need to be rebuilt every year that borrow is required from the proposed material site. The route avoids the Clearwater Creek delta at the western end of Horseshoe Lake, where it was locally reported that the ice may be thin or soft for much of the winter. Construction of a snow road may be subject to delays if freeze-up or snowfall is late or its use may be curtailed if breakup is early.

PART 5: CLOSURE

The discussions of site conditions and potential borrow materials presented in this report were based on the pertinent information listed herein. Significant alteration of any of this information or development concepts could substantially affect the provided geotechnical interpretations. Additionally, because subsurface characteristics can change sharply within a given area and with the passing of time, the possibility exists that important subsurface conditions, not disclosed by this field investigation, may be discovered during development. Should such situations occur, the influence of the new information on the present interpretations and recommendations should be evaluated without delay.

R&M Consultants, Inc. performed this work in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond the exercise of reasonable care and professional diligence, is made. This report is intended for use only in accordance with the purposes of study described within.

PKH:CHR:RLS*slv

PART 6: REFERENCES

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TABLE 1

CLIMATE DATA
AMBLER VICINITY, ALASKA

LOCATION	AMBLER ALASKA [1]	KOBUK, ALASKA [2]
Period of Record	1981 - 1987	1953 - 1979
Elevation (ft.)	120	140
Mean Annual Temperature (°F)	22.1	21.7
Average Max. Temperature (°F)	32.0	32.4
Average Min. Temperature (°F)	12.3	10.8
Record High Temperature (°F)	92 (83 & 86)	92 (July 77)
Record Low Temperature (°F)	-65 (89)	-68 (Jan. 71)
Mean Annual Precipitation (in.)	22.4	16.7
Maximum Monthly Precipitation (in.)	-	8.90 (July 67)
Maximum Daily Precipitation (in.)	1.98 (86)	2.38 (7/16/67)
Mean Annual Snowfall (in.)	104.6	54.0
Maximum Annual Snowfall (in.)	-	100.0 (1967)

(1) After AEIDC, Alaska Climate Summaries, 1989
(2) After Western Regional Climate Center, http:// www.wrcc.dri.edu/cgi-in/cliMAIN.pl?akkobu

TABLE 2

SUMMARY OF MATERIAL SOURCE RECONNAISSANCE TEST PROBES AMBLER AIRPORT REHABILITATION

TEST HOLE NO.	RECONNAISSANCE AREA	UTM CORRDINATES (Meters)		TOTAL DEPTH (Feet)	DEPTH TO WATER (Feet)
		Northing	Easting		
RM-P-A1	A	7,443,858	553,489	10.6	7.0
-A2		7,443,861	553,345	12.1	10.0
-A3		7,443,806	553,196	12.1	9.1
-A4		7,443,288	552,671	12.1	6.1
-A5		7,443,420	552,582	10.6	7.6
-A6		7,443,565	552,547	10.6	7.5
RM-P-B1	B	7,445,045	553,032	12.1	6.1
-B2		7,445,092	552,893	9.1	6.1
-B3		7,445,245	552,809	12.1	9.1
-B4		7,445,361	552,732	10.6	8.5
-B5		7,445,243	552,632	12.1	6.1
-B6		7,445,128	552,509	12.1	6.0
RM-P-C1	C	7,446,241	552,356	9.1	8.0
-C2		7,446,366	552,453	12.1	8.5
-C3		7,446,447	552,585	12.1	8.0
RM-P-D1	D	7,446,447	553,746	9.1	5.0
-D2		7,448,460	553,819	9.1	6.5
-D3		7,448,434	553,944	12.1	N/O
RM-P-E1	E	7,441,081	550,745	12.1	8.0
-E2		7,441,165	550,851	12.1	N/O
-E3		7,441,240	550,995	12.1	N/O
RM-P-F1	F	7,441,473	551,888	12.1	5.5
-F2		7,441,331	551,943	12.1	N/O
-F3		7,441,163	551,989	10.6	N/O
RM-P-G1	G	7439230	552049	12.1	6.0
-G2		7439254	552208	12.1	6.0
-G3		7439277	552324	12.1	1.5

N/O = Not observed

TABLE 3

CANDIDATE BORROW AREA RANKING MATRIX
AMBLER AIRPORT REHABILITATION

SOURCE CHARACTERISTIC WF[2]	LAND ISSUES		ASBESTOS		Overburden Thickness	Permafrost	Type of Borrow	Gravel Volume	Access Road Length		TOTAL SCORE[3]	RANK
	Cultural 5	Wetlands 4	Overburden 2	Borrow 5	2	2	4	2	All-Season 4	River Ice 3		
AREA[1]	**'Grade' on a scale of 1 to 5 (see below); 5 being considered most favorable for site development**											
A	1	1	4	3	2	4	2.5	2.5	4	4	**87**	
B	4	5	4	4	3	4	3.5	3	3	3	**123**	**1**
C	4	5	4	5	2	5	3.5	3.5	0	2.5	**116**	**2**
D	4	3	4	4	2	5	4	4	0	2	**104**	
E[4]	2	5	4	4	4	5	3.5	2.5	0	5	**110**	
F	3	5	5	4	4	5	3	2	0	4.5	**113**	**3**
G	4	3	5	4	5	5	3	2	0	3	**107**	
H[5]	4	1 (FF)					(FF)					

[1] All Sites are in alluvial floodplains and mining will require bailing below the groundwater table.
[2] 'Weight Factor' (WF) of each characteristic on a scale of 1 to 5; 5 being considered of most significant importance.
[3] Sum of 'weight factor' (WF) times the 'grade' for all characteristics.
[4] Includes only the southern portion of Ambler Island to avoid old townsite and high value wetlands
[5] Area 'H' was not drilled during the reconnaissance explorations
FF = Fatal Flaw; if encountered the area is eliminated from further consideration

Potential for Archeological Sites	
Low	5
Moderate	3
High	1

Preliminary Estimate of 'High' Value Wetland Areas	
Absent	5
<10-15%	3
>20-25%	1

Asbestos in OB/Borrow	
Not Detected	5/5
<1%	4/3
1 - 2%	3/1
>10%	FF/FF

Overburden Thickness	
<2 ft	5
3-5 ft	3
8-10 ft	1
>10 ft	FF

Type of Borrow	
Gravel	5
Sand w/ Gravel	4
Sand	3
Silty Sand	1
None	FF

Potential Gravel Volume	
Significant	5
Moderate	3
Minor	2
Very Low	1

Access Road	
<1-2 mi	5
2-3 mi	4
3-5 mi	3
>5 mi	2
None	0

Potential Permafrost Above about 25-30 ft	
0-10%	5
Est. 50%	3
Est. 75%	2
All	1

TABLE 4

SUMMARY OF DESIGN MATERIAL SOURCE INVESTIGATION TEST BORINGS
AMBLER AIRPORT REHABILITATION

TEST HOLE NO.	UTM COORDINATES (Meters)		DEPTH OF BORING (Feet)	DEPTH TO WATER (Feet)	GENERAL SOIL UNITS (Feet)		
	Northing	Easting			Overburden[1]	Alluvial	Glacial[1] (Depth to)
RM-01	7,445,237	552,594	26.5	7.5	7.5	15.0	22.5
RM-02	7,445,300	552,703	26.0	8.0	7.5	>18.5	N/O
RM-03	7,445,295	552,820	25.0	9.0	12.5	>12.5	N/O
RM-04	7,445,392	552,828	27.0	11.7[2]	4.5	>22.5	N/O
RM-05	7,445,421	552,936	27.0	8.0	11.0	>16.0	N/O
RM-06	7,445,526	552,924	27.0	7.5	4.0	13.5	17.5
RM-07	7,445,456	553,041	22.0	9.0	12.0	5.5	17.5
RM-08	7,445,387	553,127	22.0	12.5	12.5	5.0	17.5
RM-09	7,445,351	553,039	27.0	12.5	12.5	10.0	22.5
RM-10	7,445,252	553,047	26.0	8.0	8.0	>18.0	N/O
RM-11	7,445,320	552,938	27.5	8.0	8.0	>19.5	N/O
RM-12	7,445,201	552,933	27.0	13.2[2]	8.0	>19.0	N/O
RM-13	7,445,088	552,938	26.5	12.5	4.0	>22.5	N/O
RM-14	7,445,181	552,819	27.0	11.5	7.5	>19.5	N/O
RM-15	7,445,181	552,705	27.0	12.5	7.5	>19.5	N/O
RM-16	7,445,081	552,689	27.0	12.0	12.0	10.5	22.5
RM-17	7,445,054	552,813	27.0	7.5	4.0	>23.0	N/O
RM-18	7,444,942	552,821	27.0	14.1[2]	3.5	>23.5	N/O
RM-19	7,444,876	552,708	27.0	12.5	7.5	>19.5	N/O
RM-20	7,444,981	552,700	26.5	7.5	3.5	>23.0	N/O
RM-21	7,445,013	552,569	26.0	12.0	7.5	>18.5	N/O
RM-22	7,445,068	552,452	25.0	8.0	4.0	>21.0	N/O
RM-23	7,445,129	552,355	27.0	8.0	12.5	10.0	22.5
RM-24	7,445,169	552,483	26.5	7.5	7.5	15.0	22.5

N/O = Not observed

(1) Some materials in the general overburden and glacial soil units may be suitable for use in an engineered fill, subject to the specific project requirements (see Part 5.2).

(2) Boring was completed with slotted PVC pipe for monitoring groundwater levels.

TABLE 5

SUMMARY OF ASBETSOS TEST RESULTS
AMBLER MATERIAL SITE INVESTIGATION, AREA "B"

BORING	SAMPLE/DEPTH(ft)	EST SOIL GROUP SYMBOL	TOTAL ASBESTOS, Visual Area Est, %
RM-P-B1	1 / 0.5-3.1	ML	ND
	2 / 3.1-4.6	ML & SP-SM	Trace <1
	3 / 4.6-6.1	ML	ND
	4 / 6.1-7.6	SP-SM	Trace <1
	5 / 7.6-9.1	SP-SM	Trace <1
RM-P-B2	1 / 0.5-3.1	SM	ND
	2 / 3.1-4.6	SP-SM	ND
	3 / 4.6-6.1	SP-SM	ND
	4 / 6.1-7.6	SP-SM	ND
	5 / 7.6-9.1	SP-SM	ND
RM-P-B3	1 / 0.5-3.1	ML	Trace <1
	2 / 3.1-4.6	SP-SM	ND
	3 / 4.6-6.1	SP-SM	Trace <1
	4 / 6.1-7.6	SP-SM	Trace <1
	5 / 7.6-9.1	SP-SM	Trace <1
	6 / 9.1-10.6	GP-GM	ND
RM-P-B4	1 / 0.5-3.1	ML	ND
	2 / 3.1-4.6	SP-SM	ND
	3 / 4.6-6.1	SM	ND
	4 / 6.1-7.6	ML, SM & SP-SM	ND
	5 / 7.6-8.5	SM	Trace <1
	6 / 9.1-10.6	GP-GM	Trace <1
RM-P-B5	1 / 0.5-3.1	ML	ND
	2 / 3.1-4.6	MML & SP-SM	ND
	3 / 4.6-6.1	SM	ND
	4 / 6.1-7.6	ML & SP-SM	ND
	5 / 7.6-9.1	SM	ND
	6 / 9.1-10.6	SP-SM	ND
RM-P-B6	1 / 0.5-3.1	ML	ND
	2 / 3.1-4.6	SP-SM	ND
	3 / 4.6-6.1	ML	ND
	4 / 6.1-7.6	ML, SM & SP-SM	ND
	5 / 7.6-9.1	SM	Trace <1
	6 / 9.1-10.6	SP-SM	Trace <1
RM-02	3 / 15-16.5	SP-SM	Trace <1
RM-07	2 / 10-12	SM	Trace <1
RM-11	3 / 15-17	SP-SM & GP-GM	Trace <1
RM-15	3 / 15-17	SP	Trace <1
RM-18	3 / 15-17	SP-SM	Trace <1
RM-22	3 / 15-17	SW-SM	Trace <1

(1) See Drawing C-01, and boring logs in Appendices B and D.
(1) Analysis by Polarized Light Microscopy; see Table 5 and laboratory test reports in Appendix E

TABLE 6

SUMMARY OF ASBETSOS TEST RESULTS
AMBLER MATERIAL SITE INVESTIGATION
RECONNAISANCE AREAS "A, C, D, E, F & G"

AREA	BORING	SAMPLE/DEPTH(ft)	EST SOIL GROUP SYMBOL(1)	TOTAL ASBESTOS(2), Visual Area Est, %
A	RM-P-A1	6 / 9.1-10.6	GP-GM	Trace <1
	RM-P-A3	2 / 3.1-4.6	SM/ML	ND
	RM-P-A4	2 / 3.1/4.6	ML	ND
	RM-P-A5	6 / 9.1-10.6	SW-SM	1.0
	RM-P-A6	4 / 6.1-7.6	ML	Trace <1
C	RM-P-C1	2 / 3.1-4.6	SM	Trace <1
	-C2	2 / 3.1-4.6 6 / 9.1-10.6	ML SP-SM	ND ND
	-C3	1 / 0.5-3.1 6 / 9.1-10.6	ML SP-SM	ND ND
D	RM-P-D1	4 / 6.1-7.6	SP-SM	ND
	-D2	1 / 0.5-3.1 2 / 3.1-5.1	ML SM	Trace <1 Trace <1
	-D3	2 / 3.1-4.6 6 / 9.1-10.6	ML SP-SM	ND ND
E	RM-P-E1	4 / 6.1-7.6	SW	Trace <1
	-E2	2 / 3.1-4.6 6 / 9.1-10.6	SP SP	ND ND
	-E3	2 / 3.1-4.6 4 / 6.1-7.6	SP SP	Trace <1 Trace <1
F	RM-P-F1	1 / 0.3-3.1 4 / 6.1-7.6	ML SW-SM	ND ND
	-F2	2 / 3.1-4.6 6 / 9.1-10.6	SP SP & ML	Trace <1 ND
	-F3	2 / 3.1-4.6	SP	ND
G	RM-P-G1	2 / 3.1-4.6 4 / 6.1-7.6	SP-SM SW	ND ND
	-G2	2 / 3.1-4.6 4 / 6.1-7.6	SW SW	ND Trace <1
	-G3	2 / 3.1-4.6	SW	Trace <1

(1) See Drawing C-01, and boring logs in Appendix D.
(2) Analysis by Polarized Light Microscopy; see Table 5 and laboratory test reports in Appendix E

APPENDIX A

MAPS

APPENDIX B

LOGS OF TEST BORINGS

APPENDIX C

LABORATORY TEST DATA (SOILS)

APPENDIX D

RECONNAISSANCE INVESTIGATION

APPENDIX E

LABORATORY TEST DATA (ASBESTOS)

APPENDIX F

ASBESTOS SAFETY REGULATIONS

Environmental Management Incorporated. *Letter* to R&M Consultants, Inc., dated 14 April 2004

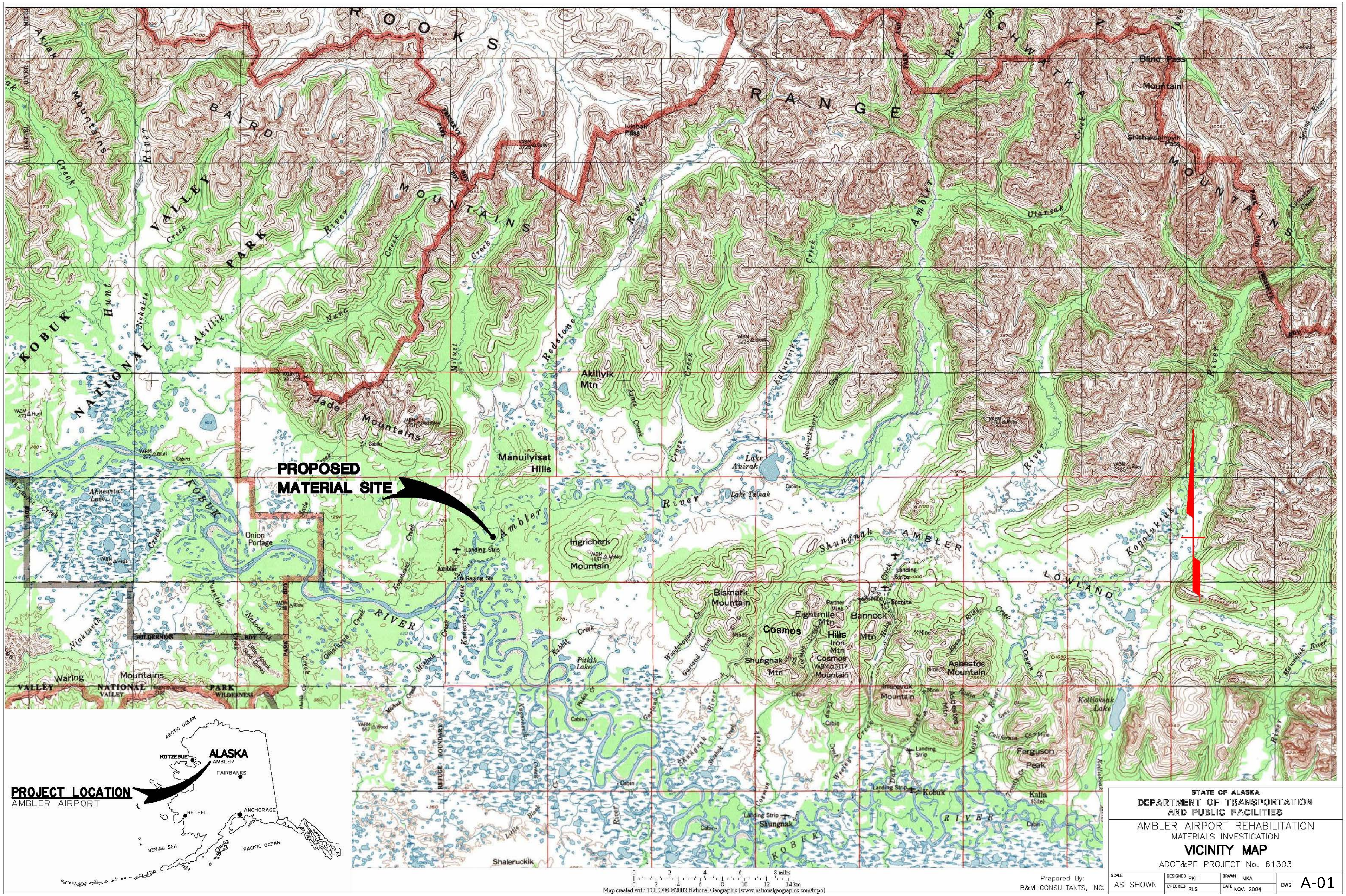
APPENDIX G

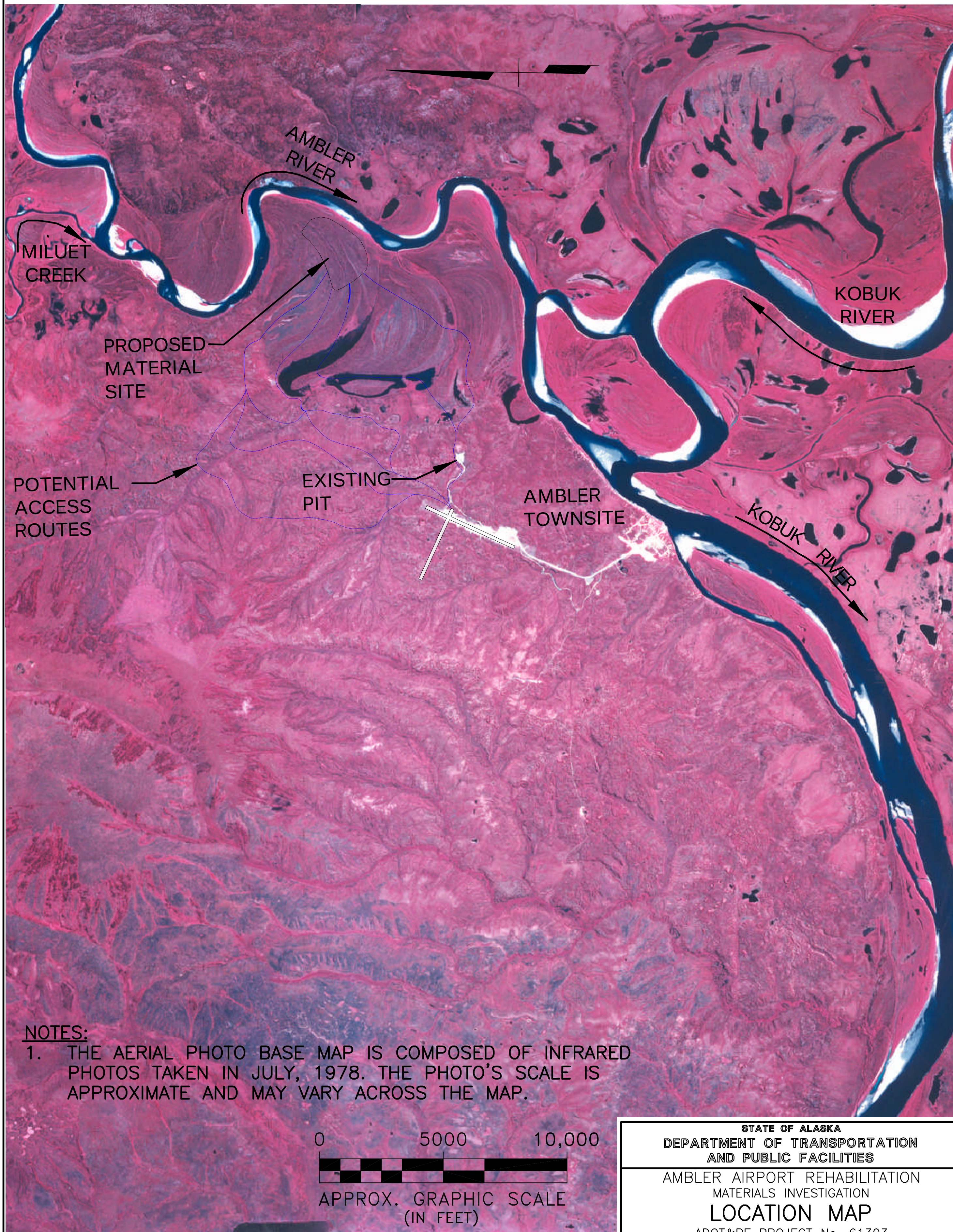
AMBLER AIRPORT EXPLORATIONS

R&M Consultants, Inc. *Geotechnical Memorandum* to DOT&PF, Northern Region, dated 3 December 2004

APPENDIX A

MAPS


PROPOSED
MATERIAL SITE
BROOKS RANGE
BAIRD MOUNTAINS
SCHWATKA MOUNTAINS
JADE MOUNTAINS
KOBUK VALLEY NATIONAL PARK
Ambler River
Kobuk River
Shungnak River
AMBLER LOWLAND
Akillik Mtn
Manuilyisat Hills
Ingricherk Mountain
Onion Portage
Lake Anirak
Lake Tullak
Bismark Mountain
Cosmos Hills
Eightmile Mtn
Bannock Mtn
Shungnak Mtn
Asbestos Mountain
Ferguson Peak
Kobuk
Shungnak
Ambler
Landing Strip
Blind Pass
Mountain
Waring Mountains
PROJECT LOCATION
AMBLER AIRPORT
ALASKA
ARCTIC OCEAN
KOTZEBUE
AMBLER
FAIRBANKS
BETHEL
ANCHORAGE
BERING SEA
PACIFIC OCEAN
Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
AMBLER AIRPORT REHABILITATION
MATERIALS INVESTIGATION
VICINITY MAP
ADOT&PF PROJECT No. 61303
Prepared By:
R&M CONSULTANTS, INC.
SCALE AS SHOWN
DESIGNED PKH
CHECKED RLS
DRAWN MKA
DATE NOV. 2004
DWG A-01



NOTES:

1. THE AERIAL PHOTO BASE MAP IS COMPOSED OF INFRARED PHOTOS TAKEN IN JULY, 1978. THE PHOTO'S SCALE IS APPROXIMATE AND MAY VARY ACROSS THE MAP.

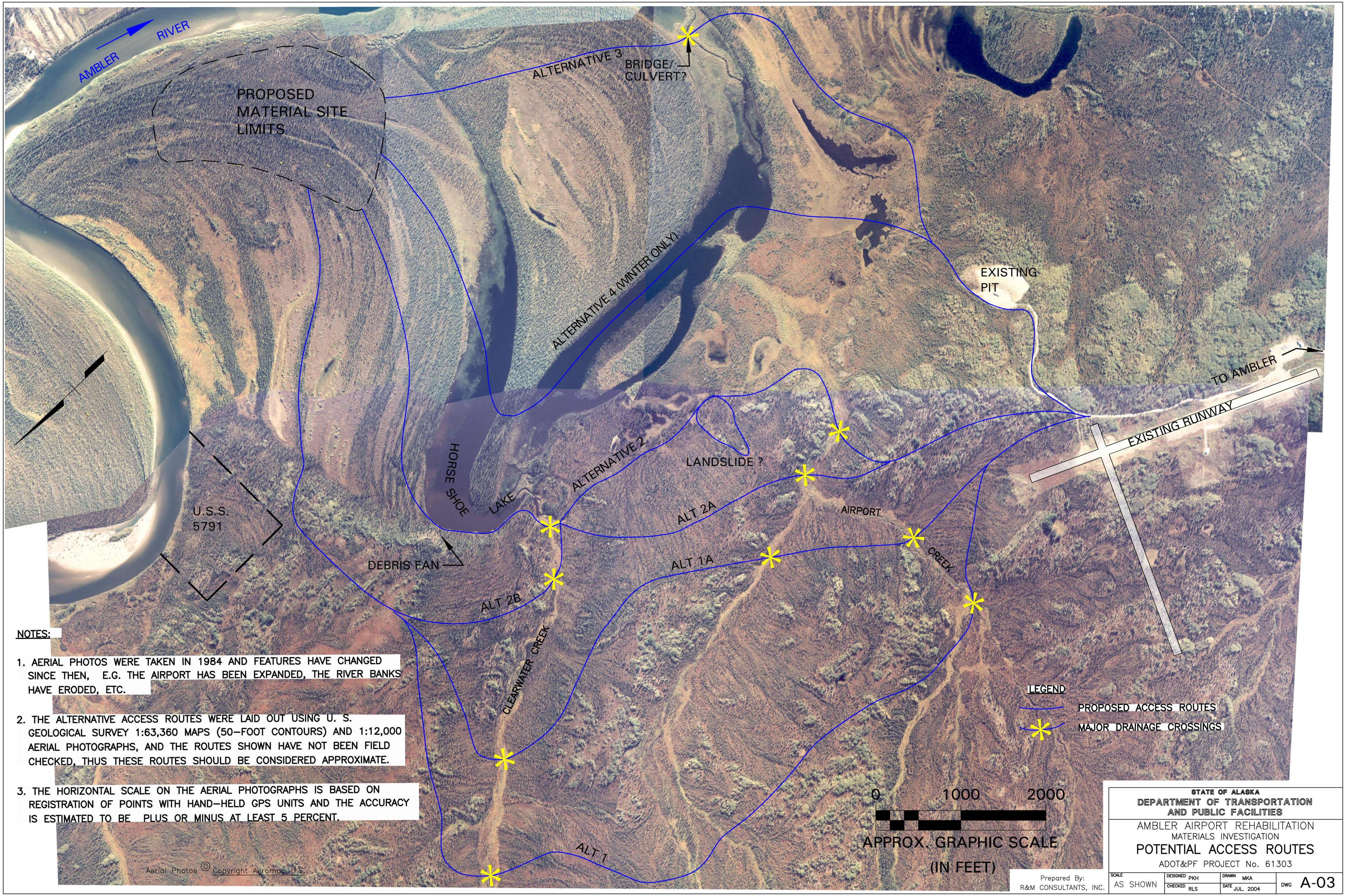
Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
MATERIALS INVESTIGATION
LOCATION MAP
ADOT&PF PROJECT No. 61303

SCALE	DESIGNED	DRAWN	DWG
AS SHOWN	PKH	MKA	A-02
	CHECKED RLS	DATE JUL. 2004	

project.04\041030_GEO\AMBLER-A-02, 1=1, 11/19/04 at 18:02 by mka



NOTES:

1. AERIAL PHOTOS WERE TAKEN IN 1984 AND FEATURES HAVE CHANGED SINCE THEN, E.G. THE AIRPORT HAS BEEN EXPANDED, THE RIVER BANKS HAVE ERODED, ETC.

2. THE ALTERNATIVE ACCESS ROUTES WERE LAID OUT USING U. S. GEOLOGICAL SURVEY 1:63,360 MAPS (50-FOOT CONTOURS) AND 1:12,000 AERIAL PHOTOGRAPHS, AND THE ROUTES SHOWN HAVE NOT BEEN FIELD CHECKED, THUS THESE ROUTES SHOULD BE CONSIDERED APPROXIMATE.

3. THE HORIZONTAL SCALE ON THE AERIAL PHOTOGRAPHS IS BASED ON REGISTRATION OF POINTS WITH HAND-HELD GPS UNITS AND THE ACCURACY IS ESTIMATED TO BE PLUS OR MINUS AT LEAST 5 PERCENT.

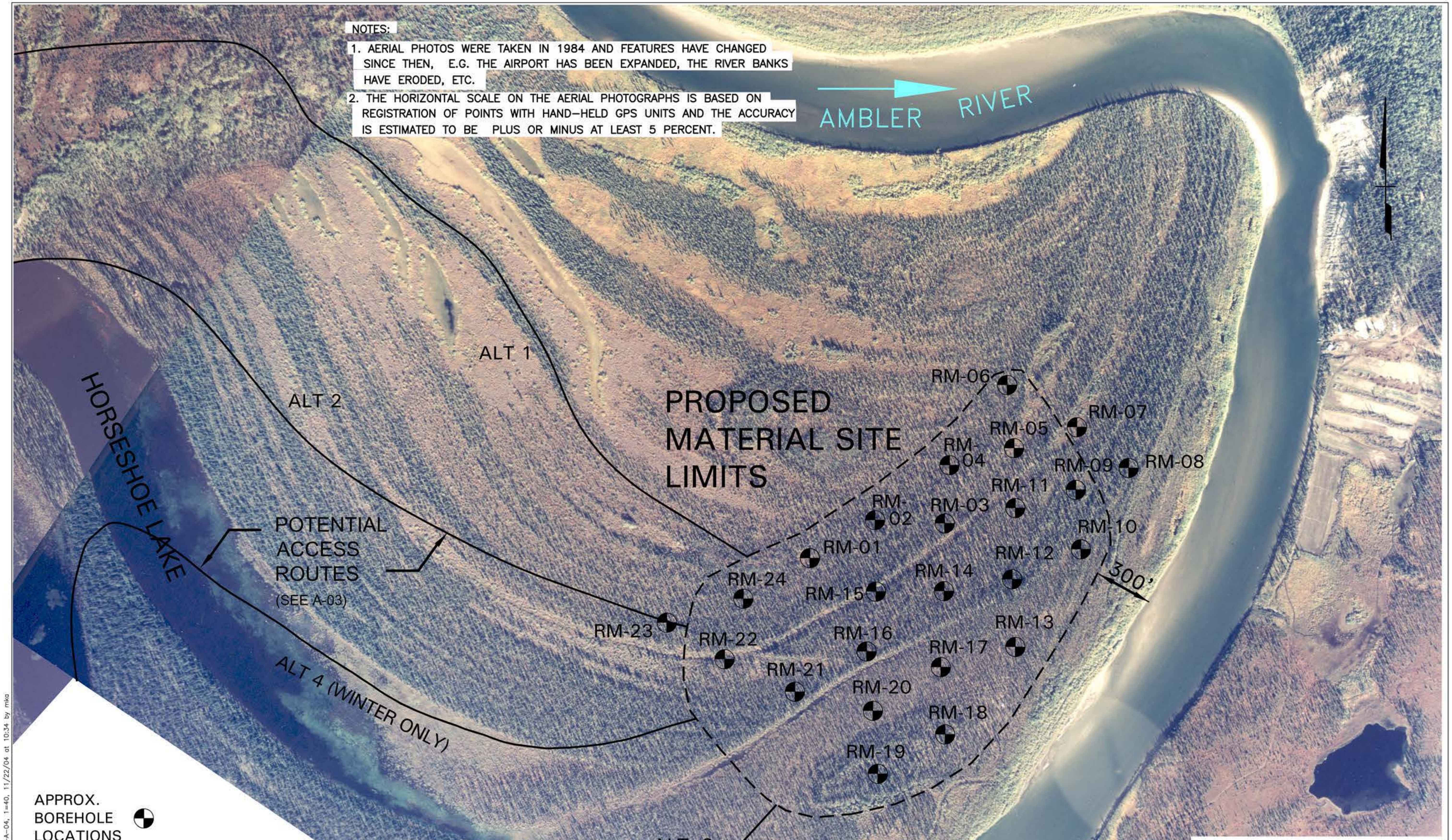
Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
MATERIALS INVESTIGATION
POTENTIAL ACCESS ROUTES
ADOT&PF PROJECT No. 61303

SCALE	DESIGNED	DRAWN	
AS SHOWN	PKH	MKA	DWG A-03
	CHECKED RLS	DATE JUL. 2004	

project.04\041030_GEO\AMBLER-A-03, 1=1000, 11/22/04 at 11:05 by mka



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
MATERIALS INVESTIGATION

PROPOSED MATERIAL SITE PLAN

ADOT&PF PROJECT No. 61303

Prepared By: R&M CONSULTANTS, INC.

SCALE	DESIGNED	DRAWN	DWG
AS SHOWN	PKH	MKA	A-04
	CHECKED RLS	DATE JUL. 2004	

APPENDIX B

LOGS OF TEST BORINGS

SOILS
CONSISTENCY AND SYMBOLS

SOIL DENSITY/CONSISTENCY - CRITERIA: Soil density/consistency as defined below and determined by normal field methods applies only to non-frozen material. For these materials, the influence of such factors as soil structure, i.e. fissure systems shrinkage cracks, slickensides, etc., must be taken into consideration in making any correlation with the consistency values listed below. In permafrost zones, the consistency and strength of frozen soil may vary significantly and inexplicably with ice content, thermal regime and soil type.

NON-COHESIVE SOILS *

Consistency	N ** (blows/foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

COHESIVE SOILS *

Consistency	N ** (blows/foot)
Very Soft	<2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	>30

* From State of Alaska Department of Transportation and Public Facilities "Alaska Geotechnical Procedures Manual" dated October 1, 2003.

** Standard Penetration "N": Blows per 1 foot of a 140-pound manual hammer (lifted with rope & cathead) falling 30 inches on a 2" O.D. split-spoon sampler except where noted.

KEY TO TEST RESULTS

DD - Dry Density
LL - Liquid Limit
MC - Moisture Content
Org - Organic Content
PI - Plastic Index
PL - Plastic Limit
PP - Pocket Penetrometer
P200 - % Passing No.200 Screen
P.02 - % Passing 0.02 mm
SG - Specific Gravity
TV - Torvane

06/29/04 8:45 AM

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	GENERAL NOTES	FB: N/A
CKD: C.H.R.			GRID: AMBLER R.
DATE: JUL. 04			PROJ.NO: 041030
SCALE: NONE			DWG.NO: B-01

Z:\PROJECT.04\040007\LOGS\B-01&B-02.GDW / DRAWING E - B-01 ENGLISH (DOT&PF)

STANDARD SYMBOLS

SYMBOL	NAME	PARTICLE SIZE	SYMBOL	NAME
	CLAY	- 0.002mm, Plastic		ORGANICS
	SILT	0.002mm, - #200		ICE
	SAND	#200, - #4		ICE W/SOIL INCLUSIONS
	GRAVEL	#4, - 3"		ICE LENSE IN SILT
	COBBLES & BOULDERS	3" - 12" & > 12"		ICE CRYSTALS IN CLAY

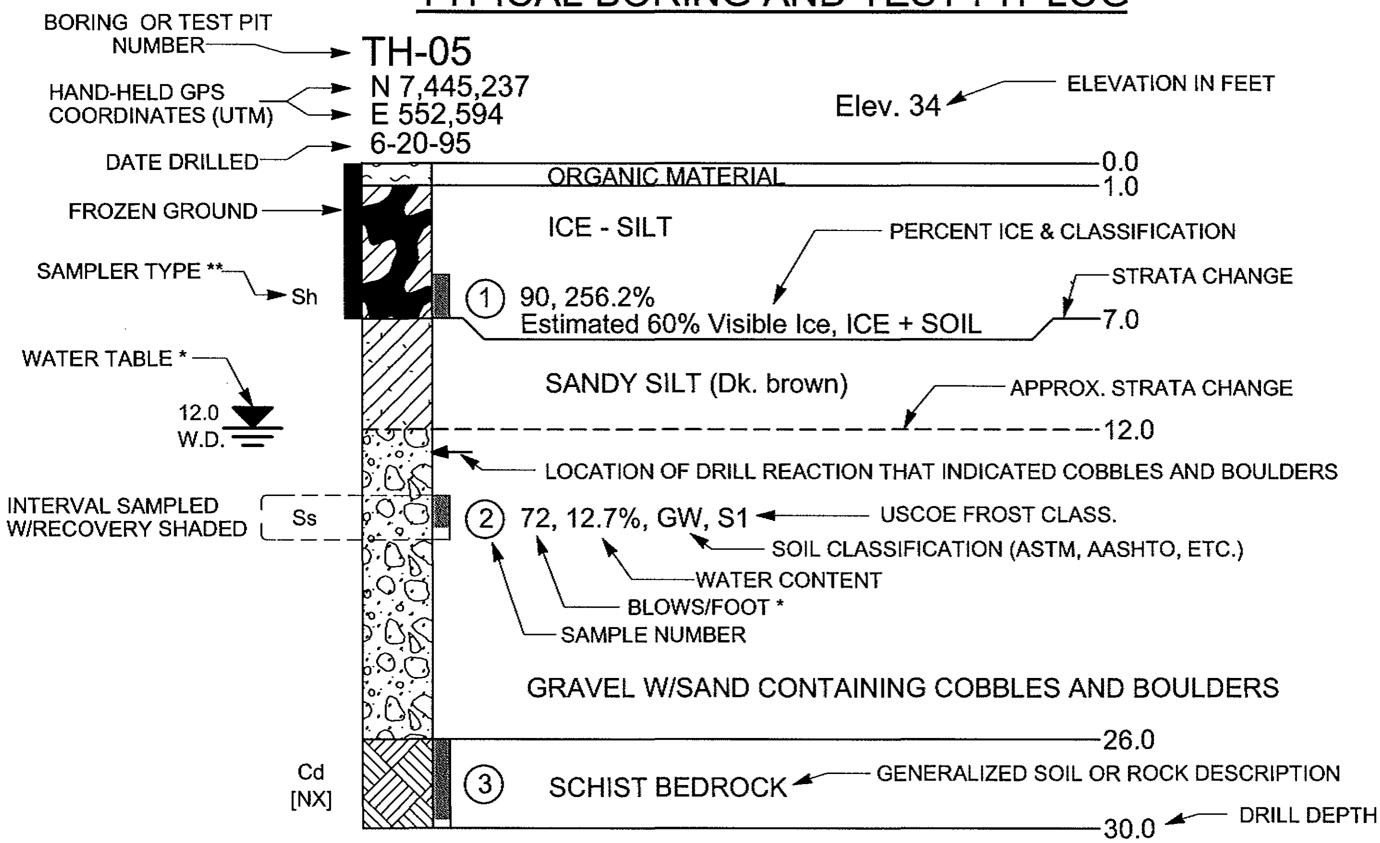
(The symbols shown above are frequently used in combinations, e. g. GRAVEL WITH SAND)

SAMPLER TYPE SYMBOLS

A	Auger Sample	Sh	2.5 In. Split Spoon w/340 lb. Manual Hammer	Sp	2.5 In. Split Spoon Pushed
C	Auger Cuttings Sample	Sha	2.5 In. Split Spoon w/340 lb. Auto Hammer	Sz	1.4 In. Split Spoon w/340 lb. Hammer
Cd	Double Tube Core Barrel	Sl	2.5 In. Split Spoon w/140 lb. Hammer	Ts	Shelby Tube
Ct	Triple Tube Core Barrel	Ss	1.4 In. Split Spoon w/140 lb. Manual Hammer	Tm	Modified Shelby Tube
Cs	Auger Core Barrel	Ssa	1.4 In. Split Spoon w/140 lb. Auto Hammer	[x]	Sampler I. D. (Added to Symbol)
DS	Drive Sample (1.4 In. Split Spoon w/nonstandard 140-lb. hammer, 8" drop)				

NOTE: Sampler types are either noted above the boring log or adjacent to it at the respective depth. An individual log may not utilize all of the items listed.

TYPICAL BORING AND TEST PIT LOG



* W.D. - WHILE DRILLING, A.B. - AFTER BORING, Ref. - SAMPLER REFUSAL

** - REFER TO SAMPLER SYMBOL (Ss, Sh, ETC.) FOR SAMPLER I.D. & HAMMER WEIGHT

NOTE: Water levels shown on the boring logs are the levels measured in the boring at the times indicated.

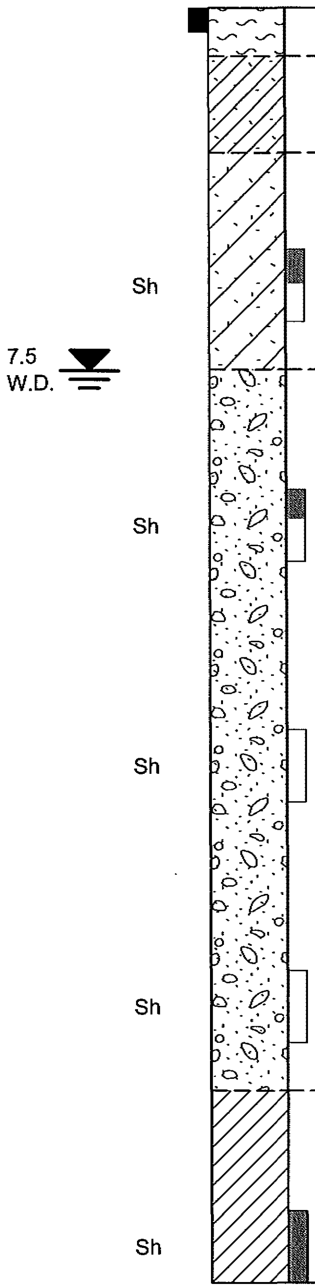
<<ProjFileSpec>> Q - B-02 ENG ASTM (DOT) (CURRENT) 1/4/05 AM

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	EXPLANATION OF SELECTED SYMBOLS	FB:	N/A
CKD:	C.H.R.			GRID:	AMBLER R.
DATE:	DEC 04			PROJ.NO:	041030
SCALE:	NONE			DWG.NO:	B-02

RM-01

N 7,445,237
E 552,594
10/31/04

DEPTH



Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT W/ SAND (Brown, Very fine sand, Nonplastic, Loose, Moist)
3.0		SILTY SAND (Dk. gray-brown, Fine sand, Nonplastic, Loose, Dry)
	Sh (1)	4, 22%, SM*
7.5		Drilled fast and smooth to 25 feet.
	Sh (2)	3, 13%, SP*
		POORLY GRADED SAND W/GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Wet)
	Sh (3)	20, 3 feet of heave in augers
	Sh (4)	14, No heave in augers
22.5		SILT (Dk. gray, Slightly plastic, Firm, Dry)
	Sh (5)	26, ML*
26.5		

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

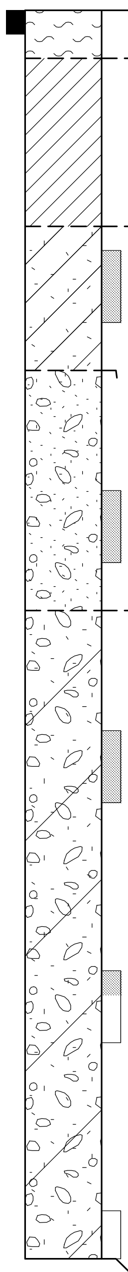
Z:\PROJECT.04\041030\LOGS\AMBLER2.GPJ

MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB:	NA
CKD:	R.L.S.			GRID:	AMBLER R.
DATE:	NOV. 04		LOG OF TEST BORING	PROJ.NO:	041030
SCALE:	1"=4'		RM-01	DWG.NO:	B-03

RM-02

N 7,445,300
E 552,703
10/31/04



Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Moist)
4.5	Sh (1)	9, 18%, SM*, P200=46 SILTY SAND (Dk. brown, Very fine sand, Nonplastic, Loose, Dry)
7.5		WELL GRADED SAND W/GRAVEL (Dk. brown, Gravel to 1.5" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (2)	23, 7.1%, SW*
12.5		Drilled fast and smooth to 25 feet.
	Sh (3)	19, 13%, SP-SM*, P200=7.2 0.5 feet of heave in augers Asbestos = <1%
		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (4)	13, SP-SM* 3 feet of heave in augers
	Sh (5)	10 blows for 6", Sampler Overfull 4 feet of heave in augers
26.0		

8.0 W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER2.GPJ

MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

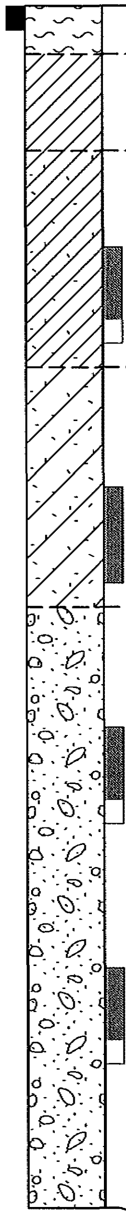
MATERIAL SITE EXPLORATION
AMBLER, ALASKA

LOG OF TEST BORING
RM-02

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-04

RM-03

N 7,445,295
E 552,820
11/1/04



Depth (ft)	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 3.0		SILT (Dk. brown, Nonplastic, Loose, Moist)
3.0 – 7.5		INTERLAYERED SILT AND POORLY GRADED SAND (Mottled brown/gray, Fine sand, Layers to 1/2" thick, Nonplastic, Loose, Dry)
	Sh (1)	8, ML & SP*
7.5 – 12.5		SILTY SAND (Dk. brown, Very fine sand grading to fine sand, Nonplastic, Loose, Wet)
	Sh (2)	8, 28%, SM*, P200=38
12.5 – 25.0		Drilled fast and smooth to 25 feet.
	Sh (3)	7, 15%, SP & GP*
		POORLY GRADED SAND W/LAYERS OF GRAVEL W/SAND (Dk. brown, Gravel to 1/2" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)
	Sh (4)	9, 20%, SP, P200=4.4 2.5 ft. of heave in augers
		4 feet of heave in augers at 25 ft., unable to sample.

9.0 W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER2.GPJ

MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

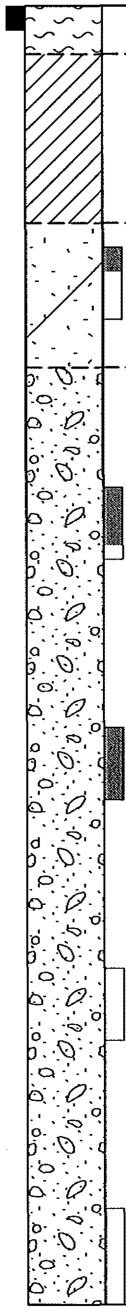
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-03

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-05

RM-04

N 7,445,392
E 552,828
11/1/04



Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. gray-brown, Nonplastic, Loose, Dry)
4.5	Sh (1)	10, 15%, SP-SM*
		POORLY GRADED SAND W/SILT (Dk. brown, Fine sand, Nonplastic, Loose, Dry)
7.5	Sh (2)	19, 3.4%, SP*
		POORLY GRADED SAND W/GRAVEL TO SAND (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Wet)
	Sh (3)	9, 14%, SP, P200=4.9
		Drilled fast and smooth to 22 feet
	Sh (4)	6, 2 feet of heave in augers
		Drilled rougher 22 to 25 feet
	Sh (5)	21, 3 feet of heave in augers
27.0		

Groundwater: 11.7, 11/07/04

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Hand-slotted one inch PVC pipe installed to 25 feet to measure groundwater depth.

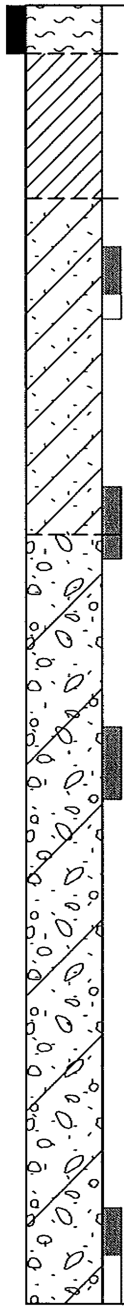
Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA	
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.	
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030	
SCALE: 1"=4'		RM-04	DWG.NO: B-06	

RM-05

N 7,445,421
E 552,936
11/1/04

DEPTH



Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0	Sh (1)	9, 17%, SM*
		SILTY SAND (Brown to gray, Very fine sand, Nonplastic, Loose, Dry to wet)
8.0 W.D.		
	Sh (2)	3 blows for 6", 32%, SM*
11.0	(3)	12 blows for 6", GW*
		WELL TO POORLY GRADED SAND W/SILT AND GRAVEL TO SAND CONTAINING LAYERS OF GRAVEL W/SAND (Dk. brown, Gravel to 1.5" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Moist to wet)
	Sh (4)	16, 11%, SW-SM*, P200=11
		Gravel to 1.5" dia. in cuttings
		Drilled fast and smooth to 25 feet.
		Unable to sample at 20 feet due to heave in augers, could not bring cuttings up on auger flights, 20 to 25 feet.
	Sh (5)	8, 14%, SP, P200=4.5 1 foot of heave in augers
27.0		

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

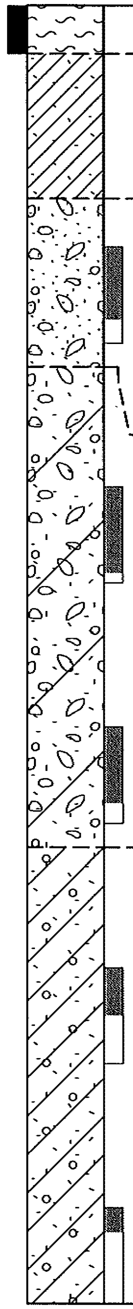
* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB: NA
CKD: R.L.S.			GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-05	DWG.NO: B-07

RM-06

N 7,445,526
E 552,924
11/2/04



DEPTH

Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT W/ SAND (Dk. brown, Very fine sand, Nonplastic, Loose, Dry)
4.0		Drilled fast and smooth to 25 feet.
	Sh (1)	12, 15%, GP & SP*
		INTERLAYERED POORLY GRADED GRAVEL W/SAND AND SAND (Dk. brown, Gravel 1/2", rounded to subangular, hard, Fine to coarse sand, Layers to 3" thick, Nonplastic, Medium dense, Dry)
7.5		7.5 W.D.
	Sh (2)	14, 12%, SP-SM*, P200=6.3
		POORLY GRADED SAND W/SILT AND GRAVEL TO SAND W/GRAVEL (Dk. brown, Gravel 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (3)	21, 9.4%, SP*
17.5		SILTY SAND W/GRAVEL (Dk. gray, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Stiff, Dry)
	Sh (4)	9, SM*
	Sh (5)	8, SM*
27.0		

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

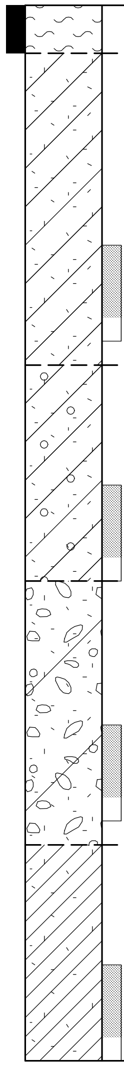
Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB: NA
CKD:	R.L.S.			GRID: AMBLER R.
DATE:	NOV. 04		LOG OF TEST BORING RM-06	PROJ.NO: 041030
SCALE:	1"=4'			DWG.NO: B-08

RM-07

N 7,445,456
E 553,041
11/2/04

DEPTH



9.0 W.D.

Sample		Depth	Description
		0.0	ORGANIC MAT
		1.0	Drilled fast and smooth to 25 feet.
			SILTY SAND (Dk. brown, Very fine sand, Nonplastic, Loose, Dry)
Sh	1		5, 20%, SM*, P200=47
		7.5	SILTY SAND (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to medium sand, Nonplastic, Loose, Wet)
Sh	2		8, 24%, SM*, P200=13 Asbestos = <1%
		12.0	POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose)
Sh	3		8, 9.4%, SP-SM*
		17.5	SANDY SILT (Dk. gray, Very fine sand, Slightly plastic, Stiff, Dry)
Sh	4		11, ML*
		22.0	

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER2.GPJ

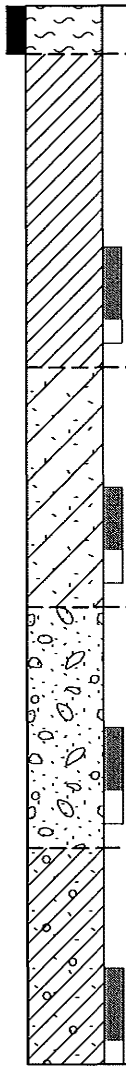
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA	
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.	
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030	
SCALE: 1"=4'		RM-07	DWG.NO: B-09	

RM-08

N 7,445,387
E 553,127
11/2/04

DEPTH



Depth	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 7.5		Drilled fast and smooth to 25 feet.
		SILT (Dk. brown, Nonplastic, Loose, Dry)
	Sh (1)	6, 18%, ML*
7.5 – 12.5		SILTY SAND (Dk. mottled brown-gray, Fine sand, Nonplastic, Loose, Dry)
	Sh (2)	8, 19%, SM*
12.5 – 17.5		WELL GRADED SAND W/GRAVEL (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)
	Sh (3)	12, 12%, SW*
17.5 – 22.0		SILT W/SAND (Dk. gray, Occasional gravel to 1" dia., Fine sand, Slightly plastic, Stiff, Wet)
	Sh (4)	10, ML*

12.5 W.D.

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

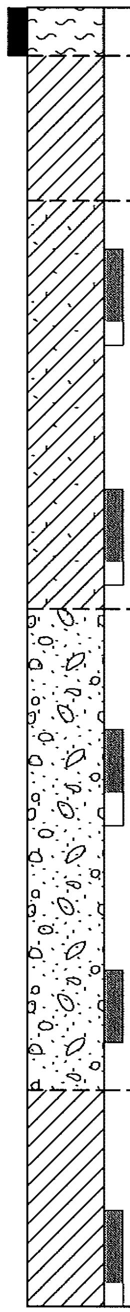
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-08

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-10

RM-09

N 7,445,351
E 553,039
11/2/04



Depth	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0	Sh (1)	4, 15%, ML*, P200=55
		SANDY SILT (Gray-brown, Fine sand, Nonplastic, Loose, Dry to moist)
	Sh (2)	4, 27%, ML*
12.5 (12.5 W.D.)		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1.5" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (3)	23, 11%, SP-SM*, P200=9.4
		Drilled fast and smooth to 25 feet.
	Sh (4)	18, SP-SM* 2 feet of heave in augers
22.5		SILT (Dk. gray, Slightly plastic, Stiff, Wet)
	Sh (5)	17, ML*
27.0		

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

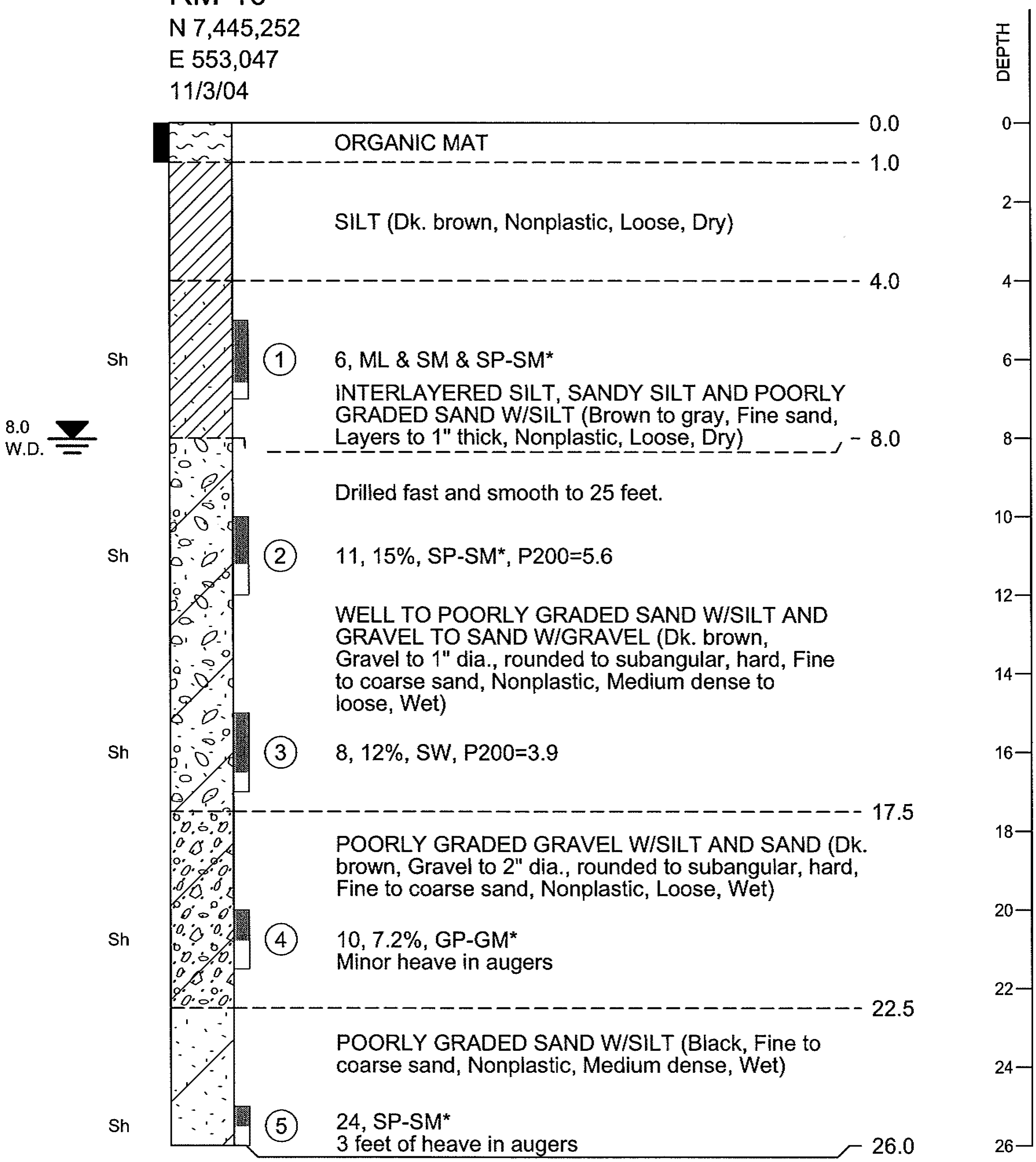
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-09

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-11

RM-10

N 7,445,252
E 553,047
11/3/04



DEPTH

Depth	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0	Sh (1)	6, ML & SM & SP-SM* INTERLAYERED SILT, SANDY SILT AND POORLY GRADED SAND W/SILT (Brown to gray, Fine sand, Layers to 1" thick, Nonplastic, Loose, Dry)
8.0 (8.0 W.D.)		Drilled fast and smooth to 25 feet.
	Sh (2)	11, 15%, SP-SM*, P200=5.6 WELL TO POORLY GRADED SAND W/SILT AND GRAVEL TO SAND W/GRAVEL (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Wet)
	Sh (3)	8, 12%, SW, P200=3.9
17.5		POORLY GRADED GRAVEL W/SILT AND SAND (Dk. brown, Gravel to 2" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)
	Sh (4)	10, 7.2%, GP-GM* Minor heave in augers
22.5		POORLY GRADED SAND W/SILT (Black, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (5)	24, SP-SM* 3 feet of heave in augers
26.0		

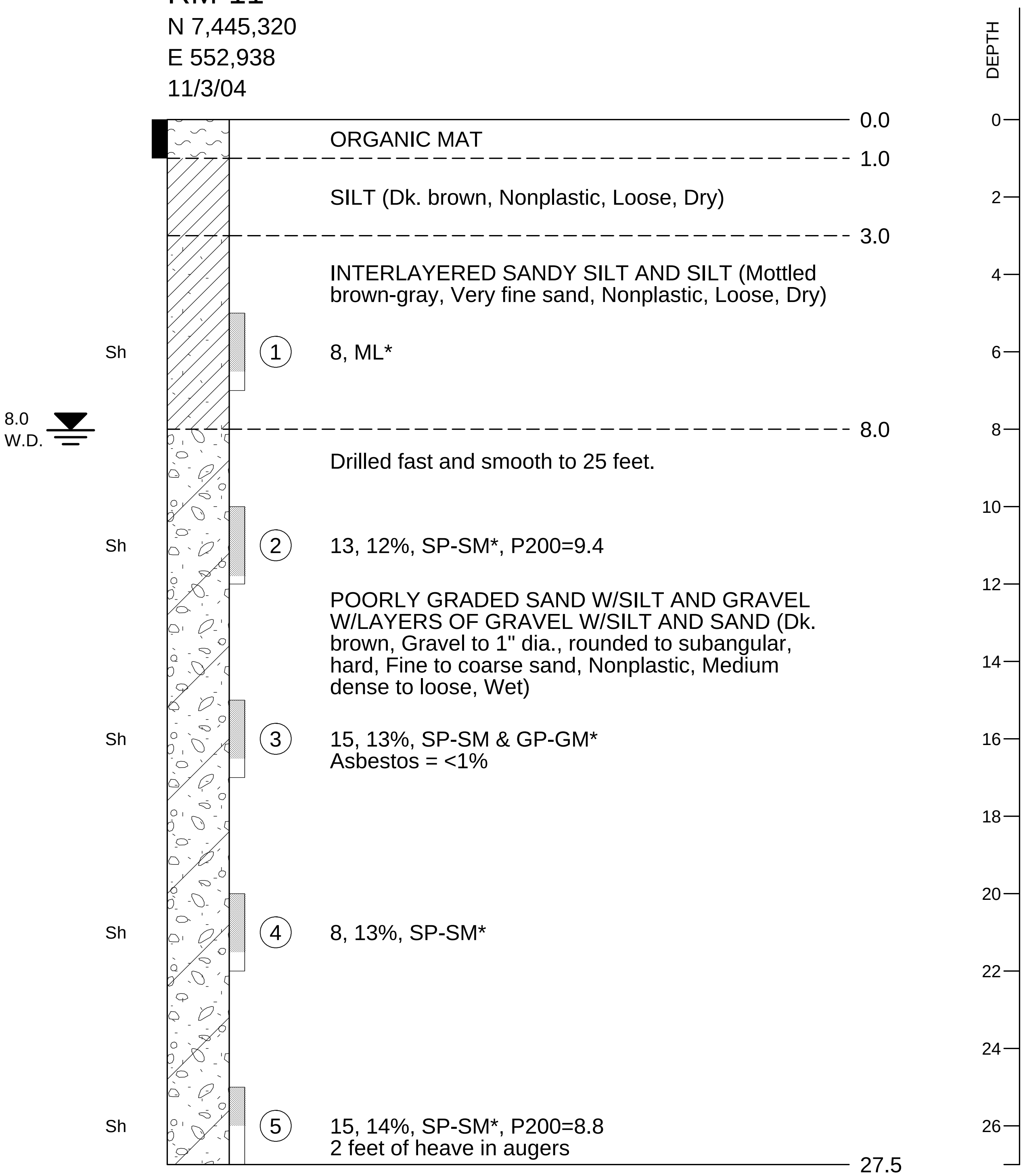
* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-10	DWG.NO: B-12

RM-11

N 7,445,320
E 552,938
11/3/04



ORGANIC MAT

SILT (Dk. brown, Nonplastic, Loose, Dry)

INTERLAYERED SANDY SILT AND SILT (Mottled brown-gray, Very fine sand, Nonplastic, Loose, Dry)

8, ML*

Drilled fast and smooth to 25 feet.

13, 12%, SP-SM*, P200=9.4

POORLY GRADED SAND W/SILT AND GRAVEL W/LAYERS OF GRAVEL W/SILT AND SAND (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Wet)

15, 13%, SP-SM & GP-GM*
Asbestos = <1%

8, 13%, SP-SM*

15, 14%, SP-SM*, P200=8.8
2 feet of heave in augers

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

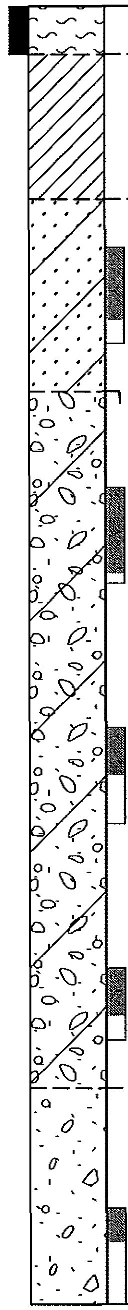
MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-11

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-13

RM-12

N 7,445,201
E 552,933
11/3/04

DEPTH



Sample	No.	Description	Depth
		ORGANIC MAT	0.0
		SILT (Dk. brown, Nonplastic, Loose, Dry)	1.0
			4.0
Sh	1	4, 17%, SM & SP*	
		INTERLAYERED SILTY SAND AND SAND (Mottled brown-gray, Very fine sand, Layers to 3" thick, Nonplastic, Loose, Dry)	
			8.0
Sh	2	21, 2.5%, SP-SM*, P200=6.3	
13.2 11/07/04		WELL TO POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Moist to wet)	
Sh	3	11, 11%, SW-SM*	
		Drilled fast and smooth to 25 feet.	
Sh	4	37, 9.2%, SW-SM*, P200=10	
			22.5
		INTERLAYERED POORLY GRADED SAND AND GRAVEL W/SAND (Dk. brown, Gravel 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)	
Sh	5	9, 14%, SP & GP 5 feet of heave in augers	
			27.0

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Hand-slotted one inch PVC pipe installed to 25 feet to measure groundwater depth.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

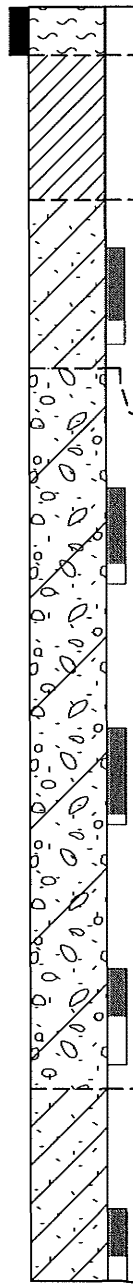
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-12

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-14

RM-13

N 7,445,088
E 552,938
11/4/04



DEPTH

Depth (ft)	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 4.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0 – 7.5	Sh (1)	7, 6.2%, SM*, P200=13
		SILTY SAND (Lt. gray, Fine sand, Horizontal dk. brown laminations to 1/4" thick, Nonplastic, Loose, Dry)
7.5 – 22.5		Drilled fast and smooth to 25 feet.
	Sh (2)	19, 6.7%, SP-SM*, P200=6.4
		12.5 W.D.
		POORLY GRADED SAND W/SILT AND GRAVEL CONTAINING LAYERS OF GRAVEL W/SAND (Dk. gray, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Dry to wet)
	Sh (3)	9, 23%, SP-SM*, P200=12 Contains 4" layer of poorly graded gravel w/sand
	Sh (4)	19, SP-SM* 1 foot of heave in augers
22.5 – 26.5		SILTY SAND (Dk. gray, Fine to medium sand, Nonplastic, Medium dense, Wet)
	Sh (5)	15, 23%, SM*, P200=16 2 feet of heave in augers

* Estimated Classification

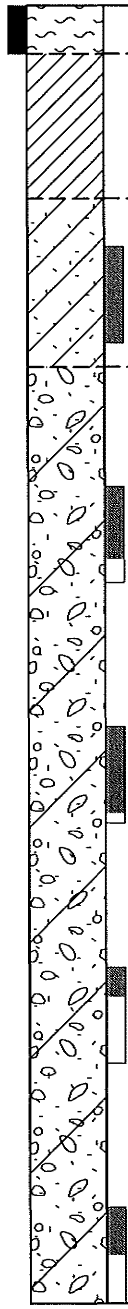
Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

A large sample of auger cuttings was taken while drilling between 15 and 20 feet.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA		FB: NA
CKD: R.L.S.				GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING RM-13		PROJ.NO: 041030
SCALE: 1"=4'				DWG.NO: B-15

RM-14

N 7,445,181
E 552,819
11/4/04



DEPTH

Depth (ft)	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 4.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0 – 7.5		SILTY SAND (Lt. gray, Fine sand, Nonplastic, Loose, Dry)
	Sh (1)	7, SM*
7.5 – 27.0		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1.5" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Dry to wet)
11.5 W.D.	Sh (2)	12, 11%, SP-SM*, P200=7.7
	Sh (3)	12, 10%, SP-SM*, P200=7.9
		Drilled fast and smooth to 25 feet.
	Sh (4)	11, SP-SM* Gravel to 1/2" dia. 6 feet of heave in augers
	Sh (5)	8, SP-SM* Gravel to 1" dia.
27.0		

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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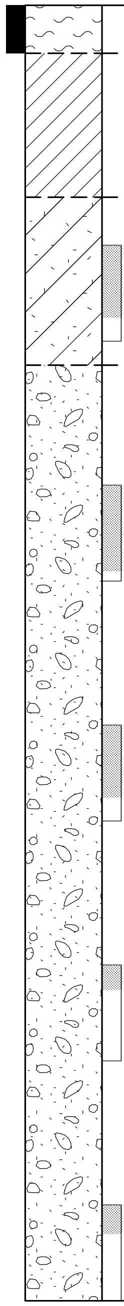
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB: NA
CKD: R.L.S.			GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING RM-14	PROJ.NO: 041030
SCALE: 1"=4'			DWG.NO: B-16

RM-15

N 7,445,181
E 552,705
11/4/04



Depth (ft)	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 4.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0 – 7.5		SILTY SAND (Lt. gray, Fine sand, Nonplastic, Loose, Dry)
	Sh (1)	8, 14%, SM*
7.5 – 27.0		Drilled fast and smooth to 25 feet.
	Sh (2)	15, 3.1%, SW*
		WELL TO POORLY GRADED SAND W/GRAVEL TO SAND (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Dry to wet)
	Sh (3)	7, 21%, SP, P200=4.7, Predominately Fine Sand Asbestos = <1%
	Sh (4)	11, SW*
	Sh (5)	14, SP*

12.5 W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

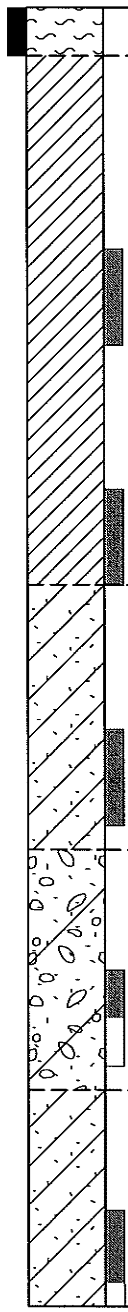
* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-15	DWG.NO: B-17

RM-16

N 7,445,081
E 552,689
11/4/04



DEPTH

Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Mottled brown-gray, Nonplastic, Loose, Dry)
	Sh (1)	6, ML*
		Drilled fast and smooth to 25 feet.
	Sh (2)	4, 36%, ML & SM* Layers of silty sand
12.0 (12.0 W.D.)		SILTY SAND TO POORLY GRADED SAND W/SILT (Dk. gray, Gravel to 1" dia., rounded to subangular, hard, Predominately fine sand, Nonplastic, Loose, Wet)
	Sh (3)	5, 23%, SM*, P200=12
17.5		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)
	Sh (4)	9, SP-SM* 2 feet of heave in augers
22.5		INTERLAYERED SILTY FINE SAND AND POORLY GRADED SAND (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Predominately fine sand, Nonplastic, Loose, Wet)
	Sh (5)	6, 19%, SM*, P200=13
27.0		

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

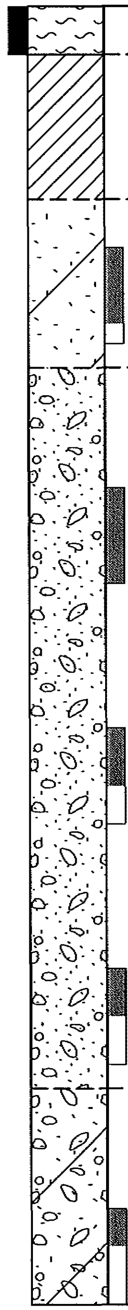
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-16

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-18

RM-17

N 7,445,054
E 552,813
11/5/04



Depth	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0		POORLY GRADED SAND W/SILT (Lt. gray, Fine sand, Nonplastic, Loose, Dry)
	Sh (1)	6, 6.2%, SP-SM*, P200=8.8
7.5		Drilled fast and smooth to 25 feet.
	Sh (2)	7, 11%, SP, P200=4.9
		POORLY GRADED SAND W/GRAVEL (Dk. brown, Gravel to 1" in dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Wet)
	Sh (3)	13, 11%, SP*
	Sh (4)	16, SP*
22.5		WELL GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1/2" in dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (5)	14, 17%, SW-SM*, P200=7.7 4 ft. of heave in augers Silty material in tip of drive shoe
27.0		

7.5 W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER2.GPJ

MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

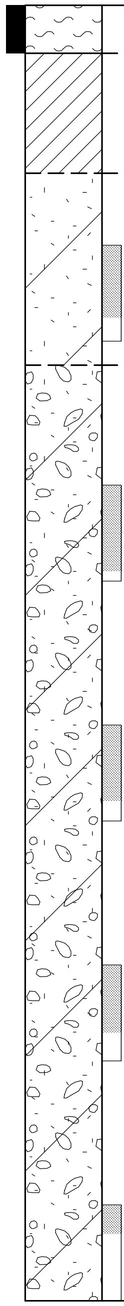
MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-17

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-19

RM-18

N 7,444,942
E 552,821
11/5/04

DEPTH



Depth	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
3.5		POORLY GRADED SAND W/SILT (Lt. gray, Very fine sand, Dk. brown laminations to 1/8" thick, Nonplastic, Loose, Dry to wet)
	Sh (1)	5, SP-SM*
7.5		Drilled fast and smooth to 25 feet.
	Sh (2)	20, 4.5%, SP-SM*, P200=8.0
		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
14.1 (water level, 11/07/04)		
	Sh (3)	21, 9.9%, SP-SM* Asbestos = <1%
		Two large samples of auger cuttings (18A and 18B) were taken while drilling between 15 and 25 feet.
	Sh (4)	13, 11%, SP-SM*, P200=8.5
	Sh (5)	12, SP-SM*
27.0		

* Estimated Classification

Hand-slotted one inch PVC pipe installed to 25 feet to measure groundwater depth.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

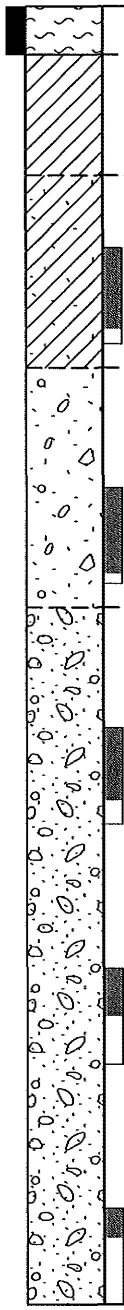
MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-18

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-20

RM-19

N 7,444,876
E 552,708
11/5/04

DEPTH



Sampler	Sample No.	Description	Depth (ft)
			0.0
		ORGANIC MAT	
			1.0
		SILT (Dk. brown, Nonplastic, Loose, Dry)	
			3.5
		INTERLAYERED SILT AND SANDY SILT (Mottled brown-gray, Very fine sand, Layers to 2" thick, Nonplastic, Loose, Dry)	
Sh	1	5, ML*	
			7.5
		POORLY GRADED SAND (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Dry)	
Sh	2	12, 3.5%, SP, P200=4.6	
12.5 W.D.			12.5
		WELL TO POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 1.5" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Wet)	
Sh	3	21, 12%, SW-SM*	
		Drilled fast and smooth to 25 feet.	
Sh	4	8, 11%, SP-SM*, P200=8.9	
Sh	5	12, SP-SM*	
			27.0

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

PREPARED BY: R&M CONSULTANTS, INC.

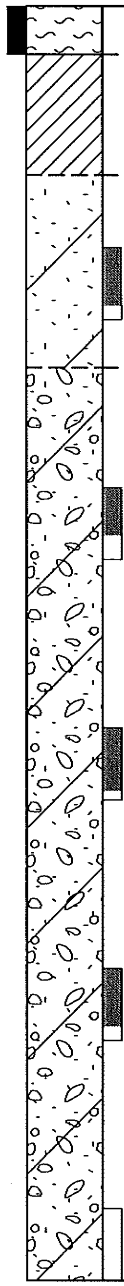
MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-19

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-21

RM-20

N 7,444,981
E 552,700
11/5/04

DEPTH



Depth	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
3.5		POORLY GRADED SAND W/SILT (Dk. brown, Fine sand, Nonplastic, Loose, Dry)
	Sh (1)	5, 6.6%, SP-SM*, P200=11
7.5 (7.5 W.D.)		POORLY GRADED SAND W/SILT AND GRAVEL CONTAINING LAYERS OF GRAVEL W/SAND (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (2)	10, 12%, SP-SM*, P200=8.3
		Drilled fast and smooth to 25 feet.
	Sh (3)	14, SP-SM*
	Sh (4)	14, 12%, SP-SM*, P200=11
		A large sample of auger cuttings was taken while drilling between 20 and 25 feet (20A and 20B). It was combined with samples from RM-22 for laboratory testing.
	Sh (5)	14
26.5		

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

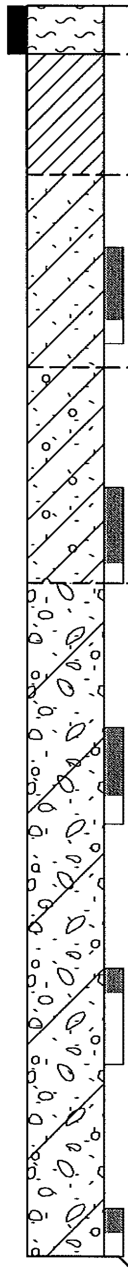
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-20

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-22

RM-21

N 7,445,013
E 552,569
11/6/04



Depth (ft)	Sample	Description
0.0 – 1.0		ORGANIC MAT
1.0 – 3.5		SILT (Dk. brown, Nonplastic, Loose, Dry)
3.5 – 7.5		SILTY SAND (Gray-brown, Very fine sand, Nonplastic, Loose, Dry)
	Sh (1)	7, 17%, SM*
7.5 – 12.0		SILTY SAND GRADING TO POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray to brown, Gravel to 1" dia., rounded to subangular, hard, Predominatly fine sand, Nonplastic, Loose, Dry to moist)
	Sh (2)	10, 17%, SM*, P200=13
12.0 W.D.		
12.0 – 26.0		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (3)	13, 11%, SP-SM*, P200=8.5
		Drilled fast and smooth to 25 feet.
	Sh (4)	13, SP-SM*
	Sh (5)	33 blows for 6", SP-SM* 2 feet of heave in augers
26.0		

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	1"=4'

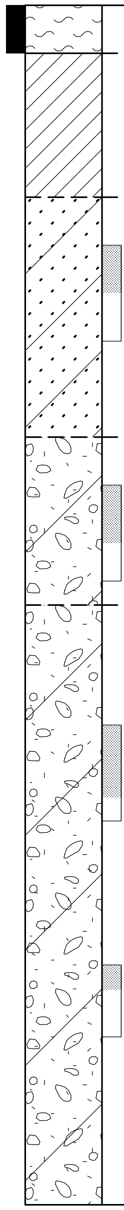
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA
LOG OF TEST BORING
RM-21

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-23

RM-22

N 7,445,068
E 552,452
11/6/04



8.0 W.D.

Sample	Description	Depth
	ORGANIC MAT	0.0 – 1.0
	SILT (Dk. brown, Nonplastic, Loose, Dry)	1.0 – 4.0
Sh (1)	10, 5.3%, SP-SM*	
	POORLY GRADED SAND W/SILT (Lt. gray, Fine sand, Nonplastic, Loose, Dry)	4.0 – 9.0
	FINE SAND TO SAND W/SILT AND GRAVEL (Gray to dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose, Wet)	9.0 – 12.5
Sh (2)	6, 17%, SP-SM*, P200=10	
	WELL GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense to loose, Wet)	12.5 – 25.0
Sh (3)	14, 10%, SW-SM* Asbestos = <1%	
	Drilled fast and smooth to 25 feet.	
Sh (4)	7, SW-SM* 4 feet of heave in augers	
	Two large samples of auger cuttings were taken while drilling between 15 and 20 feet. They were combined with a cuttings sample from RM-20 for laboratory testing.	
	4 feet of heave in augers, unable to sample	25.0

DEPTH scale: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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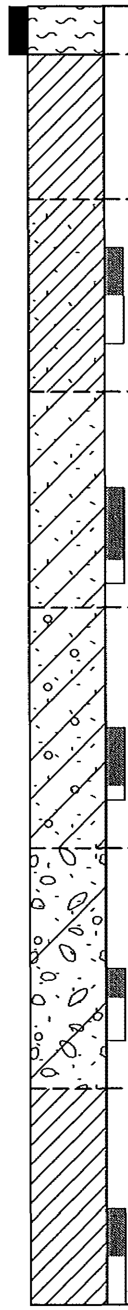
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB:	NA
CKD:	R.L.S.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE:	NOV. 04		LOG OF TEST BORING	PROJ.NO:	041030
SCALE:	1"=4'		RM-22	DWG.NO:	B-24

RM-23

N 7,445,129
E 552,355
11/6/04

DEPTH



Depth (ft)	Sample	Description
0.0		ORGANIC MAT
1.0		SILT (Dk. brown, Nonplastic, Loose, Dry)
4.0		SANDY SILT (Lt. gray, Very fine sand, Nonplastic, Loose, Dry)
	Sh (1)	6, ML*
		Drilled fast and smooth to 25 feet.
8.0 (8.0 W.D.)		SILTY SAND (Lt. gray, Fine sand grading to medium, Nonplastic, Loose, Wet)
	Sh (2)	4, 32%, SM*, P200=29
12.5		SILTY SAND (Dk. brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (3)	22, 16%, SM*, P200=18 1 foot of heave in augers
17.5		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. brown, Gravel to 3/4" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Medium dense, Wet)
	Sh (4)	16, 13%, SP-SM* 2 feet of heave in augers
22.5		SILT (Dk. gray, Slightly plastic, Stiff, Wet)
	Sh (5)	9, ML*
27.0		

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-23	DWG.NO: B-25

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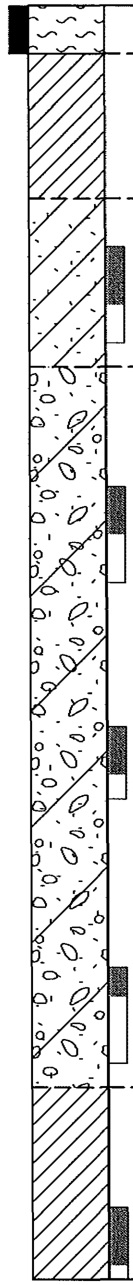
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

RM-24

N 7,445,169
E 552,483
11/6/04



Depth	Description	Sample
0.0 – 1.0	ORGANIC MAT	
1.0 – 4.0	SILT (Dk. brown, Nonplastic, Loose, Dry)	
4.0 – 7.5	SILTY SAND (Mottled gray-brown, Fine sand, Nonplastic, Loose, Dry)	Sh (1) 6, 25%, SM*
7.5 – 22.5	POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray to brown, Gravel to 1" dia., rounded to subangular, hard, Fine to coarse sand, Nonplastic, Loose to medium dense, Wet)	Sh (2) 6, 24%, SP-SM*
	Drilled fast and smooth to 25 feet.	Sh (3) 14, 12%, SP-SM*, P200=8.6
		Sh (4) 8, SP-SM*
22.5 – 26.5	SILT (Dk. gray, Slightly plastic, Firm, Wet)	Sh (5) 13, ML*

7.5 W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA	
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.	
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030	
SCALE: 1"=4'		RM-24	DWG.NO: B-26	

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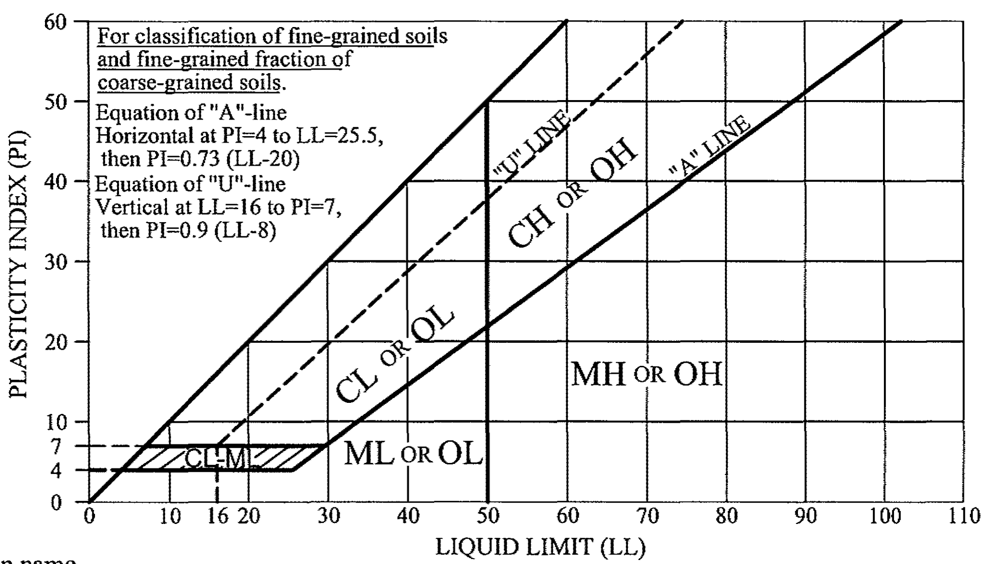
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

APPENDIX C

LABORATORY TEST DATA (SOILS)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-grained Soils More than 50% retained on the No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]	GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]	GP	Poorly-graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5 % fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]	SP	Poorly-graded sand[I]
		Sands with Fines More than 12 % fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K, L, M]
			PI < 4 and plots below "A" line[J]	ML	Silt[K, L, M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic Clay[K, L, M,N] / Organic Silt[K, L, M,O]
	Silts and Clays Liquid Limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K, L, M]
			PI plots below "A" line	MH	Elastic silt[K, L, M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic Clay[K, L, M,P] / Organic Silt[K, L, M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravel with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly-graded gravel with silt
GP-GC poorly-graded gravel with clay
[D] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly-graded sand with silt
SP-SC poorly-graded sand with clay
[E] $Cu = D_{60} / D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand " to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 and plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.



DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES ASTM D 2487	FB: N/A
CKD: C.H.R.			GRID: N/A
DATE: JUNE 04			PROJ.NO: GENERAL
SCALE: NONE			DWG.NO: C-01

Z:\PROJECT.04\041030\LOGS\ASTM.GDW (DRAWING ASTM CLASS) 1/4/05 10:00 AM

SUMMARY OF LABORATORY DATA
MATERIAL SITE EXPLORATION - AMBLER, ALASKA

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS (% FINER) **																ATTERBERG LIMITS			MOIST. CONT.	ORG. CONT.	ASTM CLASS.
			STANDARD SIEVE SIZE													(mm)								
HOLE	NO.	DEPTH (FT.)	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	.02	.005	.002	LL	PL	PI	%	%	
RM-01	1	5.0 - 6.5																				22		
RM-01	2	10.0 - 11.5																				13		
RM-02	1	5.0 - 6.5				100	99	99	98						46							18		SM*
RM-02	2	10.0 - 11.5																				7.1		
RM-02	3	15.0 - 16.5			100	97	95	88	73	53	41	29	18	12	7.2							13		SP-SM*
RM-03	2	10.0 - 12.0													38							28		SM*
RM-03	3	15.0 - 17.0																				15		
RM-03	4	20.0 - 22.0					100	97	90	79	63	40	18	8	4.4							20		SP
RM-04	1	5.0 - 6.5																				15		
RM-04	2	10.0 - 11.5																				3.4		
RM-04	3	15.0 - 16.5			100	99	96	91	77	61	50	35	18	9	4.9							14		SP
RM-05	1	5.0 - 6.5																				17		
RM-05	2	10.0 - 11.0																				32		
RM-05	4	15.0 - 16.5			100	99	93	88	70	50	37	28	21	16	11							11		SW-SM*
RM-05	5	25.0 - 27.0				100	99	98	88	67	48	30	16	8	4.5							14		SP
RM-06	1	5.0 - 7.0																				15		
RM-06	2	10.0 - 12.0			100	92	85	79	67	54	46	34	17	10	6.3							12		SP-SM*
RM-06	3	15.0 - 17.0																				9.4		
RM-07	1	5.0 - 7.0													47							20		SM*
RM-07	2	10.0 - 12.0				100	96	93	88	85	83	81	60	24	13							24		SM*
RM-07	3	15.0 - 17.0																				9.4		
RM-08	1	5.0 - 7.0																				18		
RM-08	2	10.0 - 12.0																				19		
RM-08	3	15.0 - 17.0																				12		

* Estimated Classification
** The maximum particle size of samples is limited by the I.D. of the sampler opening or the width of the auger flights.

SUMMARY OF LABORATORY DATA
MATERIAL SITE EXPLORATION - AMBLER, ALASKA

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS (% FINER) **																ATTERBERG LIMITS			MOIST. CONT.	ORG. CONT.	ASTM CLASS.
			STANDARD SIEVE SIZE													(mm)								
HOLE	NO.	DEPTH (FT.)	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	.02	.005	.002	LL	PL	PI	%	%	
RM-09	1	5.0 - 7.0													55							15		ML*
RM-09	2	10.0 - 12.0																				27		
RM-09	3	15.0 - 17.0		100	96	92	85	78	60	46	40	34	23	15	9.4							11		SP-SM*
RM-10	2	10.0 - 12.0			100	98	89	80	66	56	51	40	20	9	5.6							15		SP-SM*
RM-10	3	15.0 - 17.0			100	98	86	77	55	35	23	14	8	6	3.9							12		SW
RM-10	4	20.0 - 21.5																				7.2		
RM-11	2	10.0 - 12.0			100	97	93	87	77	67	62	56	41	19	9.4							12		SP-SM*
RM-11	3	15.0 - 17.0																				13		
RM-11	4	20.0 - 22.0																				13		
RM-11	5	25.0 - 27.0			100	98	96	93	82	67	56	41	23	14	8.8							14		SP-SM*
RM-12	1	5.0 - 7.0																				17		
RM-12	2	10.0 - 12.0			100	97	86	76	58	42	36	30	18	11	6.3							2.5		SP-SM*
RM-12	3	15.0 - 17.0																				11		
RM-12	4	20.0 - 21.5			100	95	88	81	60	42	32	25	21	16	10							9.2		SW-SM*
RM-12	5	25.0 - 27.0																				14		
RM-13	1	5.0 - 7.0													13							6.2		SM*
RM-13	2	10.0 - 12.0			100	96	92	83	62	46	37	29	17	10	6.4							6.7		SP-SM*
RM-13	3	15.0 - 17.0			100	99	94	88	74	62	55	47	36	20	12							23		SP-SM*
RM-13	5	25.0 - 26.5						100	99	97	95	91	78	55	16							23		SM*
RM-14	2	10.0 - 12.0		100	99	98	93	87	75	65	59	48	29	13	7.7							11		SP-SM*
RM-14	3	15.0 - 17.0			100	99	93	87	69	50	39	30	20	13	7.9							10		SP-SM*
RM-15	1	5.0 - 7.0																				14		
RM-15	2	10.0 - 12.0																				3.1		
RM-15	3	15.0 - 17.0				100	98	96	90	83	77	66	30	9	4.7							21		SP
RM-16	2	10.0 - 12.0																				36		
RM-16	3	15.0 - 17.0			100	98	96	96	94	93	89	75	47	22	12							23		SM*
RM-16	5	25.0 - 27.0				100	99	98	93	86	80	71	56	28	13							19		SM*

* Estimated Classification

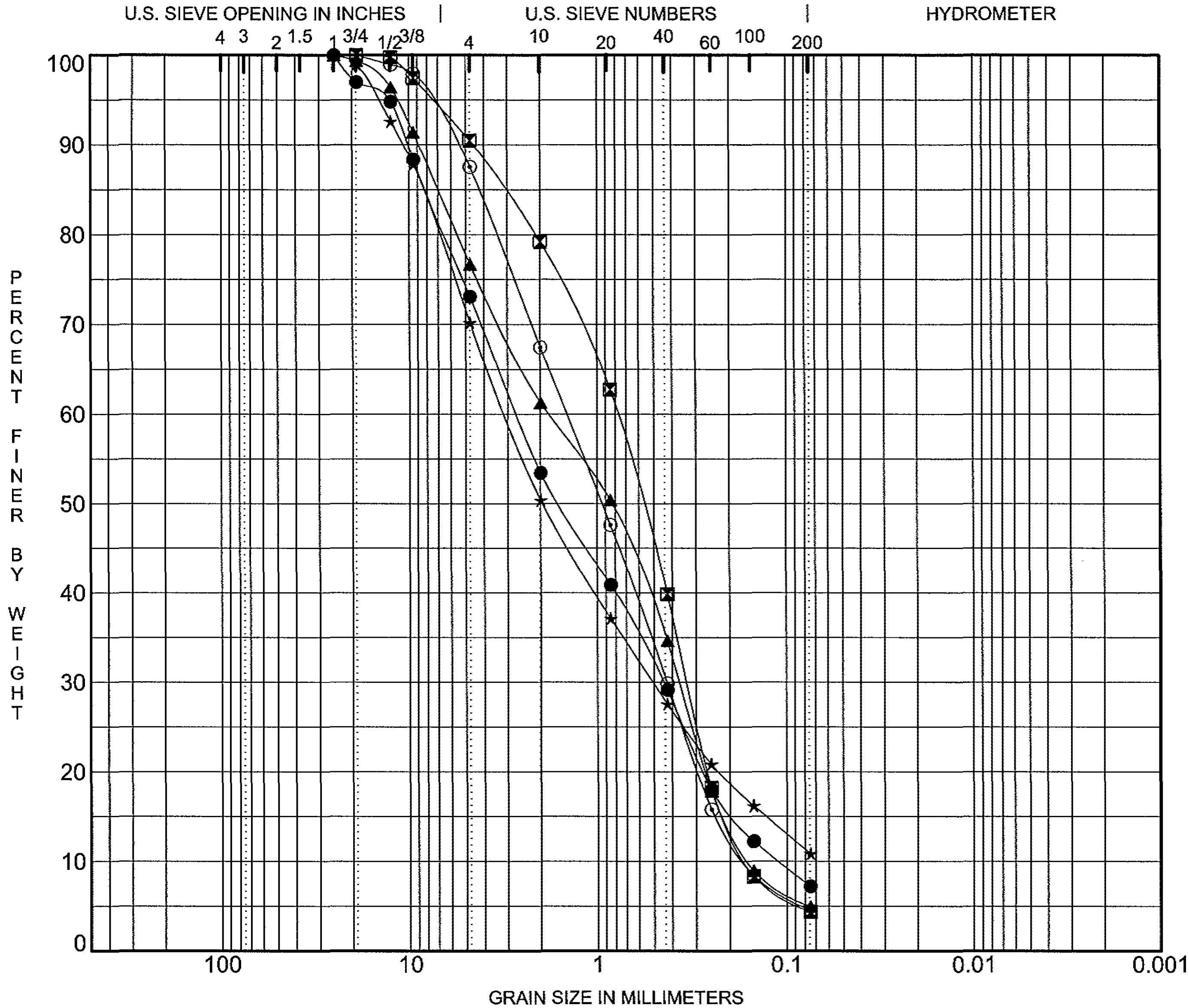
** The maximum particle size of samples is limited by the I.D. of the sampler opening or the width of the auger flights.

SUMMARY OF LABORATORY DATA
MATERIAL SITE EXPLORATION - AMBLER, ALASKA

SAMPLE IDENTIFICATION			PARTICLE SIZE ANALYSIS (% FINER) **																ATTERBERG LIMITS			MOIST. CONT.	ORG. CONT.	ASTM CLASS.
			STANDARD SIEVE SIZE													(mm)								
HOLE	NO.	DEPTH (FT.)	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200	.02	.005	.002	LL	PL	PI	%	%	
RM-17	1	5.0 - 7.0													8.8							6.2		SP-SM*
RM-17	2	10.0 - 12.0			100	99	92	83	60	42	33	24	16	9	4.9							11		SP
RM-17	3	15.0 - 17.0																				11		
RM-17	5	25.0 - 27.0					100	99	98	91	68	46	21	13	7.7							17		SW-SM*
RM-18	2	10.0 - 12.0				100	94	87	69	51	42	34	25	15	8.0							4.5		SP-SM*
RM-18	3	15.0 - 17.0																				9.9		
RM-18	4	20.0 - 22.0			100	98	92	83	63	46	38	30	20	13	8.5							11		SP-SM*
RM-19	2	10.0 - 12.0				100	99	97	87	73	59	46	23	9	4.6							3.5		SP
RM-19	3	15.0 - 17.0																				12		
RM-19	4	20.0 - 22.0		100	98	96	90	83	65	48	37	28	19	13	8.9							11		SP-SM*
RM-20	1	5.0 - 6.5													11							6.6		SP-SM*
RM-20	2	10.0 - 11.5			100	97	91	85	68	50	40	31	20	13	8.3							12		SP-SM*
RM-20	4	20.0 - 21.5			100	96	92	84	66	49	39	32	25	18	11							12		SP-SM*
RM-21	1	5.0 - 7.0																				17		
RM-21	2	10.0 - 12.0			100	99	97	95	90	86	85	83	66	29	13							17		SM*
RM-21	3	15.0 - 17.0				100	93	86	67	50	39	29	20	13	8.5							11		SP-SM*
RM-22	1	5.0 - 7.0																				5.3		
RM-22	2	10.0 - 12.0			100	96	89	83	69	58	52	47	40	21	10							17		SP-SM*
RM-22	3	15.0 - 17.0																				10		
RM-23	2	10.0 - 12.0													29							32		SM*
RM-23	3	15.0 - 16.5			100	98	98	96	89	83	76	64	43	27	18							16		SM*
RM-23	4	20.0 - 21.5																				13		
RM-24	1	5.0 - 7.0																				25		
RM-24	2	10.0 - 12.0																				24		
RM-24	3	15.0 - 16.5			100	95	91	88	76	58	46	35	20	13	8.6							12		SP-SM*

* Estimated Classification

** The maximum particle size of samples is limited by the I.D. of the sampler opening or the width of the auger flights.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-02	3	15.0 - 16.5	SP-SM*	13					0.68	24.24
⊠	RM-03	4	20.0 - 22.0	SP	20					0.87	4.78
▲	RM-04	3	15.0 - 16.5	SP	14					0.47	11.35
★	RM-05	4	15.0 - 16.5	SW-SM*	11					1.26	45.41
⊙	RM-05	5	25.0 - 27.0	SP	14					0.75	8.66

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-02	3	25.000	2.671	0.447	0.11	3	27	66	7
⊠	RM-03	4	19.000	0.782	0.334	0.164	0	10	86	4
▲	RM-04	3	25.000	1.811	0.367	0.159	1	23	72	5
★	RM-05	4	25.000	3.045	0.508		1	30	59	11
⊙	RM-05	5	19.000	1.451	0.428	0.168	0	13	83	5

*Estimated Classification

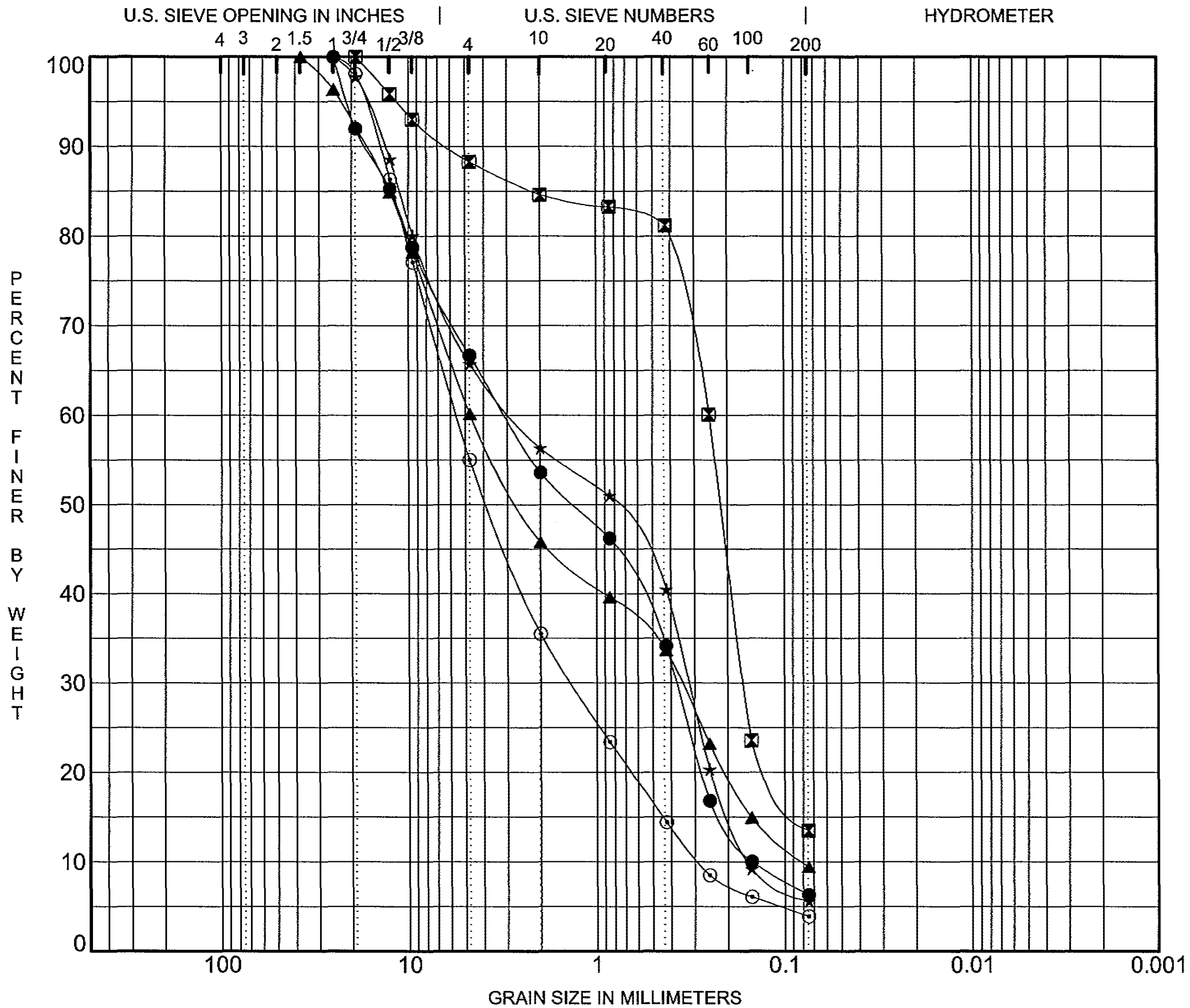
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-05



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-06	2	10.0 - 12.0	SP-SM*	12					0.31	20.44
⊠	RM-07	2	10.0 - 12.0	SM*	24						
▲	RM-09	3	15.0 - 17.0	SP-SM*	11					0.33	58.53
★	RM-10	2	10.0 - 12.0	SP-SM*	15					0.24	18.02
⊙	RM-10	3	15.0 - 17.0	SW	12					1.16	19.42

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-06	2	25.000	3.054	0.374	0.149	8	33	60	6
⊠	RM-07	2	19.000	0.25	0.164		0	12	75	13
▲	RM-09	3	37.500	4.708	0.353	0.08	8	40	51	9
★	RM-10	2	25.000	2.802	0.323	0.155	2	34	60	6
⊙	RM-10	3	25.000	5.557	1.357	0.286	2	45	51	4

*Estimated Classification

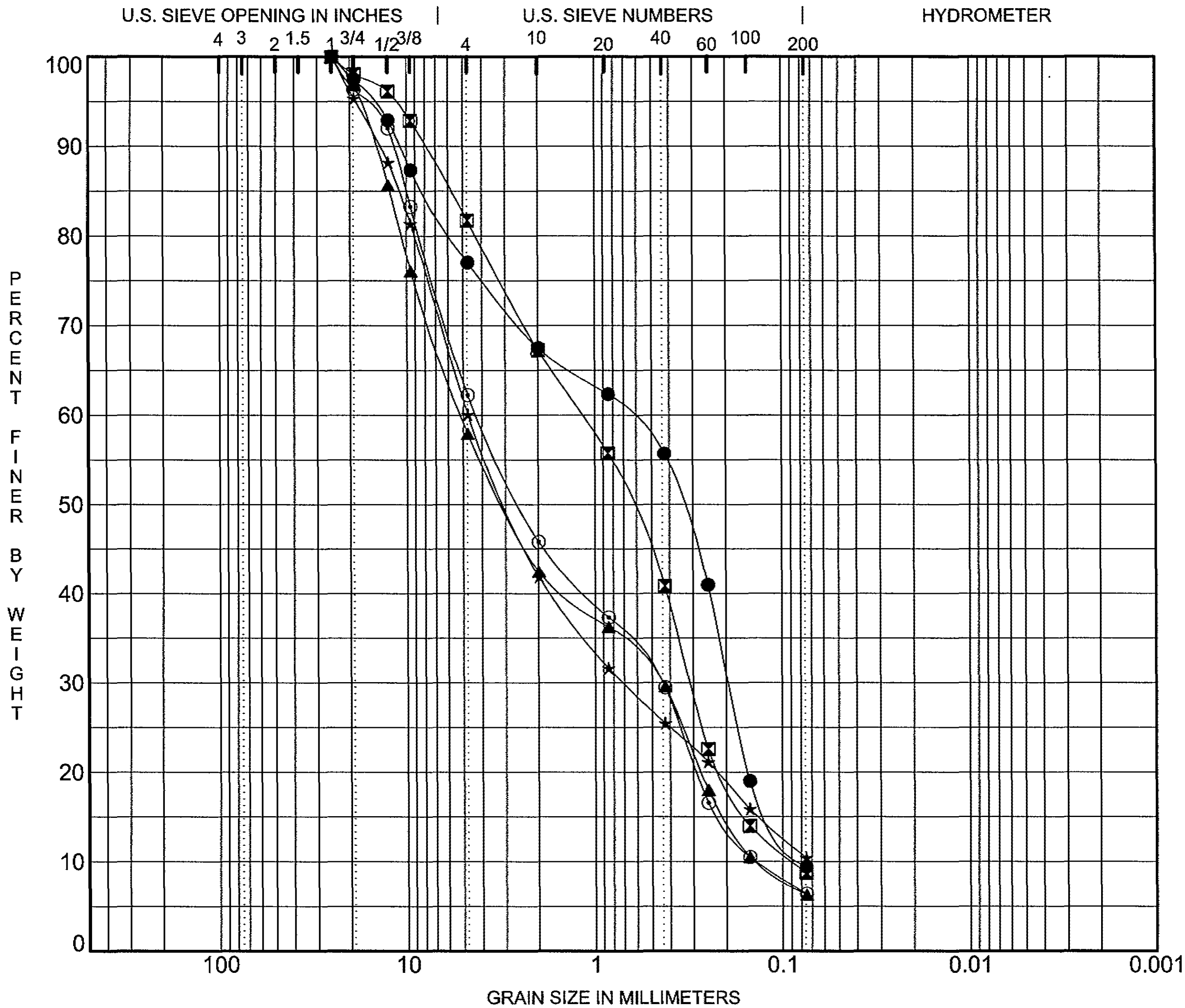
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-06



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-11	2	10.0 - 12.0	SP-SM*	12					0.72	8.51
⊠	RM-11	5	25.0 - 27.0	SP-SM*	14					0.93	13.19
▲	RM-12	2	10.0 - 12.0	SP-SM*	2.5					0.28	37.32
★	RM-12	4	20.0 - 21.5	SW-SM*	9.2					1.49	66.60
⊙	RM-13	2	10.0 - 12.0	SP-SM*	6.7					0.34	30.58

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-11	2	25.000	0.666	0.194	0.078	3	23	68	9
⊠	RM-11	5	25.000	1.167	0.31	0.089	2	18	73	9
▲	RM-12	2	25.000	5.141	0.444	0.138	3	42	52	6
★	RM-12	4	25.000	4.73	0.709		5	40	50	10
⊙	RM-13	2	25.000	4.221	0.445	0.138	4	38	56	6

*Estimated Classification

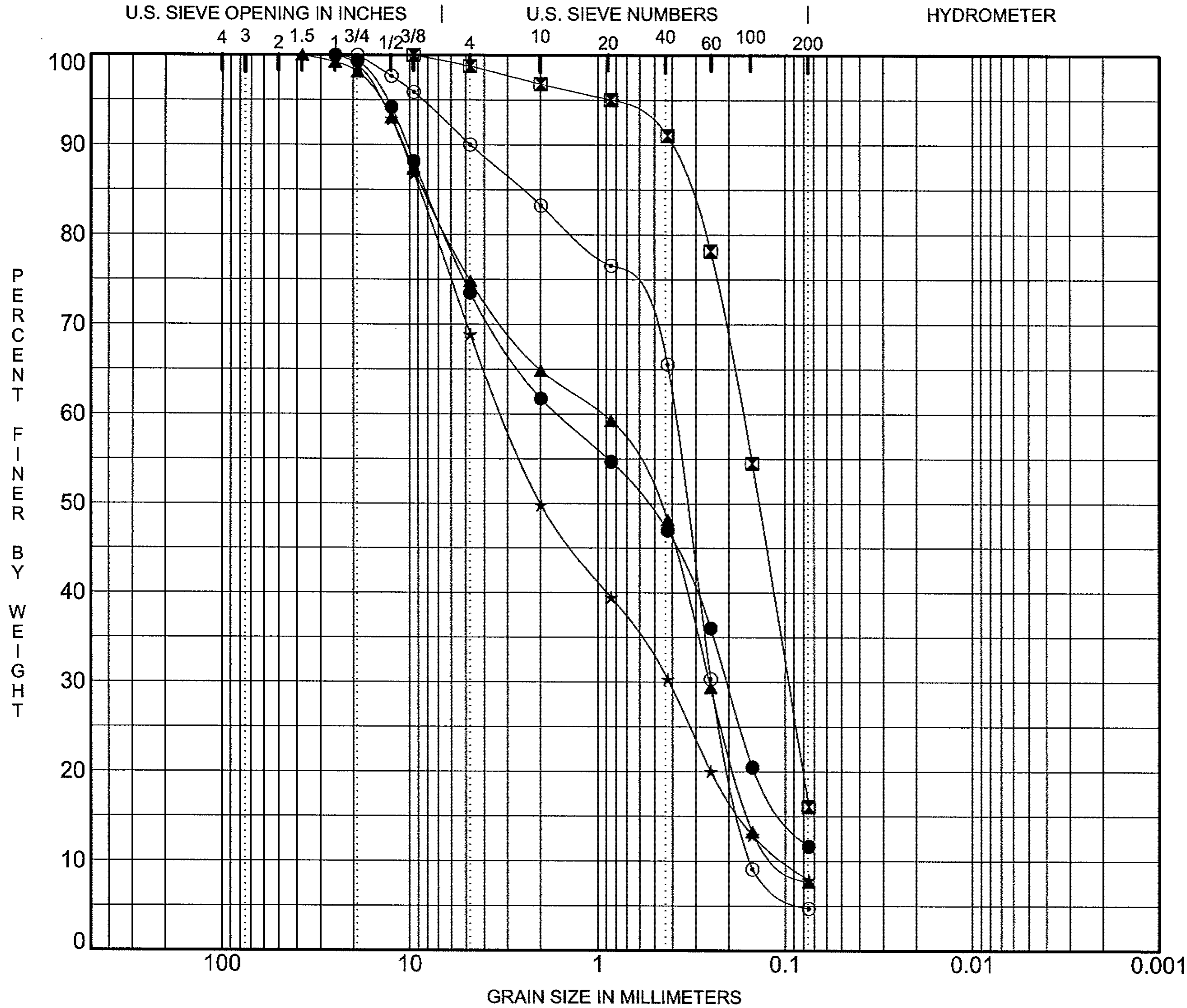
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-07



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-13	3	15.0 - 17.0	SP-SM*	23					0.39	24.57
⊠	RM-13	5	25.0 - 26.5	SM*	23						
▲	RM-14	2	10.0 - 12.0	SP-SM*	11					0.68	9.50
★	RM-14	3	15.0 - 17.0	SP-SM*	10					0.55	31.66
⊙	RM-15	3	15.0 - 17.0	SP	21					1.03	2.55

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-13	3	25.000	1.62	0.205		1	27	62	12
⊠	RM-13	5	9.500	0.169	0.096		0	1	83	16
▲	RM-14	2	37.500	0.951	0.255	0.1	2	25	67	8
★	RM-14	3	25.000	3.173	0.418	0.1	1	31	61	8
⊙	RM-15	3	19.000	0.391	0.248	0.153	0	10	85	5

*Estimated Classification

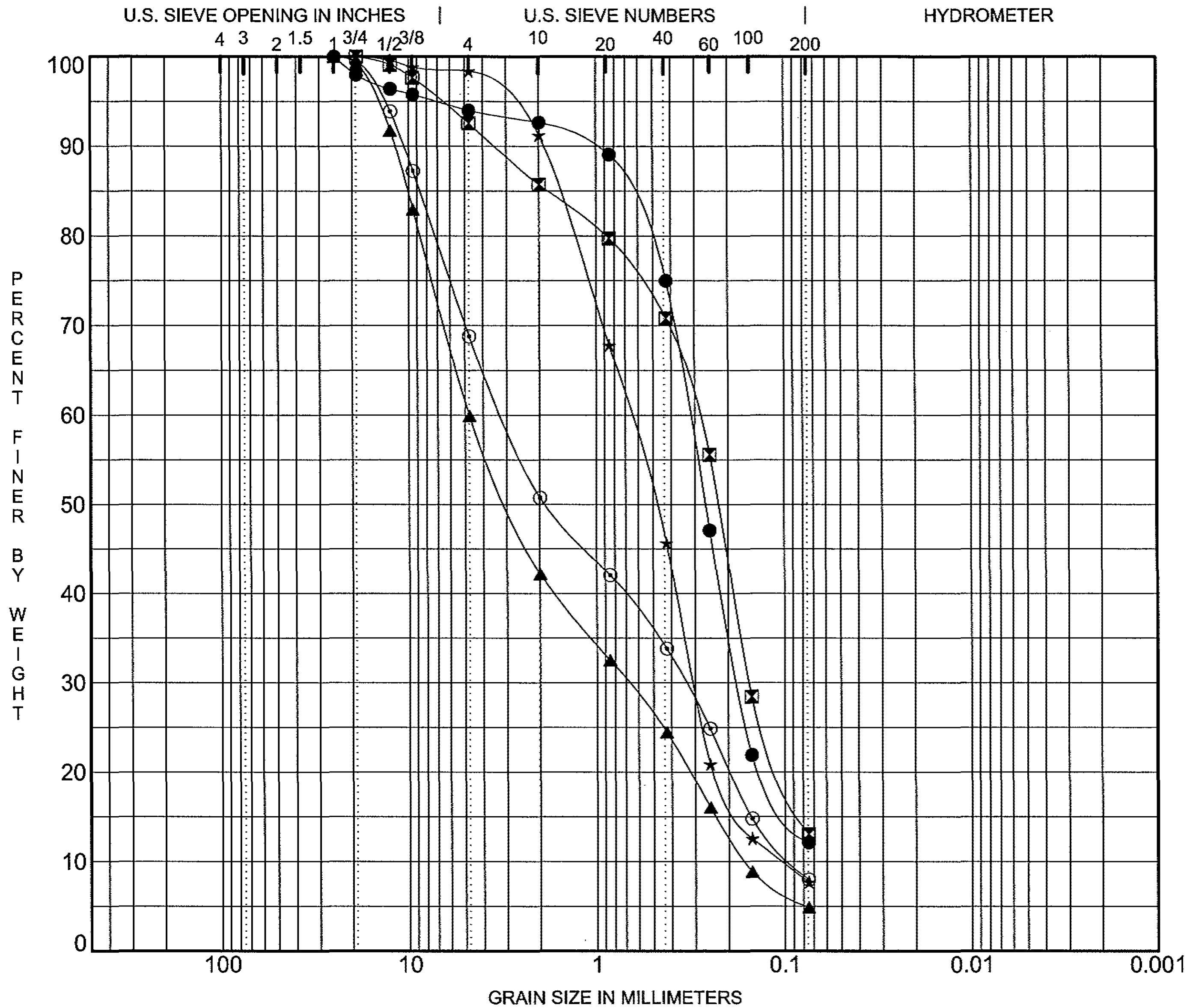
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-08



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-16	3	15.0 - 17.0	SM*	23					1.51	4.95
⊠	RM-16	5	25.0 - 27.0	SM*	19						
▲	RM-17	2	10.0 - 12.0	SP	11					0.61	29.30
★	RM-17	5	25.0 - 27.0	SW-SM*	17					1.33	6.39
⊙	RM-18	2	10.0 - 12.0	SP-SM*	4.5					0.40	33.83

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-16	3	25.000	0.32	0.177		2	6	82	12
⊠	RM-16	5	19.000	0.292	0.155		0	7	80	13
▲	RM-17	2	25.000	4.764	0.686	0.163	1	40	55	5
★	RM-17	5	19.000	0.666	0.304	0.104	0	2	91	8
⊙	RM-18	2	25.000	3.117	0.339	0.092	0	31	61	8

*Estimated Classification

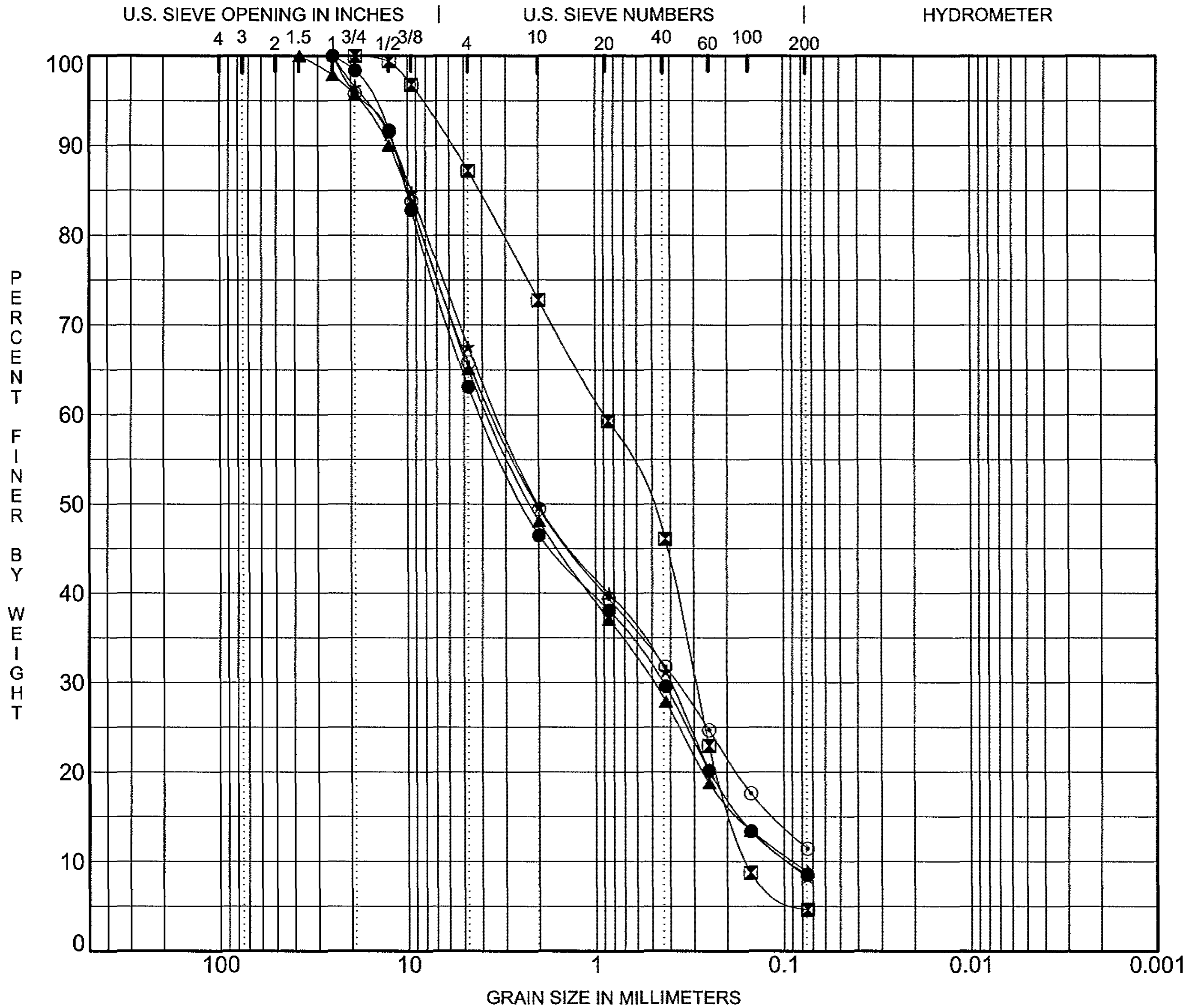
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-09



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-18	4	20.0 - 22.0	SP-SM*	11					0.52	43.67
⊠	RM-19	2	10.0 - 12.0	SP	3.5					0.62	5.67
▲	RM-19	4	20.0 - 22.0	SP-SM*	11					0.76	41.23
★	RM-20	2	10.0 - 11.5	SP-SM*	12					0.51	34.84
⊙	RM-20	4	20.0 - 21.5	SP-SM*	12					0.62	54.76

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-18	4	25.000	4.041	0.441	0.093	2	37	55	9
⊠	RM-19	2	19.000	0.89	0.294	0.157	0	13	83	5
▲	RM-19	4	37.500	3.67	0.5	0.089	4	35	56	9
★	RM-20	2	25.000	3.292	0.4	0.094	3	32	59	8
⊙	RM-20	4	25.000	3.492	0.373		4	34	54	11

*Estimated Classification

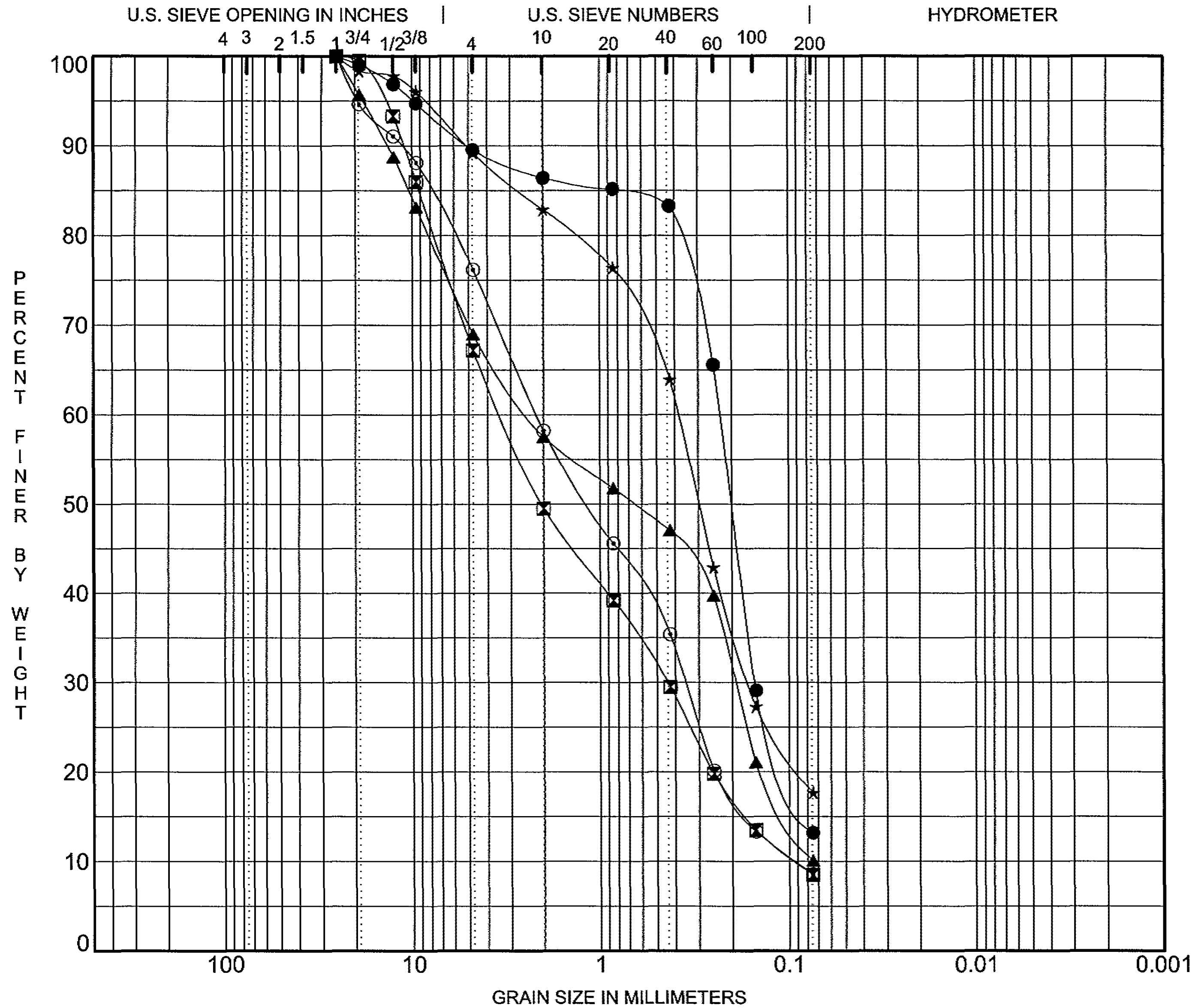
DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-10



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Borehole	Sam. No	Interval	ASTM Class.	M.C.%	ORG.%	LL	PL	PI	Cc	Cu
●	RM-21	2	10.0 - 12.0	SM*	17						
⊠	RM-21	3	15.0 - 17.0	SP-SM*	11					0.63	36.17
▲	RM-22	2	10.0 - 12.0	SP-SM*	17					0.20	32.36
★	RM-23	3	15.0 - 16.5	SM*	16						
⊙	RM-24	3	15.0 - 16.5	SP-SM*	12					0.62	23.62

	Borehole	Sam. No	D100	D60	D30	D10	% +3/4"	%Gravel	%Sand	%Fines
●	RM-21	2	25.000	0.231	0.152		1	**11**	**76**	13
⊠	RM-21	3	25.000	3.343	0.441	0.092	0	**33**	**59**	9
▲	RM-22	2	25.000	2.41	0.192		4	**31**	**59**	10
★	RM-23	3	25.000	0.385	0.164		2	**11**	**72**	18
⊙	RM-24	3	25.000	2.181	0.353	0.092	5	**24**	**68**	9

*Estimated Classification

DWN:	P.K.H.
CKD:	R.L.S.
DATE:	NOV. 04
SCALE:	N.T.S.

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE EXPLORATION
AMBLER, ALASKA

GRADATION CURVES

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	C-11

LABORATORY TEST REPORT

R&M CONSULTANTS, INC. 9101 VANGUARD DR. ANCHORAGE, ALASKA 99507 PH 907-522-1707

CLIENT: DOT&PF / Northern Region

PROJECT: Material Site Investigation - Ambler, Alaska

CLIENT PROJECT:

CLIENT ADDRESS: 2301 Peger Road, Fairbanks Alaska, 99709

MATERIAL/USE: Not Specified

SOURCE: Potential Material Site

SAMPLED FROM: Auger Cuttings

LOCATION: Test Boring RM-13

SAMPLED BY: P. Hardcastle

DATE SAMPLED: 11/4/2004

DEPTH: 15' - 25'

R&M PROJECT: 041030

AASHTO R18 AMRL LAB # 793

LAB NO.: 1001

FIELD NO.: 13

DATE REPORTED: 1/4/2005

DATE RECEIVED: 11/15/2004

GRAIN SIZE DISTRIBUTION

SIEVE	% PASS	SPEC.
5"		
4"		
3"		
2"		
1 1/2"		
1"	100	
3/4"	99	
1/2"	94	
3/8"	88	
#4	74	
#8		
#10	62	
#16		
#20	55	
#30		
#40	47	
#50		
#60	36	
#80		
#100	20	
#200	11.6	
.02MM		
.005MM		
.002MM		

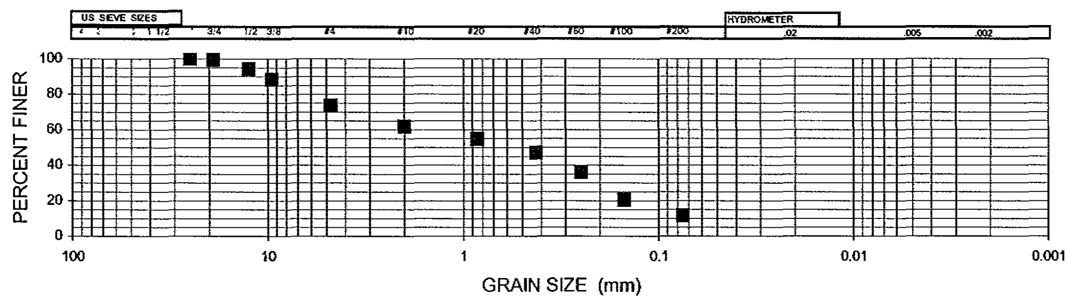
CLASSIFICATION

	ASTM	AASHTO	FAA
% + 10			
% + 3			
% GRAVEL	26.5		
% SAND	61.9		
% SILT	11.6		
% CLAY			
FSV			
LL			
PL			
PI			
CLASS	SP-SM		

COMPACTION

OPTIMUM MOISTURE:	
CORR. OPTIMUM MOISTURE:	
MIN. DRY DENSITY.	
MAX. DRY DENSITY:	
CORR. MAX. DRY DENSITY:	
% FRACTURE:	
METHOD:	
NATURAL DENSITY:	
NATURAL MOISTURE:	
WEIGHT LOOSE:	
WEIGHT RODDED:	

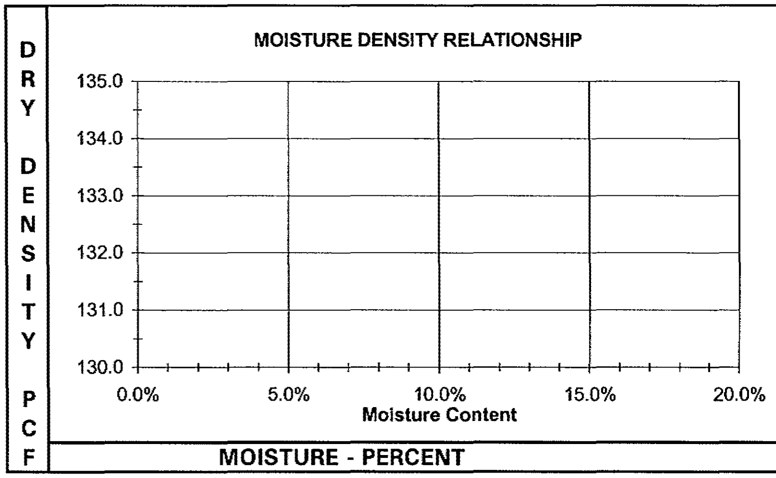
GRAIN SIZE DISTRIBUTION CHART



TOTAL WT. TESTED: 39,291 grams

COARSE	SPEC	FINE	SPEC	Additional Testing
				MINUS #200 MESH T11
				SOFT FRAGMENTS
				COAT & LIG. OR L.T.WT.PT.
				PERMEABILITY
				UNCOMPACTED VOIDS T304
				FRIABLE PARTICLES
				THIN-ELONGATED
				ORGANIC COLOR
				FINENESS MODULUS
				SULFATE SOUNDNESS
49				DEGRADATION VALUE
1.321				ABSORPTION
2.585				SPG.-BULK T84
2.619				SPG.-BULK S.S.D.
2.676				SPG.-APPARENT

MOISTURE DENSITY RELATIONSHIP



Tech Responsible: DL

Checked By:

ORGANIC CONTENT %:

L.A. ABRASION LOSS: 33.9% Method "C"

SAND EQUIVALENT:

Signed By:

Title: Thomas R Oliver R&M Materials Laboratory Manager

ASTM CLASSIFICATION: SAND WITH SILT AND GRAVEL

REMARKS:

LABORATORY TEST REPORT

R&M CONSULTANTS, INC. 9101 VANGUARD DR. ANCHORAGE, ALASKA 99507 PH 907-522-1707

CLIENT: DOT&PF / Northern Region
PROJECT: Material Site Investigation - Ambler, Alaska
CLIENT PROJECT:
CLIENT ADDRESS: 2301 Peger Road, Fairbanks Alaska, 99709
MATERIAL/USE: Not Specified
SOURCE: Potential Material Site
SAMPLED FROM: Auger Cuttings
LOCATION: Test Boring RM-18

SAMPLED BY: P. Hardcastle
DATE SAMPLED: 11/5/2004
DEPTH: 15' - 20'

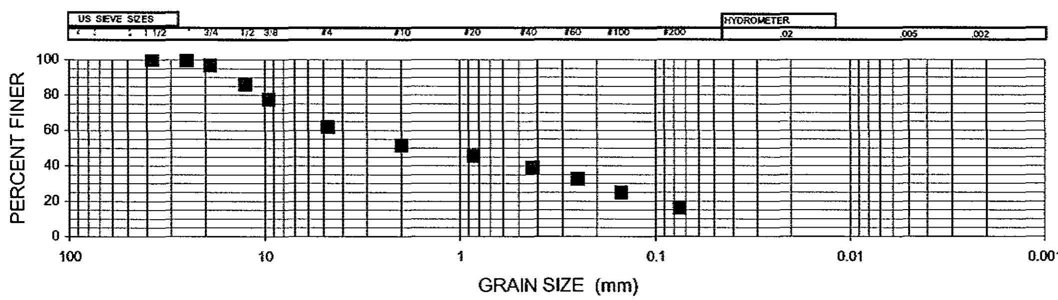
R&M PROJECT: 041030
AASHTO R18
AMRL LAB # 793
LAB NO.: 999
FIELD NO.: 18 A & B
DATE REPORTED: 1/4/2005
DATE RECEIVED: 11/15/2004

GRAIN SIZE DISTRIBUTION		
SIEVE	% PASS	SPEC.
5"		
4"		
3"		
2"		
1 1/2"	100	
1"	100	
3/4"	97	
1/2"	86	
3/8"	77	
#4	62	
#8		
#10	51	
#16		
#20	45	
#30		
#40	39	
#50		
#60	32	
#80		
#100	25	
#200	16.2	
.02MM		
.005MM		
.002MM		

CLASSIFICATION	ASTM	AASHTO	FAA
% + 10			
% + 3			
% GRAVEL	38.2		
% SAND	45.6		
% SILT	16.2		
% CLAY			
FSV			
LL			
PL			
PI			
CLASS	SM		

COMPACTION	
OPTIMUM MOISTURE:	5.8%
CORR. OPTIMUM MOISTURE:	
MIN. DRY DENSITY.	
MAX. DRY DENSITY:	
CORR. MAX. DRY DENSITY:	136.3
% FRACTURE:	
METHOD: "D" Procedure =	ASTM D-1557
NATURAL DENSITY:	
NATURAL MOISTURE:	
WEIGHT LOOSE:	
WEIGHT RODDED:	

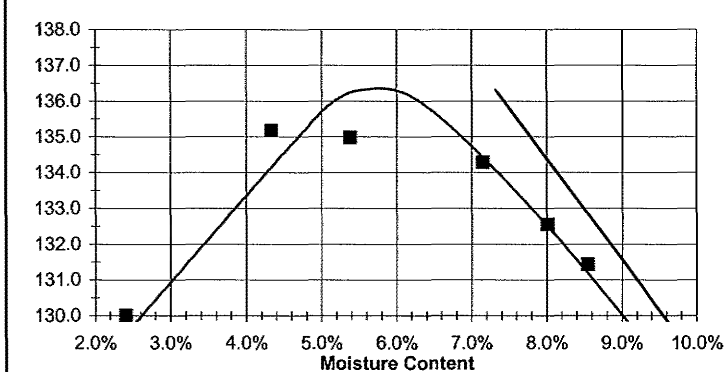
GRAIN SIZE DISTRIBUTION CHART



TOTAL WT. TESTED: 14,356 grams

COARSE	SPEC	FINE	SPEC	Additional Testing
				MINUS #200 MESH T11
				SOFT FRAGMENTS
				COAT & LIG. OR L.T.WT.PT.
				PERMEABILITY
				UNCOMPACTED VOIDS T304
				FRIABLE PARTICLES
				THIN-ELONGATED
				ORGANIC COLOR
				FINENESS MODULUS
1.4%				SULFATE SOUNDNESS
44				DEGRADATION VALUE
0.928				ABSORPTION
2.602				SPG.-BULK T84
2.626				SPG.-BULK S.S.D. C-128
2.666		2.66051		SPG.-APPARENT T-100

MOISTURE DENSITY RELATIONSHIP



Tech Responsible: DL
Checked By: Tro

ORGANIC CONTENT %:
L.A. ABRASION LOSS: 33.0% **Method "C"**
SAND EQUIVALENT:

Signed By:
Title: Thomas R Oliver R&M Materials Laboratory Manager

ASTM CLASSIFICATION: SILTY SAND WITH GRAVEL

REMARKS:

DRAWING C-13

LABORATORY TEST REPORT

R&M CONSULTANTS, INC. 9101 VANGUARD DR. ANCHORAGE, ALASKA 99507 PH 907-522-1707

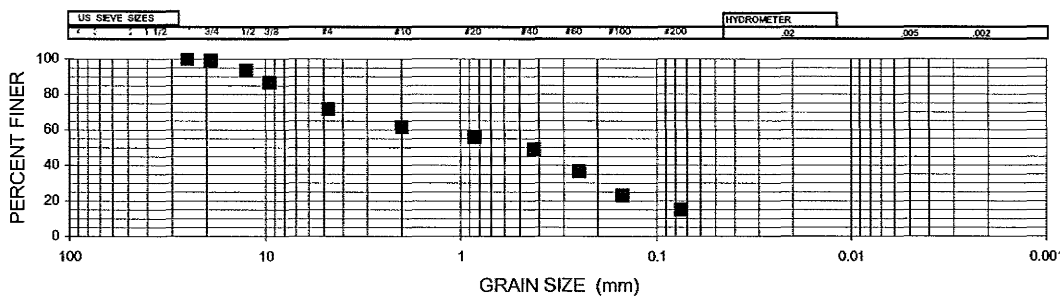
CLIENT: DOT&PF / Northern Region
PROJECT: Material Site Investigation - Ambler, Alaska
CLIENT PROJECT:
CLIENT ADDRESS: 2301 Peger Road, Fairbanks Alaska, 99709
MATERIAL/USE: Not Specified
SOURCE: Potential Material Site
SAMPLED FROM: Auger Cuttings
LOCATION: Test Boring RM-20 & RM-22

SAMPLED BY: P. Hardcastle
DATE SAMPLED: 11/5-6/04
DEPTH: 15' - 25'

R&M PROJECT: 041030
AASHTO R18 AMRL LAB # 793
LAB NO.: 1000
FIELD NO.: See Remarks
DATE REPORTED: 1/4/2005
DATE RECEIVED: 11/15/2004

GRAIN SIZE DISTRIBUTION			CLASSIFICATION				COMPACTION	
SIEVE	% PASS	SPEC.		ASTM	AASHTO	FAA		
5"			% + 10				OPTIMUM MOISTURE:	5.9%
4"			% + 3				CORR. OPTIMUM MOISTURE:	
3"			% GRAVEL	28.4			MIN. DRY DENSITY.	
2"			% SAND	56.8			MAX. DRY DENSITY:	
1 1/2"			% SILT	14.9			CORR. MAX. DRY DENSITY:	135.8
1"	100		% CLAY				% FRACTURE:	
3/4"	99		FSV				METHOD: "D" Procedure	ASTM D-1557
1/2"	93		LL				NATURAL DENSITY:	
3/8"	87		PL				NATURAL MOISTURE:	
#4	72		PI				WEIGHT LOOSE:	
#8			CLASS	SM			WEIGHT RODDED:	
#10	61							
#16								
#20	56							
#30								
#40	49							
#50								
#60	37							
#80								
#100	23							
#200	14.9							
.02MM								
.005MM								
.002MM								

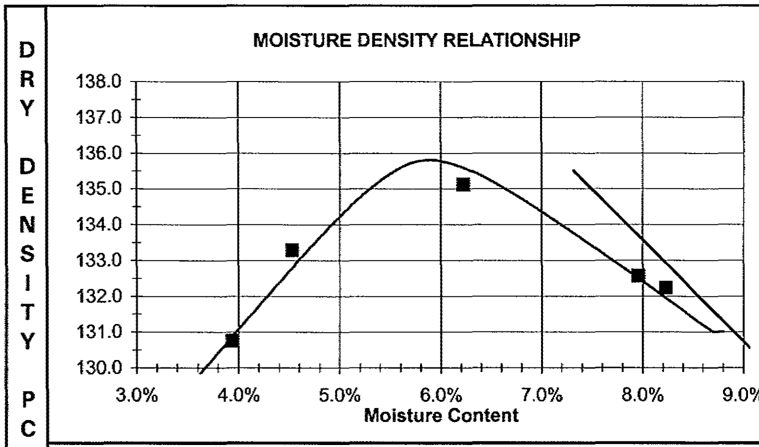
GRAIN SIZE DISTRIBUTION CHART



TOTAL WT. TESTED: 21,677 grams

COARSE	SPEC	FINE	SPEC	Additional Testing
				MINUS #200 MESH T11
				SOFT FRAGMENTS
				COAT & LIG. OR L.T.WT.PT.
				PERMEABILITY
				UNCOMPACTED VOIDS T304
				FRIABLE PARTICLES
				THIN-ELONGATED
				ORGANIC COLOR
				FINENESS MODULUS
3.8%				SULFATE SOUNDNESS
62				DEGRADATION VALUE
1.177				ABSORPTION
2.583				SPG.-BULK T84
2.613				SPG.-BULK S.S.D.C-128
2.664		2.59804		SPG.-APPARENT T-100

MOISTURE DENSITY RELATIONSHIP



Tech Responsible: ____________ Checked By: ____________

ORGANIC CONTENT %: ____________
L.A. ABRASION LOSS: 69% Method "C"
SAND EQUIVALENT: ____________

Signed By: ____________
Title: Thomas R Oliver R&M Materials Laboratory Manager

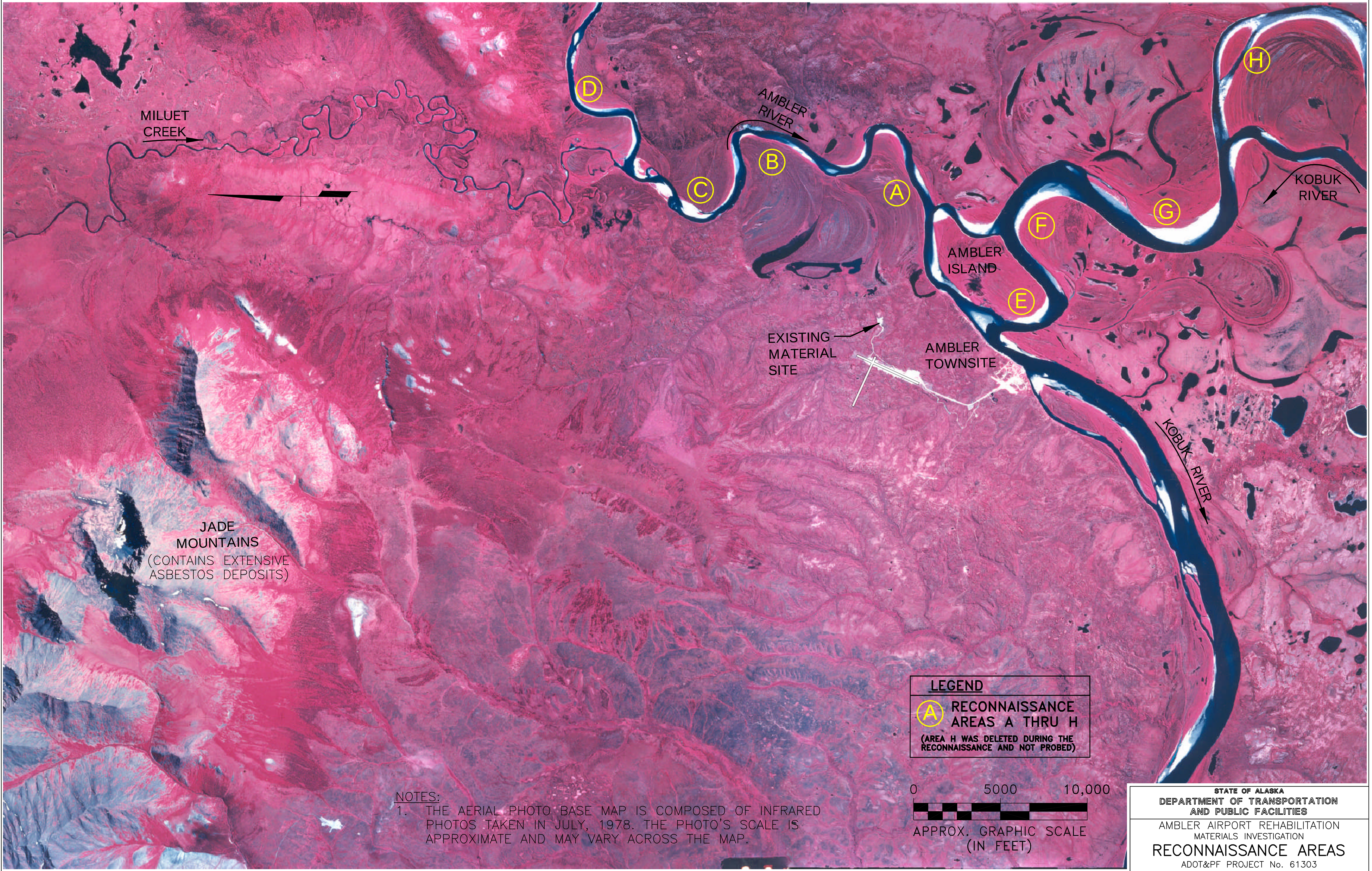
ASTM CLASSIFICATION: SILTY SAND WITH GRAVEL

REMARKS: SAMPLES FROM TEST BORINGS RM-22 (15'-25') AND RM-20 (20'-25') WERE COMBINED FOR TESTING.

DRAWING C-14

APPENDIX D

RECONNAISSANCE INVESTIGATION



LEGEND

(A) RECONNAISSANCE AREAS A THRU H

(AREA H WAS DELETED DURING THE RECONNAISSANCE AND NOT PROBED)

0 5000 10,000

APPROX. GRAPHIC SCALE (IN FEET)

NOTES:

1. THE AERIAL PHOTO BASE MAP IS COMPOSED OF INFRARED PHOTOS TAKEN IN JULY, 1978. THE PHOTO'S SCALE IS APPROXIMATE AND MAY VARY ACROSS THE MAP.

Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
MATERIALS INVESTIGATION

RECONNAISSANCE AREAS

ADOT&PF PROJECT No. 61303

SCALE	DESIGNED	DRAWN	DWG
AS SHOWN	PKH	MKA	D-01
	CHECKED RLS	DATE JUL. 2004	

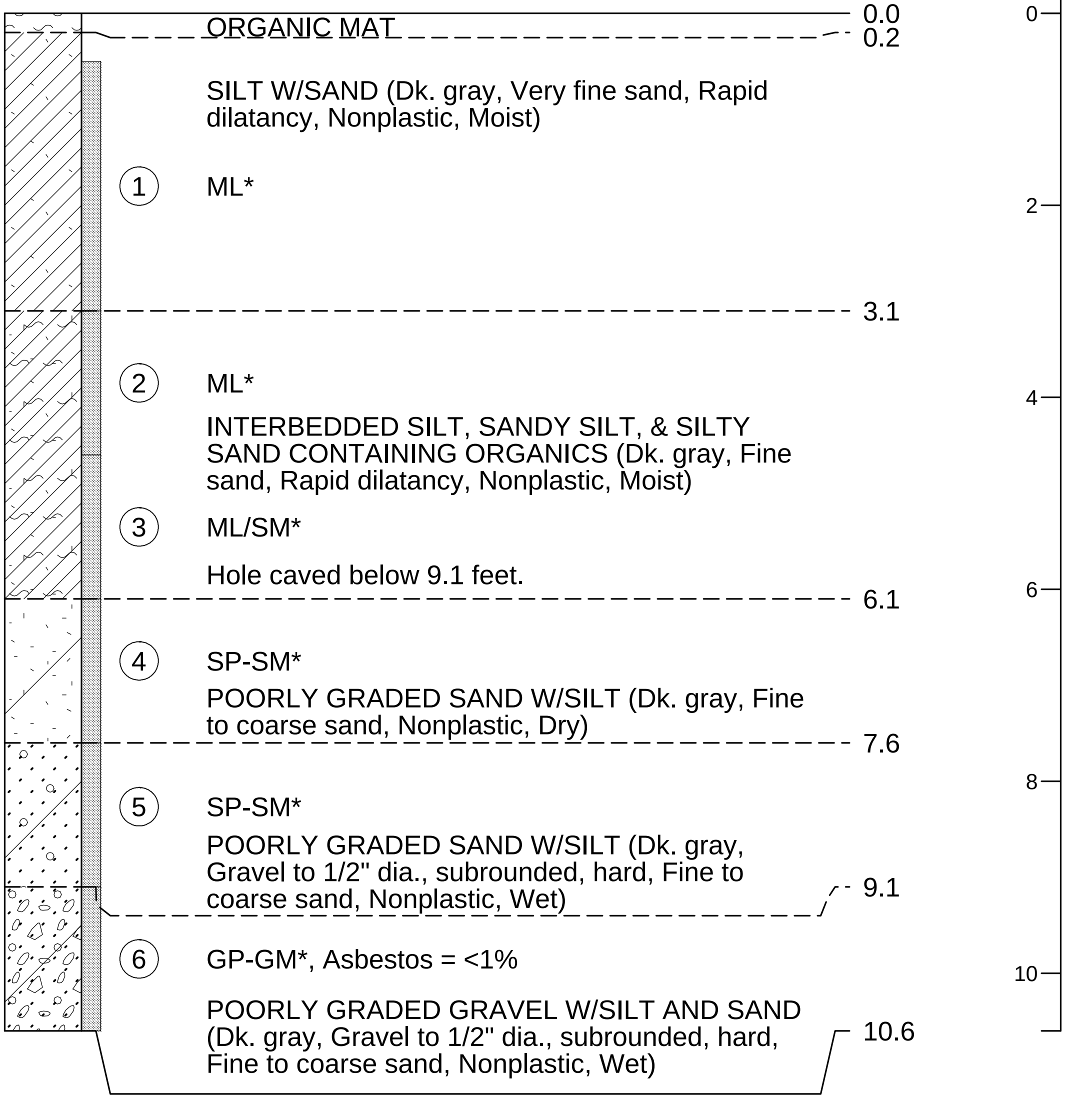
project.04\041030_GEO\ambler-D-01, 1=1, 11/19/04 at 17:25 by mka

project.04\041030_GEO\AMBLER-D-02-A, 1=40, 07/20/04 at 16:48 by mka

RM-P-A1

N 7,443,858
E 553,489
6/13/04

DEPTH



Sample type	Depth (ft)	Sample	Description
	0.0 – 0.2		ORGANIC MAT
C	0.2 – 3.1	1	SILT W/SAND (Dk. gray, Very fine sand, Rapid dilatancy, Nonplastic, Moist) ML*
DS	3.1 – 6.1	2	ML*
C		3	INTERBEDDED SILT, SANDY SILT, & SILTY SAND CONTAINING ORGANICS (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist) ML/SM* Hole caved below 9.1 feet.
DS	6.1 – 7.6	4	SP-SM* POORLY GRADED SAND W/SILT (Dk. gray, Fine to coarse sand, Nonplastic, Dry)
C	7.6 – 9.1	5	SP-SM* POORLY GRADED SAND W/SILT (Dk. gray, Gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)
DS	9.1 – 10.6	6	GP-GM*, Asbestos = <1% POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)

7.0 ft. W.D.

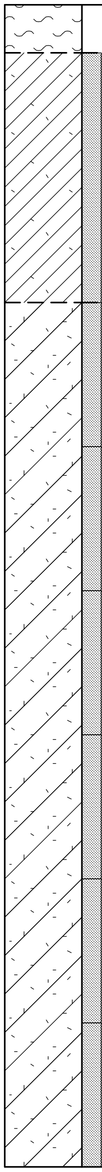
* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030
SCALE: 1"=2'		RM-P-A1	DWG.NO: D-03

RM-P-A2

N 7,443,861
E 553,345
6/13/04



Sample type	Sample	Description	Depth (ft)
		ORGANIC MAT	0.0
		SILT (Dk. gray, Very fine sand, Rapid dilatancy, Slightly plastic, Wet to moist)	0.5
C	1	ML*	
			3.1
DS	2	ML*, SP*, SM* & SP-SM*, Silt layers to 2" thick	
C	3	ML*, SP*, SM* & SP-SM*	
		POORLY GRADED SAND CONTAINING SILT AND SILTY SAND LAYERS (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry to moist)	
DS	4	ML*, SP*, SM* & SP-SM* Sandy silt layers to 4" thick	
C	5	ML*, SP*, SM* & SP-SM*	
DS (10.0 ft. W.D.)	6	ML*, SP*, SM* & SP-SM*, Silt layers to 2" thick	
		Hole caved below 10 feet.	
C	7	ML*, SP*, SM* & SP-SM*	
			12.1

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

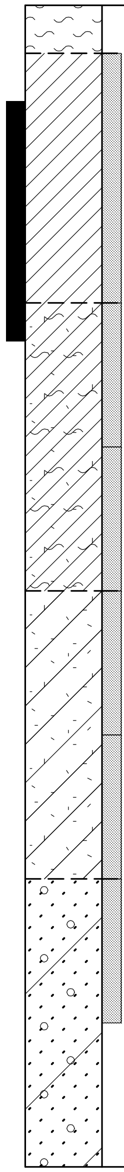
Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE		FB: NA
CKD: C.H.R.		AMBLER, ALASKA		GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE		PROJ.NO: 041030
SCALE: 1"=2'		RM-P-A2		DWG.NO: D-04

RM-P-A3

N 7,443,806
E 553,196
6/13/04

DEPTH



Sample	No.	Description	Depth (ft)
		ORGANIC MAT	0.0
			0.5
		SILT (Dk. gray-brown, Plastic, Moist)	
C	1	ML*	
		Seasonal Frost 1.0 to 3.5 feet	
			3.1
DS	2	ML* & SM*, Asbestos Not Detected Silt layers to 6" thick	
		INTERBEDDED SILT, SANDY SILT, & SILTY SAND CONTAINING ORGANICS (Dk. gray, Fine sand, Nonplastic, Dry to wet)	
C	3	ML*	
			6.1
DS	4	SP-SM*, ML* & SM*, Silty sand layers to 6" thick	
		INTERBEDDED SAND W/SILT, SILT, & SILTY SAND (Dk. gray, Fine sand, Nonplastic, Dry)	
C	5	SM*	
		Hole caved below 9 feet.	
9.1 ft. W.D.			9.1
DS	6	SP-SM*, Layers of GP-GM* to 1" thick	
		POORLY GRADED SAND W/SILT CONTAINING THIN LAYERS OF GRAVEL (Dk. gray, Gravel to 1/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	
			12.1

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

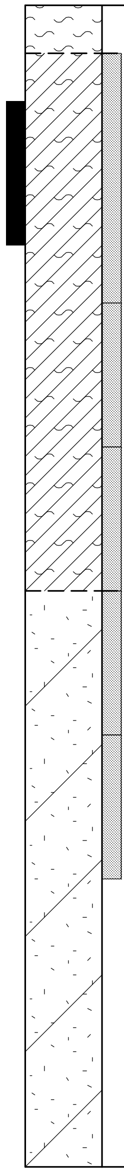
MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE
CKD:	C.H.R.		AMBLER, ALASKA
DATE:	JUNE 04		LOG OF TEST PROBE
SCALE:	1"=2'		RM-P-A3

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-05

RM-P-A4

N 7,443,288
E 552,671
6/14/04



Sample	No.	Description	Depth (ft)
		ORGANIC MAT	0.0
			0.5
		Seasonal Frost 1.0 - 2.5 feet	
C	1	ML*	
		SILT W/ORGANICS (Dk. gray-brown, Slightly plastic, Moist)	
DS	2	ML*, Asbestos Not Detected	
C	3	ML*	
		Hole caved below 6.1 feet.	6.1
DS	4	SP-SM*	
C	5	SP-SM*, Slurry auger return	
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	
			12.1

6.1 ft. W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

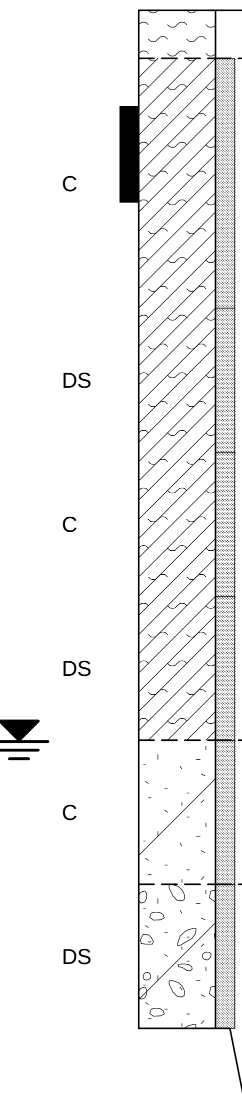
Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB:	NA
CKD:	C.H.R.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE:	1"=2'		RM-P-A4	DWG.NO:	D-06

RM-P-A5

N 7,443,420
E 552,582
6/14/04



Sample		Description	Depth
		ORGANIC MAT	0.0
			0.5
		Seasonal Frost 1.0 - 2.0 feet	
C	1	ML*	
		SILT W/ORGANICS (Dk. gray, Plastic, Moist)	
DS	2	ML*, Material varved	
C	3	ML*	
DS	4	ML*, Fine sand in tip of sampler	
7.6 ft. W.D.			7.6
C	5	SP-SM*	
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	9.1
		Hole caved below 9.1 feet.	
DS	6	SW-SM*, Asbestos = 1.0%	
		WELL GRADED SAND W/SILT AND GRAVEL (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	10.6

DEPTH: 0, 2, 4, 6, 8, 10

* Estimated Classification

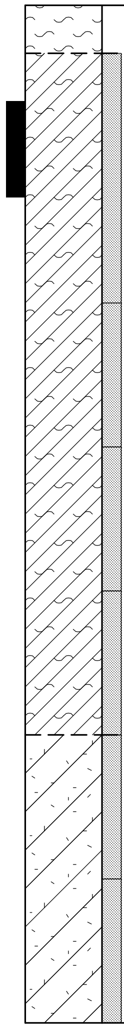
Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030
SCALE: 1"=2'		RM-P-A5	DWG.NO: D-07

RM-P-A6

N 7,443,565
E 552,547
6/14/04

DEPTH



Sample	No.	Description	Depth
		ORGANIC MAT	0.0
			0.5
		Seasonal Frost 1.0 - 2.0 feet	
C	1	ML*	
		SILT W/ORGANICS (Dk. gray, Plastic, Moist)	
DS	2	ML*, Alternating layers of gray and brown material to 3" thick	
C	3	ML*	
DS	4	ML*, Asbestos = <1% Sand in tip of sampler	
7.5 ft. W.D.			7.6
C	5	SM*	
		INTERBEDDED SILT, SILTY SAND, & POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	
DS	6	ML*, SM* & SP-SM*	
		Hole caving below 9.1 feet.	10.6

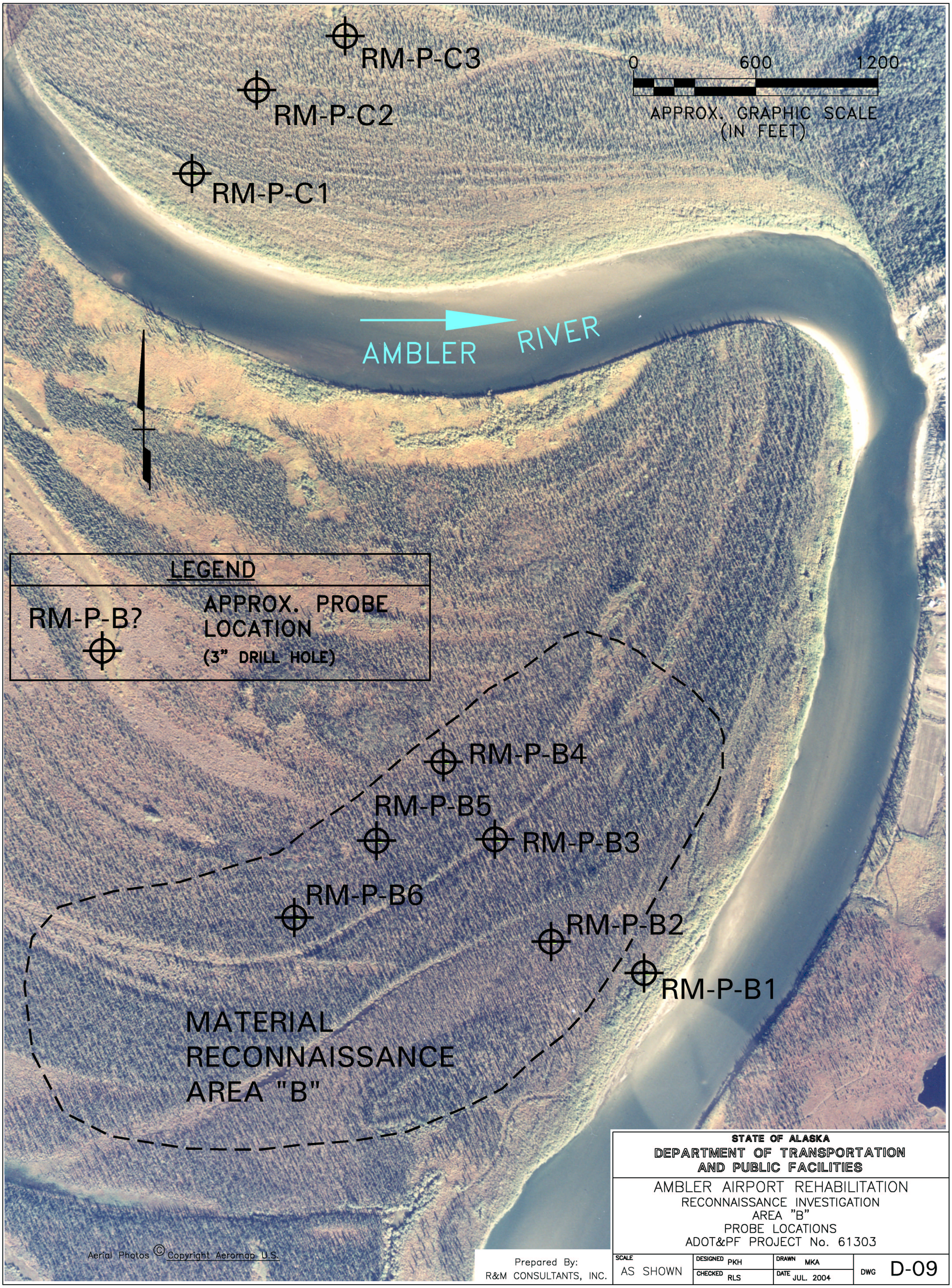
Depth scale: 0, 2, 4, 6, 8, 10

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030
SCALE: 1"=2'		RM-P-A6	DWG.NO: D-08



Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

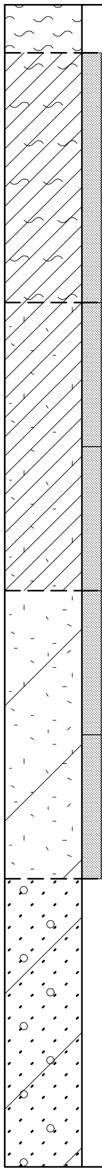
AMBLER AIRPORT REHABILITATION
RECONNAISSANCE INVESTIGATION
AREA "B"
PROBE LOCATIONS
ADOT&PF PROJECT No. 61303

SCALE AS SHOWN	DESIGNED PKH	DRAWN MKA	DWG	D-09
	CHECKED RLS	DATE JUL. 2004		

project.04\041030_GEO\AMBLER-BASE-B, 1=40, 07/20/04 at 13:20 by mka

RM-P-B1

N 7,445,045
E 553,032
6/11/04



Sample type	Sample No.	Description	Depth (ft)
			0.0
		ORGANIC MAT	
			0.5
		SILT CONTAINING ORGANICS (Dk. gray, Plastic, Moist)	
C	1	ML*, Asbestos Not Detected	
			3.1
DS	2	ML* & SP-SM*, Asbestos = <1% Silt layers to 3" thick	
		INTERBEDDED SILT & SAND W/SILT CONTAINING ORGANICS (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry to moist)	
C	3	ML*, Asbestos Not Detected	
6.1 ft. W.D.			6.1
DS	4	SP-SM*, Asbestos = <1%	
		SAND W/SILT (Dk. gray, Fine to medium sand, Nonplastic, Wet)	
C	5	SP-SM*, Asbestos = <1%	
		Hole caved below 7.5 feet.	
			9.1
		Drilling indicates fine gravel below 9.1 feet.	
		POORLY GRADED SAND W/SILT CONTAINING LAYERS OF GRAVEL (Dk. gray, Wet)	
			12.1

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

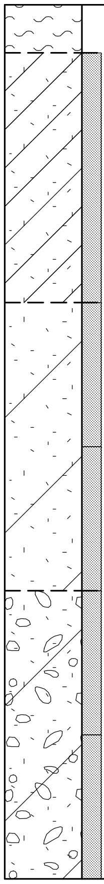
Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE AMBLER, ALASKA	FB:	NA
CKD:	C.H.R.			GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE RM-P-B1	PROJ.NO:	041030
SCALE:	1"=2'			DWG.NO:	D-10

RM-P-B2

N 7,445,092
E 552,893
6/11/04

DEPTH



Sample type	Sample no.	Description	Depth (ft)
		ORGANIC MAT	0.0
			0.5
		SILTY SAND (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist)	
C	1	SM*, Asbestos Not Detected	
			3.1
DS	2	SP-SM*, Asbestos Not Detected	
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist)	
C	3	SP-SM*, Asbestos Not Detected	
6.1 ft. W.D.			6.1
DS	4	SP-SM*, Asbestos Not Detected	
		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray, Gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	
C	5	SP-SM*, Asbestos Not Detected	
			9.1

Depth scale: 0, 2, 4, 6, 8

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

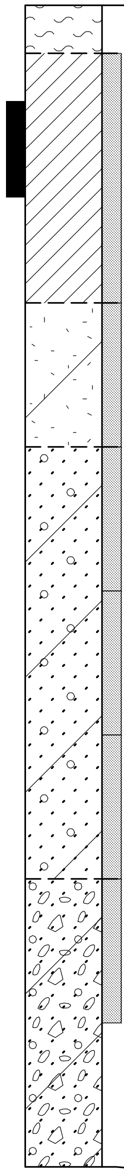
DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB:	NA
CKD:	C.H.R.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE:	1"=2'		RM-P-B2	DWG.NO:	D-11

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

RM-P-B3

N 7,445,245
E 552,809
6/11/04

DEPTH



Sample	Depth (ft)	No.	Description
	0.0		ORGANIC MAT
	0.5		
C		1	SILT (Dk. gray, Slightly plastic, Wet to moist) ML*, Asbestos = <1% Seasonal Frost 1.0 - 2.0 feet
	3.1		
DS		2	SP-SM*, Asbestos Not Detected POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist)
	4.6		
C		3	SP-SM*, Asbestos = <1% Drilling indicated layer of gravel to 3" thick POORLY GRADED SAND W/SILT CONTAINING THIN LAYERS OF GRAVEL (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to medium sand, Nonplastic, Wet)
DS		4	SP-SM*, Asbestos = <1% Layer of gravel to 1" thick
C		5	SP-SM*, Asbestos = <1% Drilling indicates gravel below 9.1 feet.
9.1 ft. W.D.	9.1		Hole caved below 9.1 feet.
DS		6	GP-GM*, Asbestos Not Detected POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)
	12.1		

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

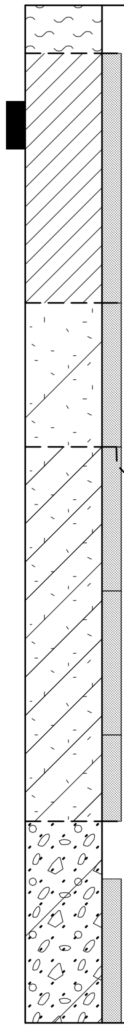
Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA	
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.	
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030	
SCALE: 1"=2'		RM-P-B3	DWG.NO: D-12	

RM-P-B4

N 7,445,361
E 552,732
6/12/04



Sample	No.	Description	Depth
		ORGANIC MAT	0.0
			0.5
		Seasonal Frost 1.0 - 1.5 feet	
C	1	ML*, Asbestos Not Detected	
		SILT (Dk. gray, Plastic, Wet to moist)	
			3.1
DS	2	SP-SM*, Asbestos Not Detected Silt layers to 1" thick	
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry to moist)	4.6
C	3	SM*, Asbestos Not Detected	
		INTERBEDDED SILT, SILTY SAND & SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	
DS	4	ML*, SM* & SP-SM*, Asbestos Not Detected	
C	5	SM*, Asbestos = <1%	
			8.5
		POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	
DS	6	GP-GM*, Asbestos = <1%	
		Hole caved below 9.1 feet.	10.6

8.5 ft. W.D.

DEPTH: 0, 2, 4, 6, 8, 10

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

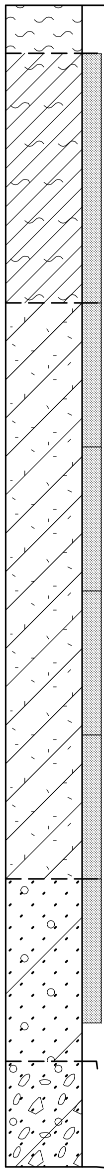
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-B4

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-13

RM-P-B5

N 7,445,243
E 552,632
6/12/04



Sample type	Sample	Depth (ft)	Description
		0.0	ORGANIC MAT
		0.5	SILT W/ORGANICS (Dk. gray, Plastic, Moist)
C	1		ML*, Asbestos Not Detected
		3.1	
DS	2		ML* & SP-SM*, Asbestos Not Detected Beds to 2" thick
C	3		SM*, Asbestos Not Detected
			INTERBEDDED SILT, SILTY SAND AND POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry to wet)
DS	4		ML* & SP-SM*, Asbestos Not Detected
C	5		SM*, Asbestos Not Detected
			Hole caved below 9.1 feet.
		9.1	
DS	6		SP-SM*, Asbestos Not Detected
			POORLY GRADED SAND W/SILT W/GRAVEL LAYERS (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine sand, Rapid dilatancy, Nonplastic, Wet)
		11.0	POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Wet)
		12.1	

6.1 ft. W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12

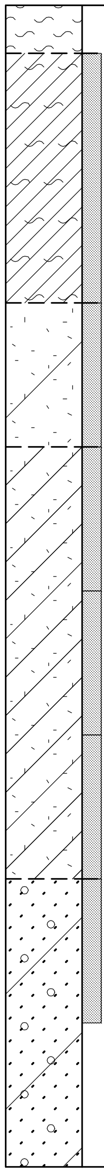
* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB:	NA
CKD: C.H.R.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE: 1"=2'		RM-P-B5	DWG.NO:	D-14

RM-P-B6

N 7,445,128
E 552,509
6/12/04



Sample Type	Sample No.	Description	Depth
			0.0
		ORGANIC MAT	
			0.5
		SILT W/ORGANICS (Dk. gray, Plastic, Moist)	
C	1	ML*, Asbestos Not Detected	
			3.1
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry)	
DS	2	SP-SM*, Asbestos Not Detected	
			4.6
C	3	ML*, Asbestos Not Detected	
		INTERBEDDED SILT, SANDY SILT & POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	
DS	4	ML*, SM* & SP-SM*, Asbestos Not Detected	
C	5	SM*, Asbestos = <1%	
			9.1
		Hole caved below 9.1 feet.	
DS	6	SP-SM*, Asbestos = <1%	
		POORLY GRADED SAND W/SILT (Dk. gray, Occasional piece of gravel, Fine to medium sand, Rapid dilatancy, Nonplastic, Wet)	
			12.1

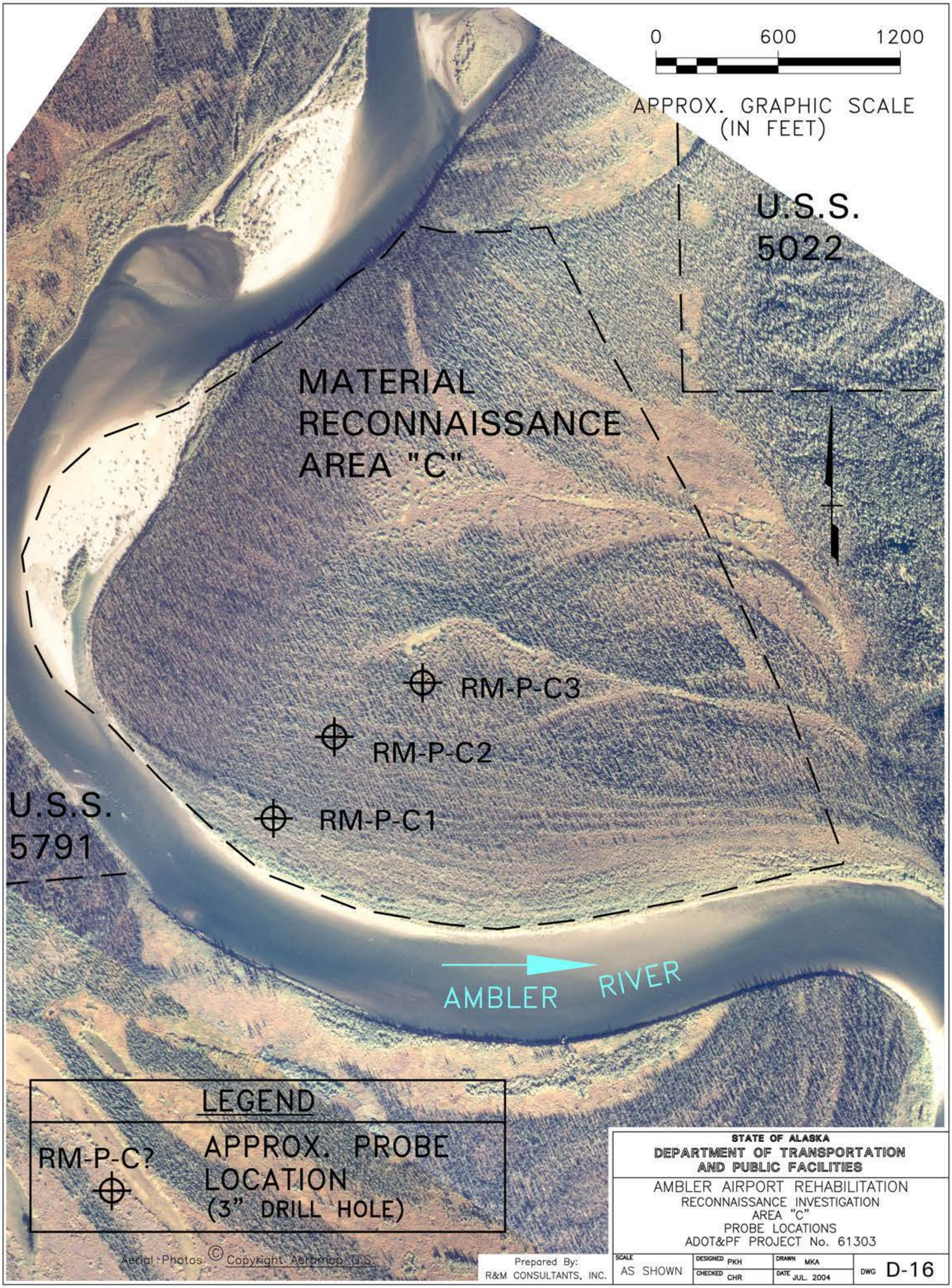
6.1 ft.
W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

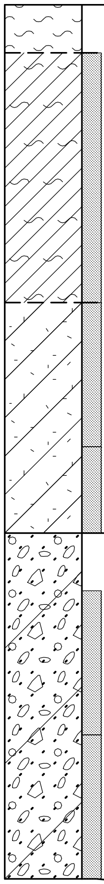
DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030
SCALE: 1"=2'		RM-P-B6	DWG.NO: D-15



project.04\041030_GEO\AMBLER-BASE-C, 1=600, 07/20/04 at 16:30 by mka

RM-P-C1

N 7,446,241
E 552,356
6/10/04



Sample type	Sample	Description	Depth (ft)
		ORGANIC MAT	0.0
		SILT W/ORGANICS (Dk. gray, Nonplastic, Moist)	0.5
C	1	ML*	
			3.1
DS	2	SM*, Asbestos = <1%	
		SILTY SAND GRADING TO POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist)	
C	3	SP*, Pieces of gravel near bottom of sample	
			5.5
		Hole caved below 6 feet.	
DS	4	GP-GM*	
		POORLY GRADED GRAVEL W/SILT AND SAND (Dk. gray, Gravel to 1" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Moist to wet)	
C	5	GP-GM*	
			9.1

8.0 ft.
W.D

DEPTH: 0, 2, 4, 6, 8

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

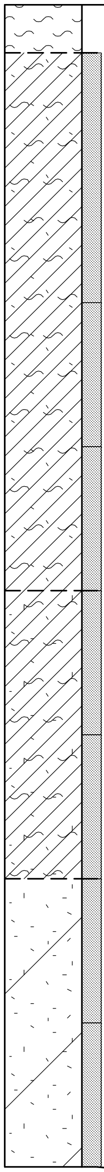
MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA

LOG OF TEST PROBE
RM-P-C1

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-17

RM-P-C2

N 7,446,366
E 552,453
6/10/04



Sample Type	Sample No.	Description	Depth (ft)
			0.0
		ORGANIC MAT	
			0.5
		SILT W/SAND CONTAINING ORGANICS (Dk. gray, Very fine sand, Micaceous, Rapid dilatancy, Nonplastic, Dry)	
C	1	ML*	
DS	2	ML*, Asbestos Not Detected	
C	3	ML*	
			6.1
DS	4	ML* & SM*, Layers to 4" thick	
		INTERBEDDED SILT W/ORGANICS, SILTY SAND AND POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist to wet)	
C (8.5 ft. W.D.)	5	SP-SM*	
		Hole caved below 9.1 feet.	
			9.1
DS	6	SP-SM*, Asbestos Not Detected	
		SAND W/SILT (Dk. gray, Fine to medium sand, Nonplastic, Wet)	
C	7	SP-SM*	
			12.1

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

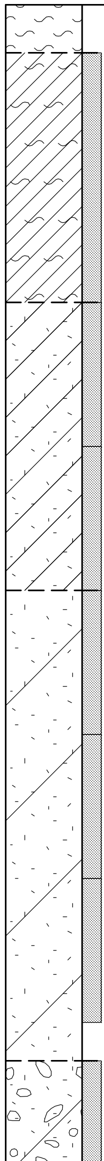
PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-C2

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-18

RM-P-C3

N 7,446,447
E 552,585
6/10/04



Sample type	Sample	Description	Depth (ft)
		ORGANIC MAT	0.0
		SILT (Dk. gray, Nonplastic, Moist)	0.5
C	1	ML*, Asbestos Not Detected	
DS	2	ML*, SM* & SP-SM*	3.1
		INTERBEDDED SILT, SILTY SAND & POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Moist)	
C	3	ML*, SM* & SP-SM*	
DS	4	SP-SM*	6.1
		POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Wet)	
C	5	SP-SM*	
		Hole caved below 9.1 feet.	
DS	6	SP-SM*, Asbestos Not Detected	
C	7	SP-SM*	11.0
		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray, Fine to coarse sand, Nonplastic, Wet)	12.1

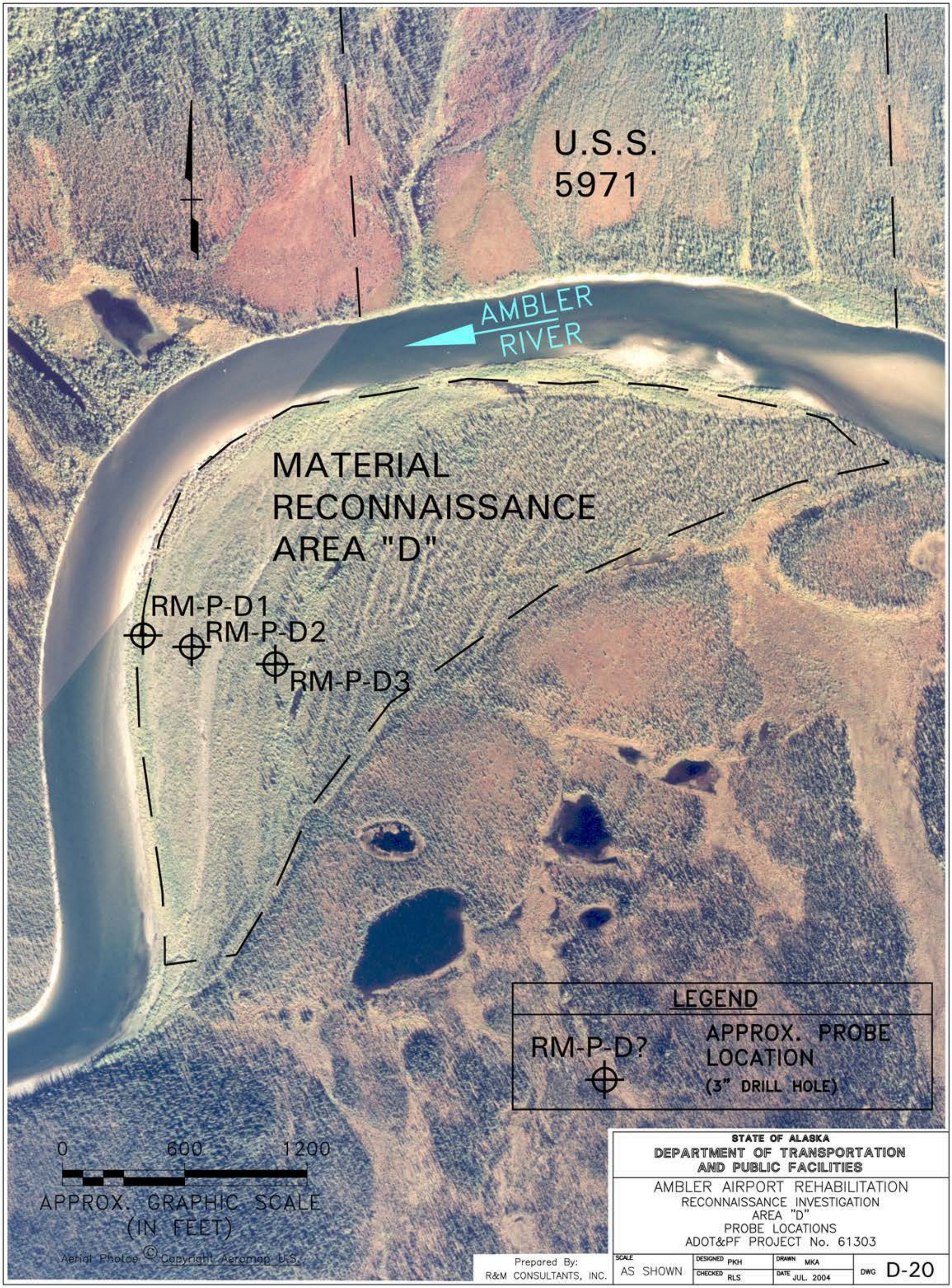
8.0 ft. W.D.

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: JUNE 04		LOG OF TEST PROBE	PROJ.NO: 041030
SCALE: 1"=2'		RM-P-C3	DWG.NO: D-19



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
RECONNAISSANCE INVESTIGATION
AREA "D"
PROBE LOCATIONS
ADOT&PF PROJECT No. 61303

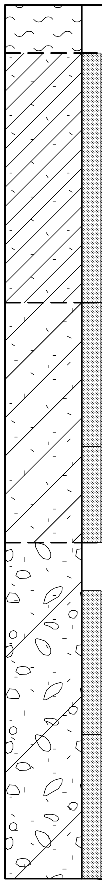
Prepared By: R&M CONSULTANTS, INC.	SCALE AS SHOWN	DESIGNED PKH	DRAWN MKA	DWG D-20
		CHECKED RLS	DATE JUL. 2004	

project.04\041030_GEO\AMBLER-BASE-D, 1=600, 07/20/04 at 16:02 by mka

RM-P-D1

N 7,446,447
E 553,746
6/9/04

DEPTH



Sample Type	Sample	Description	Depth
			0.0
		ORGANIC MAT	
			0.5
		SILT W/ SAND (Dk. gray, Fine sand, Micaceous, Rapid dilatancy, Nonplastic, Moist)	
C	1	ML*	
			3.1
DS	2	SM*	
		SILTY SAND (Dk. gray, Fine to medium sand, Micaceous, Rapid dilatancy, Nonplastic, Moist to wet)	
C	3	SM*	
			5.6
		Hole caved below 6 feet.	
DS	4	SP-SM*, Asbestos Not Detected	
		SAND W/SILT AND GRAVEL (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	
C	5	SP-SM*	
			9.1

5.0 ft.
W.D.

Depth scale: 0, 2, 4, 6, 8

* Estimated Classification

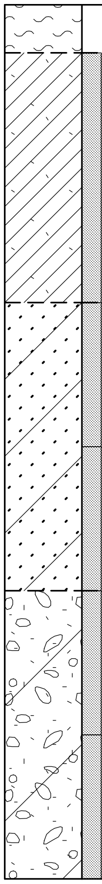
Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB:	NA
CKD:	C.H.R.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE:	1"=2'		RM-P-D1	DWG.NO:	D-21

RM-P-D2

N 7,448,460
E 553,819
6/9/04

DEPTH



Sample type	Sample	Description	Depth
		ORGANIC MAT	0.0
C	1	SILT GRADING TO SILT W/SAND (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry) ML*, Asbestos = <1% Sand increases w/depth	0.5
DS	2	SM*, Asbestos = <1% SILTY SAND (Dk. gray, Fine to medium sand, Slow dilatancy, Nonplastic, Dry)	3.1
C	3	SM*	
DS	4	Hole caved below 6.5 feet. SP-SM* POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	6.1
C	5	SP-SM*	
			9.1

6.5 ft.
W.D

Depth scale: 0, 2, 4, 6, 8

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-D2

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-22

RM-P-D3

N 7,448,434
E 553,944
6/9/04

Sample Type	Sample No.	Description	Depth
			0.0
		ORGANIC MAT	
			0.5
		SILT W/SAND (Dk. gray, Very fine sand, Rapid dilatancy, Nonplastic, Moist)	
C	1	ML*	
DS	2	ML*, Asbestos Not Detected	
C	3	ML*	
			6.1
DS	4	SP-SM*	
		POOLY GRADED SAND W/SILT (Dk. gray, Fine to medium sand, Nonplastic, Moist)	
C	5	SP-SM*	
			9.1
DS	6	SP-SM*, Asbestos Not Detected	
		POORLY GRADED SAND W/SILT AND GRAVEL (Dk. gray, Gravel to 1" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Moist to wet)	
		Hole caved below 10 feet.	
			12.1

DEPTH
0
2
4
6
8
10
12

* Estimated Classification

Groundwater was not observed while drilling.

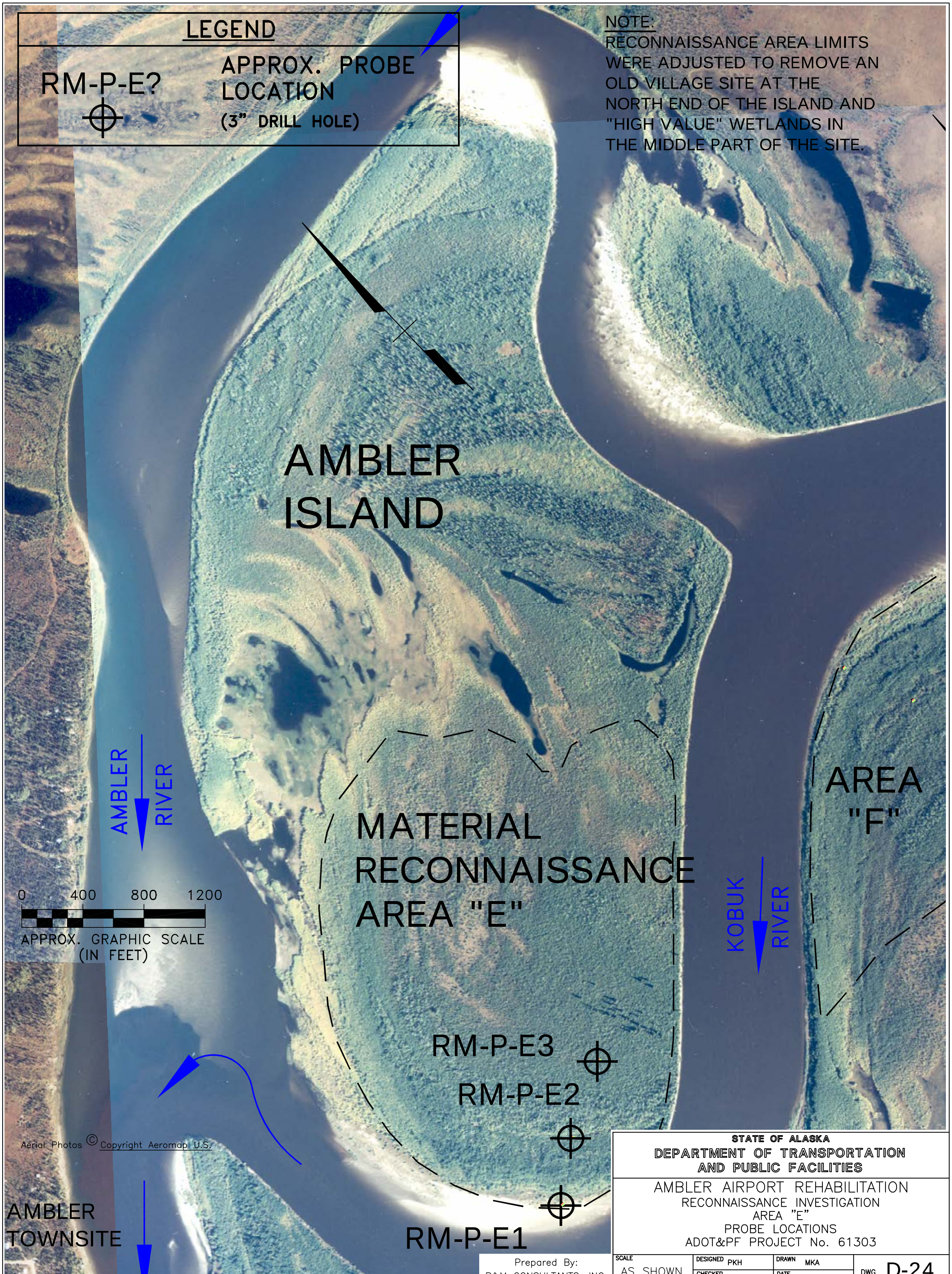
Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-D3

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-23



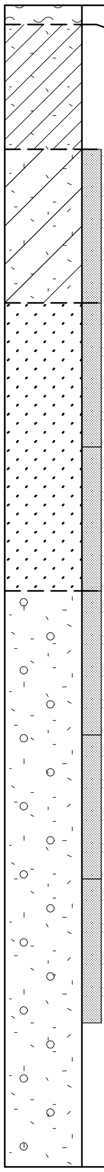
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES						
AMBLER AIRPORT REHABILITATION RECONNAISSANCE INVESTIGATION AREA "E" PROBE LOCATIONS ADOT&PF PROJECT No. 61303						
Prepared By: R&M CONSULTANTS, INC.	SCALE AS SHOWN	DESIGNED PKH	CHECKED RLS	DRAWN MKA	DATE JUL. 2004	DWG D-24

project.04\041030_GEO\AMBLER-BASE-Ea, 1=1000, 07/20/04 at 14:37 by mka

RM-P-E1

N 7,441,081
E 550,745
6/17/04

DEPTH



Sample type	Sample no.	Description	Elevation (ft)	Depth
		ORGANIC MAT	0.0	0
		SILT W/SAND (Dk. gray, Very fine sand, Rapid dilatancy, Nonplastic, Dry)	0.2	
		SILTY SAND (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry)	1.5	
C	1	SM*		2
			3.1	
DS	2	SP*, Occasional pieces of gravel to 1/4" dia.		4
		POORLY GRADED SAND (Dk. gray-brown, Fine sand, Rapid dilatancy, Dry)		
C	3	SP*		
			6.1	6
DS	4	SW*, Asbestos = <1%		
		WELL GRADED SAND (Dk. gray, Occasional gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Moist to wet)		8
C	5	SW*		
		Hole caved below 9 feet.		
DS	6	SW*		10
			12.1	12

8.0 ft.
W.D.

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE AMBLER, ALASKA	FB:	NA
CKD:	C.H.R.			GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE RM-P-E1	PROJ.NO:	041030
SCALE:	1"=2'			DWG.NO:	D-25

RM-P-E2

N 7,441,165
E 550,851
6/17/04

Sample type	Sample	Depth (ft)	Description
		0.0	ORGANIC MAT
		0.2	POORLY GRADED SAND (Dk. gray, Fine to medium sand, Dry)
C	1		SP*
DS	2		SP*, Asbestos Not Detected
C	3		SP*
DS	4		SP*
C	5		SP*
			Hole caved below 9.1 feet.
DS	6		SP*, Asbestos Not Detected
		11.0	POORLY GRADED GRAVEL W/SAND (Dk. gray, Gravel subrounded, hard, Fine to coarse sand, Moist)
		12.1	

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Groundwater was not observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

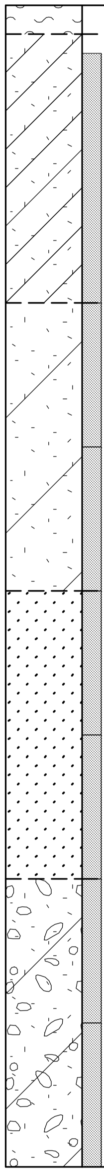
MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-E2

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-26

RM-P-E3

N 7,441,240
E 550,995
6/17/04

DEPTH



Sample type	Sample	Description	Depth
		ORGANIC MAT	0.0
			0.3
		SILTY SAND (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry)	
C	1	SM*	
			3.1
DS	2	SP*, Asbestos = <1%	
		POORLY GRADED SAND TO SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry)	
C	3	SP-SM*	
			6.1
DS	4	SP*, Asbestos = <1%	
		POORLY GRADED SAND (Dk. gray-brown, Fine to medium sand, Dry)	
C	5	SP*	
		Hole caved below 9.1 feet.	
			9.1
DS	6	SP*, Gravel layer to 6" thick	
		POORLY GRADED SAND W/GRAVEL LAYERS (Dk. gray, Gravel to 3/4" dia., subrounded, hard, Fine to coarse sand, Dry)	
C	7	SP*	
			12.1

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Groundwater was not observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

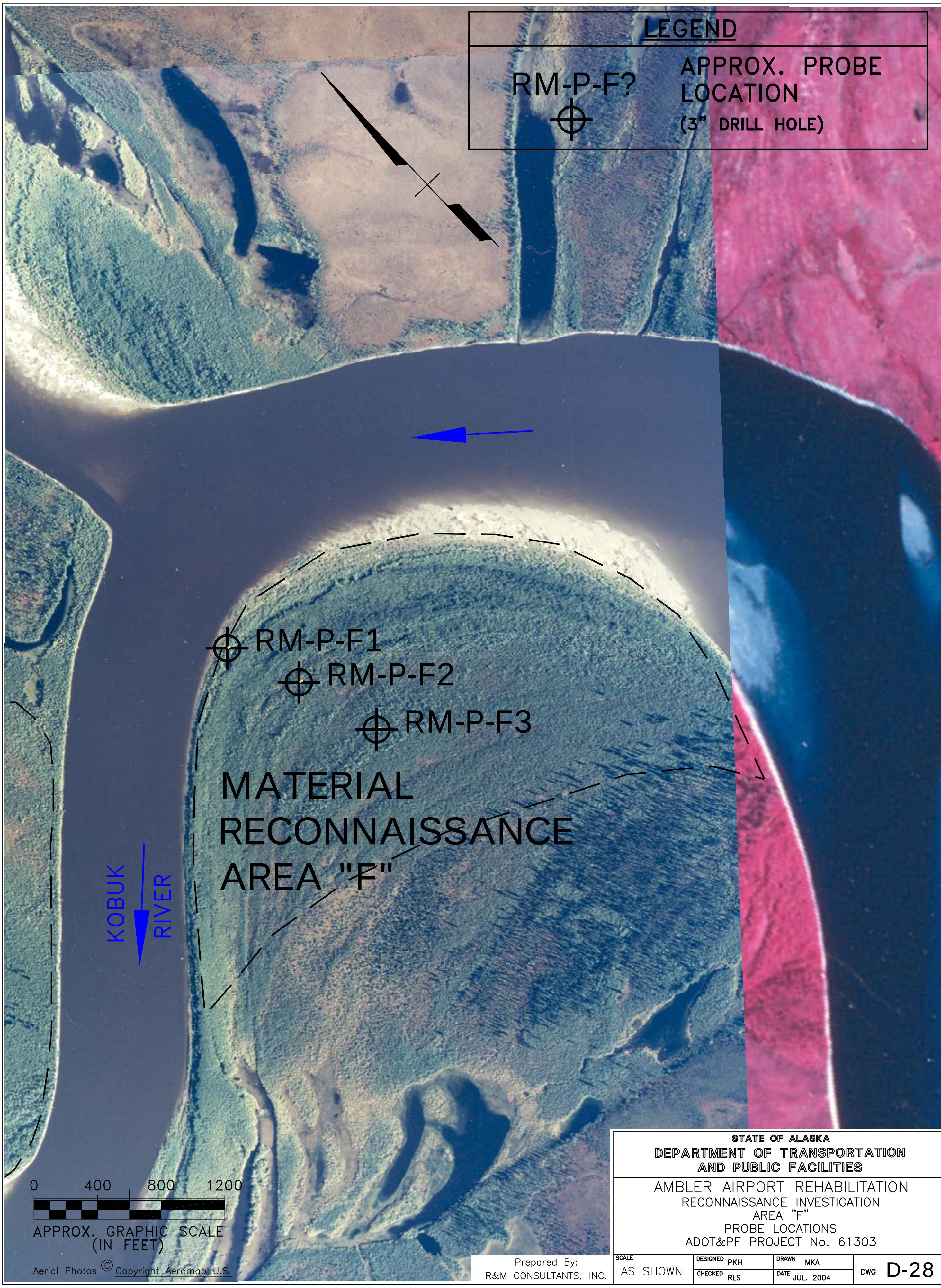
MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-E3

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-27



Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

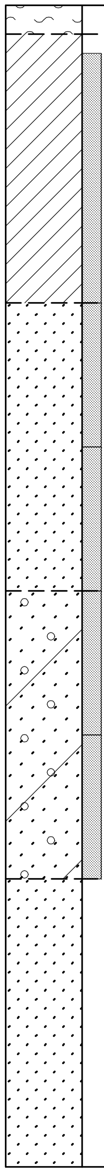
AMBLER AIRPORT REHABILITATION
RECONNAISSANCE INVESTIGATION
AREA "F"
PROBE LOCATIONS
ADOT&PF PROJECT No. 61303

SCALE	DESIGNED	DRAWN	DWG
AS SHOWN	PKH	MKA	D-28
	CHECKED RLS	DATE JUL. 2004	

project.04\041030_GEO\AMBLER-BASE-F, 1=1000, 07/20/04 at 14:33 by mka

RM-P-F1

N 7,441,473
E 551,888
6/15/04



DEPTH

Sample type	Sample	Description	Depth (ft)
		ORGANIC MAT	0.0
		SILT (Dk. gray, Micaceous, Rapid dilatancy, Dry)	0.3
C	1	ML*, Asbestos Not Detected	
			3.1
DS	2	SP*	
		POORLY GRADED SAND (Dk. gray, Fine sand, Rapid dilatancy, Dry to wet)	
C	3	SP*	
		Hole caved below 6.1 feet.	6.1
DS	4	SW-SM*, Asbestos Not Detected	
		WELL TO POORLY GRADED SAND W/SILT TO SAND (Dk. gray, Gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Nonplastic, Wet)	
C	5	SP*	
			9.1
		POORLY GRADED SAND (Dk. gray, Fine sand, Rapid dilatancy, Wet)	
			12.1

5.5 ft. W.D.

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

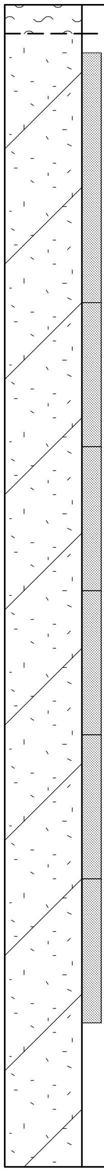
Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB:	NA
CKD:	C.H.R.		AMBLER, ALASKA	GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE:	1"=2'		RM-P-F1	DWG.NO:	D-29

RM-P-F2

N 7,441,331
E 551,943
6/15/04



Sample Type	Sample No.	Description	Depth
		ORGANIC MAT	0.0
		POORLY GRADED SAND W/SILT LAYERS (Dk. gray-brown grading to dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry to moist)	0.3
C	1	SP*	
DS	2	SP*, Asbestos = <1%	
C	3	SP-SM*	
DS	4	SP* & ML*, Silt layers to 4" thick	
C	5	SP-SM*	
		Hole caved below 9 feet.	
DS	6	SP* & ML*, Asbestos Not Detected Silt layers to 1" thick	
			12.1

DEPTH: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

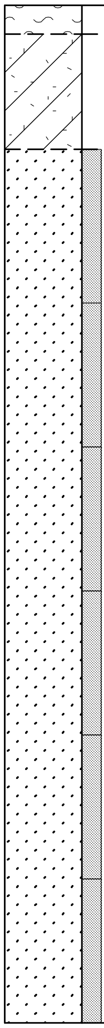
Groundwater was not observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE AMBLER, ALASKA	FB:	NA
CKD:	C.H.R.			GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE RM-P-F2	PROJ.NO:	041030
SCALE:	1"=2'			DWG.NO:	D-30

RM-P-F3

N 7,441,163
E 551,989
6/15/04



Sample type	Sample	Description	Depth (ft)
		ORGANIC MAT	0.0
		SILT (Dk. gray, Rapid dilatancy, Nonplastic, Moist)	0.3
			1.5
C	1	SP*	
		SAND (Dk. gray-brown, Fine sand, Rapid dilatancy, Dry to wet)	
DS	2	SP*, Asbestos Not Detected	
C	3	SP*	
DS	4	SP*	
C	5	SP*	
		Hole caved below 9.1 feet.	
DS	6	SP*	
			10.6

DEPTH: 0, 2, 4, 6, 8, 10

* Estimated Classification

Groundwater was not observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

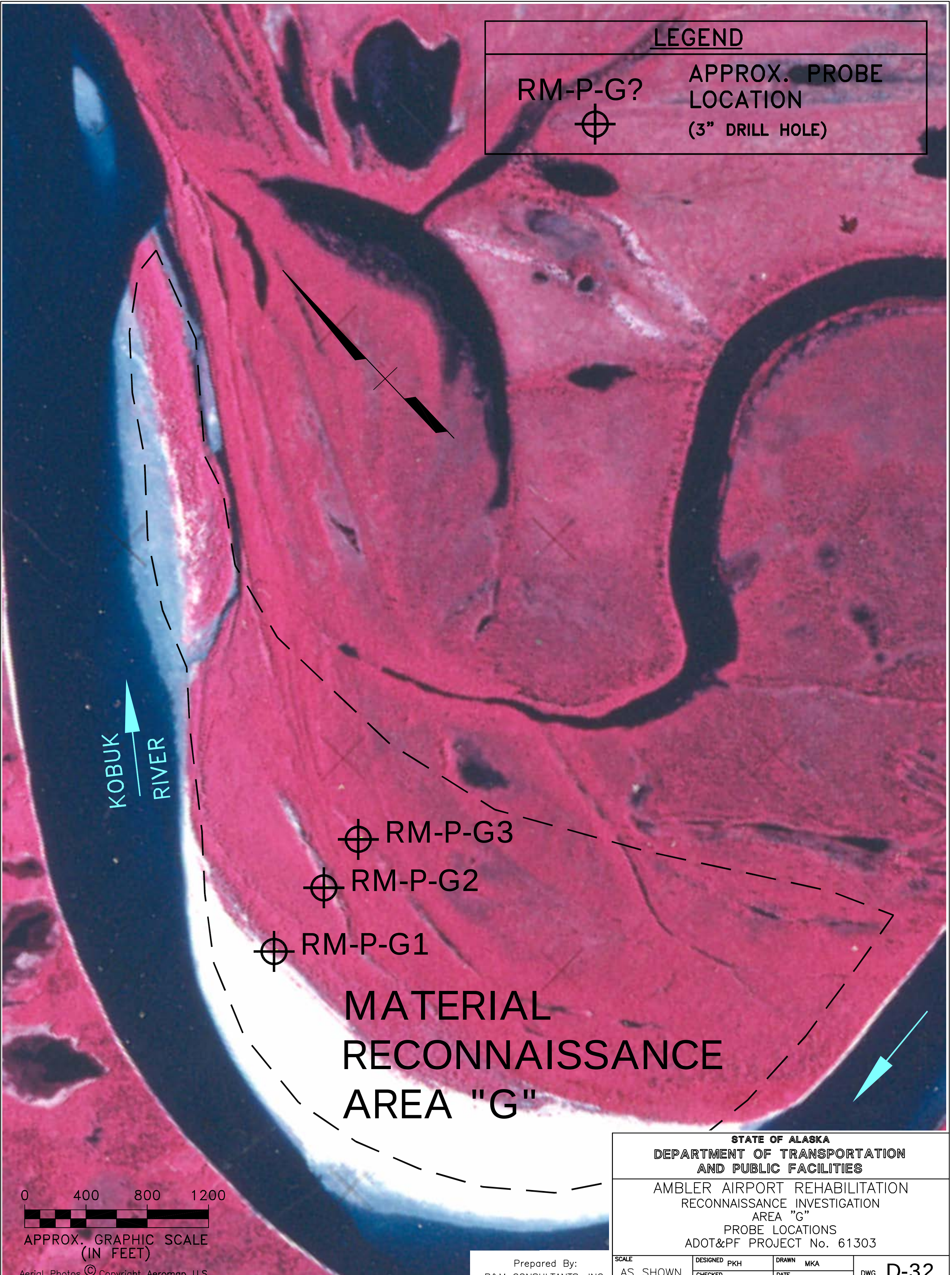
MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-F3

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-31



Prepared By:
R&M CONSULTANTS, INC.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

AMBLER AIRPORT REHABILITATION
RECONNAISSANCE INVESTIGATION
AREA "G"
PROBE LOCATIONS
ADOT&PF PROJECT No. 61303

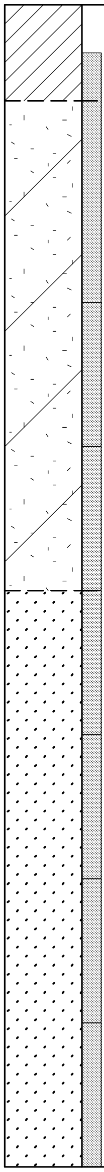
SCALE	DESIGNED	DRAWN	DWG
AS SHOWN	PKH	MKA	D-32
	CHECKED RLS	DATE JUL. 2004	

project.04\041030_GEO\AMBLER-BASE-G, 1=1000, 07/20/04 at 14:40 by mka

RM-P-G1

N 7,439,230
E 552,049
6/16/04

DEPTH



Depth (ft)	Sample type	Sample no.	Description
0.0			SILT (Dk. gray, Micaceous, Rapid dilatancy, Nonplastic, Dry)
1.0	C	1	SP-SM*
			POORLY GRADED SAND W/SILT (Dk. gray, Fine sand, Rapid dilatancy, Nonplastic, Dry)
	DS	2	SP-SM*, Asbestos Not Detected
	C	3	SP-SM*
6.1	DS	4	SW*, Asbestos Not Detected
			WELL GRADED SAND (Dk. gray, Fine to coarse sand, Moist to wet)
	C	5	SW*
			Hole caved below 9.1 feet.
	DS	6	SW*
	C	7	SW*
12.1			

6.0 ft.
W.D.

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE AMBLER, ALASKA	FB:	NA
CKD:	C.H.R.			GRID:	AMBLER R.
DATE:	JUNE 04		LOG OF TEST PROBE	PROJ.NO:	041030
SCALE:	1"=2'		RM-P-G1	DWG.NO:	D-33

RM-P-G2

N 7,439,254
E 552,208
6/16/04

Sample	No.	Description	Depth (ft)
			0.0
		ORGANIC MAT	
			0.5
		SILT (Dk. gray, Micaceous, Rapid dilatancy, Nonplastic, Dry)	
			1.5
		POORLY GRADED SAND (Dk. brown, Fine sand, Rapid dilatancy, Moist)	
C	1	SP*	
			3.1
DS	2	SW*, Asbestos Not Detected	
		WELL GRADED SAND (Dk. gray-brown grading to dk. gray, Fine to coarse sand, Moist to wet)	
C	3	SW*	
DS	4	SW*, Asbestos = <1%	
C	5	SW*	
		Hole caved below 9.1 feet. Sand heaving.	
DS	6	SW*	
C	7	SW*	
			12.1

6.0 ft.
W.D.

DEPTH
0
2
4
6
8
10
12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUNE 04
SCALE:	1"=2'

PREPARED BY: R&M CONSULTANTS, INC.

MATERIAL SITE RECONNAISSANCE
AMBLER, ALASKA
LOG OF TEST PROBE
RM-P-G2

FB:	NA
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	D-34

RM-P-G3

N 7,439,277
E 552,324
6/16/04

DEPTH

0.0 — ORGANIC MAT

0.5 — SILT (Dk. gray, Micaceous, Rapid dilatancy, Nonplastic, Moist)

1.5 ft. W.D.

1.5 — POORLY GRADED SAND (Dk. gray, Fine sand, Rapid dilatancy, Wet)

C (1) SP*

3.1

DS (2) SW*, Asbestos = <1%

WELL GRADED SAND (Dk. gray, Gravel to 1/2" dia., subrounded, hard, Fine to coarse sand, Wet)

C (3) SW*

Hole caved below 6 feet.

DS (4) SW*

9.1 — POORLY GRADED SAND (Dk. gray, Fine sand, Wet)

12.1

Depth scale: 0, 2, 4, 6, 8, 10, 12

* Estimated Classification

Coordinates are in UTM UPS Zone 4W (meters), WGS 84 map datum.

Z:\PROJECT.04\041030\LOGS\AMBLER1.GPJ

MASTER ONE COL/PAGE AMBLER1.GPJ MASTER2.GDT 6/25/04

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE RECONNAISSANCE	FB: NA	
CKD: C.H.R.		AMBLER, ALASKA	GRID: AMBLER R.	
DATE: JUNE 04		LOG OF TEST PROBES	PROJ.NO: 041030	
SCALE: 1"=2'		RM-P-G3	DWG.NO: D-35	

APPENDIX E

LABORATORY TEST DATA (ASBESTOS)

ANALYTICA SOLUTIONS

12189 Pennsylvania Street
Thornton, Colorado 80241

POLARIZED LIGHT MICROSCOPY (PLM)
BULK SAMPLE ANALYSIS PROCEDURES

Bulk samples of construction materials are analyzed by a professional mineralogist with a minimum of a Bachelor's Degree in Geology using the July 1993, EPA Test Method, (EPA/600/R-93/116), "Method for the Determination of Asbestos in Bulk Building Materials"[1]. Samples are prepared and analyzed in different Cargille® certified refractive index oils. Estimates of asbestos content are based on visual comparisons using a calibrated graticule. Additional tests and treatments (see below) may also be required for certain samples.

Analytica is accredited by the National Institute of Standards and Technology (Lab Code #101086) under the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos analysis. Analytica participates in the NVLAP bulk asbestos proficiency testing program *(results available upon request)*. An in-house QA/QC program is maintained on a daily basis that requires, at a minimum, 10% of samples submitted to be re-analyzed and logged into a quality control tracking system. Analytica participates in two round robin QA/QC programs annually with accredited laboratories throughout the United States. Unused portions of samples are archived for six months, then disposed of or returned to the client.

ASHING

Ashing is a procedure in which one half of the sample is placed in a crucible and then set in a furnace at 500° C for one hour or more. Most non-silicate interferants are eliminated, leaving only asbestos undisturbed. The amount of ashed material is compared to the original amount to determine the volume percent lost due to ashing. The sample is then analyzed by PLM for the type and amount of asbestos present. The results shown on the final report are the percentage of asbestos in the original material, not the ashed material, i.e. if 50% of the original material is lost due to ashing and the ashed sample contains 10% asbestos, then the final report would show 5% asbestos in the original material.

POINT COUNTING

As of November 20, 1990, the National Emission Standards for Hazardous Air Pollutants (NESHAP) established rules requiring that friable ACM bulk samples with less than 10% asbestos be analyzed by the point count procedures described in the EPA-600/R-93/116 test method. Analytica does have experienced analysts to perform point counts if needed. **Analytica Solutions, Inc. cannot determine bulk sample friability and cannot assume responsibility for client compliance with the NESHAP rule.**

(1) In January 1994, a NESHAP clarification was issued regarding analysis of multi-layered samples. This clarification requires all layers of a sample must be analyzed and reported separately. On August 1, 1994, EPA issued a notice of advisory adopting a new AHERA policy consistent with the NESHAP policy. When reviewing an Analytica Solutions PLM analysis report, do not use the composite result for the determination of positive (> 1%) ACM. Determination of ACM should be made strictly from the individual layers of each sample.

(2) On August 10, 1994, OSHA ruled that to demonstrate that Potential Asbestos Containing Material (PACM) does not contain asbestos, tests shall include analysis of 3 bulk samples of each homogeneous area of the PACM collected in a randomly distributed manner.

(3) This test report relates only to items tested.

(4) NVLAP policy requires that this report may not be reproduced except in full, without the written approval of the laboratory.

(5) NVLAP policy requires that this report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government.

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Fax: (303) 469-5254

ANALYTICA SOLUTIONS
an Analytica Group Company

RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348364**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-A1 (6)	06/13/2004	9.1 to 10.6 feet [grey sand/gravel]
RM-P-A3 (2)	06/13/2004	3.1 to 4.6 feet [brown soil]
RM-P-A4 (2)	06/14/2004	3.1 to 4.6 feet [brown/grey soil]
RM-P-A5 (6)	06/14/2004	9.1 to 10.6 feet [grey sand/gravel]
RM-P-A6 (4)	06/14/2004	6.1 to 7.6 feet [brown soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-A1 (6)	RM-P-A3 (2)	RM-P-A4 (2)	RM-P-A5 (6)	RM-P-A6 (4)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%			1.0	Trace <1%
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	ND	ND	1.0	Trace <1%
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	Trace <1%	1.0	3.0	Trace <1%	1.0
Synthetics					
Other:					
Percent Nonfibrous Material	99.0	99.0	97.0	98.5	98.5

Analyst: Nikki MacDonald
Nikki MacDonald

Date: 06/25/2004

DRAWING E-02

NVLAP LAB CODE 101086-0

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348364**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-B1 (1)	06/11/2004	0.5 to 3.1 feet [brown soil]
RM-P-B2 (2)	06/11/2004	3.1 to 4.6 feet [grey sand]
RM-P-B2 (4)	06/11/2004	6.1 to 7.6 feet [grey sand]
RM-P-B3 (2)	06/11/2004	3.1 to 4.6 feet [grey sand]
RM-P-B3 (6)	06/11/2004	9.1 to 10.6 feet [grey sand]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B1 (1)	RM-P-B2 (2)	RM-P-B2 (4)	RM-P-B3 (2)	RM-P-B3 (6)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile					
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	ND	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	2.0	Trace <1%	Trace <1%	1.0	Trace <1%
Synthetics					
Other:					
Percent Nonfibrous Material	98.0	99.5	99.5	99.0	99.5

Analyst: Douglas Kent Date: 06/25/2004

DRAWING E-03

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NVLAP LAB CODE 101086-0

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.**

LGN: **348365**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-B4 (2)	06/12/2004	3.1 to 4.6 feet [gray soil]
RM-P-B4 (4)	06/12/2004	6.1 to 7.6 feet [gray soil]
RM-P-B5 (2)	06/12/2004	3.1 to 4.6 feet [gray soil]
RM-P-B5 (6)	06/12/2004	9.1 to 10.6 feet [gray soil]
RM-P-B6 (4)	06/12/2004	6.1 to 7.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B4 (2)	RM-P-B4 (4)	RM-P-B5 (2)	RM-P-B5 (6)	RM-P-B6 (4)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile					
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	ND	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	100	100	100	100

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 06/26/2004

DRAWING E-04

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an Analytica Group Company

RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: R & M Consultants, Inc. LGN: 348425

Project ID: 041030, Ambler Material Site

Sample Description:

Sample Number	Sample Date	Description
RM-P-B1 (2)	06/11/2004	3.1 - 4.6 feet [gray soil]
RM-P-B1 (3)	06/11/2004	4.6 - 6.1 feet [gray soil]
RM-P-B1 (4)	06/11/2004	6.1 - 7.6 feet [gray soil]
RM-P-B1 (5)	06/11/2004	7.6 - 9.1 feet [gray soil]
RM-P-B2 (1)	06/11/2004	0.5 - 3.1 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B1 (2)	RM-P-B1 (3)	RM-P-B1 (4)	RM-P-B1 (5)	RM-P-B2 (1)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%		Trace <1%	Trace <1%	
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	ND	Trace <1%	Trace <1%	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.9	100	99.9	99.9	100

Analyst: Bruce G. Sales Date: 07/02/2004

DRAWING E-05

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348425**

Project ID: **041030, Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-B2 (3)	06/11/2004	4.6 - 6.1 feet [gray soil]
RM-P-B2 (5)	06/11/2004	7.6 - 9.1 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B2 (3)	RM-P-B2 (5)			
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile					
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND			
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	100			

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 07/02/2004

DRAWING E-06

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: R & M Consultants, Inc. LGN: 348426

Project ID: 041030, Ambler Material Site

Sample Description:

Sample Number	Sample Date	Description
RM-P-B3 (1)	06/11/2004	0.5 - 3.1 feet [gray soil]
RM-P-B3 (3)	06/11/2004	4.6 - 6.1 feet [gray soil]
RM-P-B3 (4)	06/11/2004	6.1 - 7.6 feet [gray soil]
RM-P-B3 (5)	06/11/2004	7.6 - 9.1 feet [gray soil]
RM-P-B4 (1)	06/12/2004	0.5 - 3.1 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B3 (1)	RM-P-B3 (3)	RM-P-B3 (4)	RM-P-B3 (5)	RM-P-B4 (1)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%	Trace <1%	Trace <1%	Trace <1%	
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	Trace <1%	Trace <1%	Trace <1%	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.9	99.9	99.9	99.9	100

Analyst: Bruce G. Sales

Bruce G. Sales

Date: 07/02/2004

DRAWING E-07

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348426**

Project ID: **041030, Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-B4 (3)	06/12/2004	4.6 - 6.1 feet [gray soil]
RM-P-B4 (5)	06/12/2004	7.6 - 8.5 feet [gray soil]
RM-P-B4 (6)	06/12/2004	9.1 - 10.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B4 (3)	RM-P-B4 (5)	RM-P-B4 (6)		
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile		Trace <1%	Trace <1%		
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	Trace <1%	Trace <1%		
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	99.9	99.9		

Analyst: Bruce G. Sales Date: 07/02/2004
Bruce G. Sales

DRAWING E-08

NVLAP
NVLAP LAB CODE 101086-0

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348427**

Project ID: **041030, Ambler Material Site** Page: 1 of 2

Sample Description:

Sample Number	Sample Date	Description
RM-P-B5 (1)	06/12/2004	0.5 - 3.1 feet [gray soil]
RM-P-B5 (3)	06/12/2004	4.6 - 6.1 feet [gray soil]
RM-P-B5 (4)	06/12/2004	6.1 - 7.6 feet [gray soil]
RM-P-B5 (5)	06/12/2004	7.6 - 9.1 feet [gray soil]
RM-P-B6 (1)	06/12/2004	0.5 - 3.1 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B5 (1)	RM-P-B5 (3)	RM-P-B5 (4)	RM-P-B5 (5)	RM-P-B6 (1)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile					
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	ND	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	100	100	100	100

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 07/02/2004

DRAWING E-09

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: R & M Consultants, Inc. LGN: 348427

Project ID: 041030, Ambler Material Site

Sample Description:

Sample Number	Sample Date	Description
RM-P-B6 (2)	06/12/2004	3.1 - 4.6 feet [gray soil]
RM-P-B6 (3)	06/12/2004	4.6 - 6.1 feet [gray soil]
RM-P-B6 (5)	06/12/2004	7.6 - 9.1 feet [gray soil]
RM-P-B6 (6)	06/12/2004	9.1 - 10.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-B6 (2)	RM-P-B6 (3)	RM-P-B6 (5)	RM-P-B6 (6)	
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile			Trace <1%	Trace <1%	
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	Trace <1%	Trace <1%	
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	100	99.9	99.9	

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 07/02/2004

DRAWING E-10

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ANALYTICA SOLUTIONS
an Analytica Group Company

RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: R & M Consultants, Inc. LGN: 348365

Project ID: Ambler Material Site

Sample Description:

Sample Number	Sample Date	Description
RM-P-C1 (2)	06/10/2004	3.1 to 4.6 feet [gray soil]
RM-P-C2 (2)	06/10/2004	3.1 to 4.6 feet [gray soil]
RM-P-C2 (6)	06/10/2004	9.1 to 10.6 feet [gray soil]
RM-P-C3 (1)	06/10/2004	0.5 to 3.1 feet [gray soil]
RM-P-C3 (6)	06/10/2004	9.1 to 10.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-C1 (2)	RM-P-C2 (2)	RM-P-C2 (6)	RM-P-C3 (1)	RM-P-C3 (6)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%				
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	ND	ND	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.9	100	100	100	100

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 06/26/2004

DRAWING E-11

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348366**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-D1 (4)	06/09/2004	6.1 - 7.6 feet [gray soil]
RM-P-D2 (1)	06/09/2004	0.5 - 3.1 feet [gray soil]
RM-P-D2 (2)	06/09/2004	3.1 - 5.1 feet [gray soil]
RM-P-D3 (2)	06/09/2004	3.1 - 4.6 feet [gray soil]
RM-P-D3 (6)	06/09/2004	9.1 - 10.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-D1 (4)	RM-P-D2 (1)	RM-P-D2 (2)	RM-P-D3 (2)	RM-P-D3 (6)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile		Trace <1%	Trace <1%		
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	Trace <1%	Trace <1%	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	100	99.9	99.9	100	100

Analyst: [signature]
Bruce G. Sales

Date: 06/27/2004

DRAWING E-12

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: R & M Consultants, Inc.

LGN: 348366

Project ID: Ambler Material Site

Sample Description:

Sample Number	Sample Date	Description
RM-P-E1 (4)	06/17/2004	6.1 - 7.6 feet [gray soil]
RM-P-E2 (2)	06/17/2004	3.1 - 4.6 feet [gray soil]
RM-P-E2 (6)	06/17/2004	9.1 - 10.6 feet [gray soil]
RM-P-E3 (2)	06/17/2004	3.1 - 4.6 feet [gray soil]
RM-P-E3 (4)	06/17/2004	6.1 - 7.6 feet [gray soil]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-E1 (4)	RM-P-E2 (2)	RM-P-E2 (6)	RM-P-E3 (2)	RM-P-E3 (4)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%			Trace <1%	Trace <1%
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	ND	ND	Trace <1%	Trace <1%
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.9	100	100	99.9	99.9

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 06/27/2004

DRAWING E-13

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348363**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-F1 (1)	06/15/2004	0.3 - 3.1 feet [brown soil]
RM-P-F1 (4)	06/15/2004	6.1 - 7.6 feet [gray sand]
RM-P-F2 (2)	06/15/2004	3.1 - 4.6 feet [gray sand]
RM-P-F2 (6)	06/15/2004	9.1 - 10.6 feet [gray sand]
RM-P-F3 (2)	06/15/2004	3.1 - 4.6 feet [gray sand]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-F1 (1)	RM-P-F1 (4)	RM-P-F2 (2)	RM-P-F2 (6)	RM-P-F3 (2)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile			Trace <1%		
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	Trace <1%	ND	ND
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	1.0	Trace <1%	Trace <1%	Trace <1%	Trace <1%
Synthetics					
Other:					
Percent Nonfibrous Material	99.0	99.5	99.0	99.5	99.5

Analyst: Nikki MacDonald
Nikki MacDonald

Date: 06/24/2004

DRAWING E-14

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **348363**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-P-G1 (2)	06/16/2004	3.1 - 4.6 feet [gray sand]
RM-P-G1 (4)	06/16/2004	6.1 - 7.6 feet [gray sand]
RM-P-G2 (2)	06/16/2004	3.1 - 4.6 feet [gray sand]
RM-P-G2 (4)	06/16/2004	6.1 - 7.6 feet [gray sand]
RM-P-G3 (2)	06/16/2004	3.1 - 4.6 feet [gray sand]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-P-G1 (2)	RM-P-G1 (4)	RM-P-G2 (2)	RM-P-G2 (4)	RM-P-G3 (2)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile				Trace <1%	Trace <1%
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	ND	ND	ND	Trace <1%	Trace <1%
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	Trace <1%	2.0	Trace <1%	Trace <1%	Trace <1%
Synthetics					
Other:					
Percent Nonfibrous Material	99.5	98.0	99.5	99.0	99.8

Analyst: Douglas Kent / Michael K. Scales Date: 06/24/2004

DRAWING E-15

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **349392**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-02 (3)	/ /	[gray sandy/silty gravel]
RM-07 (2)	/ /	[gray sandy/silty gravel]
RM-11 (3)	/ /	[gray sandy/silty gravel]
RM-15 (3)	/ /	[gray sandy/silty gravel]
RM-18 (3)	/ /	[gray sandy/silty gravel]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-02 (3)	RM-07 (2)	RM-11 (3)	RM-15 (3)	RM-18 (3)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%	Trace <1%	Trace <1%	Trace <1%	Trace <1%
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	Trace <1%	Trace <1%	Trace <1%	Trace <1%
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.5	99.5	99.5	99.5	99.5

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 12/01/2004

DRAWING E-16

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RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **349392**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-22 (3)	/ /	[gray sandy/silty gravel]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-22 (3)				
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%				
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%				
Other Fibrous Materials:					
Fibrous Glass					
Cellulose					
Synthetics					
Other:					
Percent Nonfibrous Material	99.5				

Analyst: Bruce G. Sales
Bruce G. Sales

Date: 12/01/2004

DRAWING E-17

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APPENDIX F

ASBESTOS SAFETY REGULATIONS

Environmental Management Incorporated. *Letter* to R&M Consultants, Inc., dated 14 April 2004

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

April 14, 2004

Robert L. Scher, P.E.
R&M Consultants, Inc.
9101 Vanguard Drive
Anchorage, AK 99507

Dear Mr. Scher:

Environmental Management, Inc. has reviewed the federal & state safety regulations relating to the use and handling of asbestos. We have not been able to find any regulations directly applicable to your exploration project that specifically address asbestos. However, the enclosed summary of related regulations present prudent guidelines for you to follow. Mining operations, to include exploration for mine site, is regulated under the Mine Safety and Health Agency (MSHA).

We have also enclosed material related to some proposed regulations in California specifically relating to using soils which contain asbestos. This is the most current directly related information we have been able to find.

Cathy Hummel, one of our industrial hygienists did the research in this area and is available to discuss it in more detail if you have any questions.

Sincerely
Environmental Management, Inc.

Larry Helgeson

Larry Helgeson, P.E.
V.P Consulting

Encl: 1. Summary of Federal and State Safety Regulations…
2. Title 17. California Air Resources Board

SUMMARY OF FEDERAL AND STATE SAFETY REGULATIONS APPLICABLE TO EXPLORATION IN AREAS WITH NATURALLY OCCURRING ASBESTOS BEARING MINERALS

Alaska and Federal Occupational Safety and Health agencies (OSHA) regulate asbestos in construction and general industry; The Mine Safety and Health agency (MSHA) regulates asbestos exposure on mine sites. The Environmental Protection Agency (EPA) regulates emissions of asbestos to outdoor air and the Alaska Dept. of Environmental Conservation regulates particulate sources that impact ambient air quality.

The safety and health standards indirectly applicable to mineral exploration activities in asbestos bearing materials are found in 30 CFR Mine Safety and Health standards. Although R & M Consultants is typically an OSHA regulated employer, when operating on a mine site, compliance with MSHA standards is necessary to protect the mine operators and vice-versa.

Each agency has addressed asbestos hazards in a specific manner (OSHA abatement activity standards) or indirectly (MSHA exposure limits). MSHA requirements mirror OSHA requirements with respect to hazard communication programs, awareness training, and established permissible exposure limits. Both organizations specify the use of engineering controls, work practices and personal protective equipment for asbestos exposure control. However, MSHA and OSHA have various discrepancies within these standards pertinent to independent consulting activities on mine sites.

Prudence would dictate that independent contractors adopt and meet the more stringent agency's standards while performing geologic surveys at a future mine site.

The operation of an auger drill should not generate excessive dusts if proper work practices are employed (keep area wet). Laboratory activities that do generate dusty atmospheres should be ventilated and good housekeeping observed. This should sufficiently prevent exposures to asbestos when performing analytical tasks in asbestos bearing materials.

With respect to EPA's disposal requirements for asbestos waste, all regulations are specific to asbestos containing wastes that are, or, have become friable and are a hazardous air pollutant. This does not pertain to naturally occurring rocks containing asbestos unless they are tailings from an asbestos mining operation or ACM debris resulting from asbestos removal activities.

If friable asbestos debris is collected and is in excess of 1% asbestos it should be disposed of in an approved landfill that accepts Asbestos Containing Material. In that event, landfill policies would be followed to ensure compliance with the EPA NESHAP.

Employee Safety Training & Information Programs

A hazard communication program which meets the requirements of 29 CFR 1910.1200 will also meet the requirements of 30 CFR 48 once site specific hazards are included, specifically asbestos.

While raw materials, samples and ore do not require hazard communication labels, procedures for tracking samples should indicate that asbestos is or may be present in the sample. Material Safety Data Sheets for asbestos must be available and employees must receive training to include health hazards, control methods and safe handling methods.

Alaska State OSH requires the inclusion of physical agents in a hazard communication program: noise, heat stress, cold stress, hand/arm vibration, UV light, microwaves, lasers, and radiation.

Asbestos training required by OSHA 29 CFR 1926.1001 "Asbestos in Construction" mandates 2 hours of Asbestos Awareness training. This 2-hour Awareness Training would satisfy the requirement of MSHA, in 30 CFR Part 46, for the training of independent contractors' employees, thereby meeting the hazard communication training requirements of both MSHA and OSHA.

Asbestos Exposure Limits

The OSHA 8 hr time-weighted average exposure limit for asbestos of 0.1 f/cc is far more protective than the level set by MSHA (2.0 f/cc). MSHA is currently proposing adoption of the OSHA exposure limits, although it is not final at this time. By following a few simple guidelines, asbestos exposure is not likely to approach the OSHA level while performing soils exploration operations. If abrasion testing yields significant degradation of asbestos bearing materials, implementation of stringent dust-control measures such as wet methods, process isolation, and local HEPA exhaust filtration would be necessary.

Safety Guidelines

These guidelines are intended to eliminate or reduce the potential for employee exposure to asbestos while performing soils classification and exploration operations in asbestos bearing materials.

Employees familiar with the equipment and analytic techniques used in their operations should use best available practices to reduce their exposure to potentially harmful agents and follow these guidelines for personal hygiene, decontamination and exposure control. The following general guidelines should be followed in all cases:

- Where employees handle asbestos bearing minerals, hand cleaning facilities must be available for use prior to eating, drinking, smoking, applying cosmetics (bug dope), or departing to designated break areas.

- Asbestos bearing material debris found in enclosed work areas should be removed promptly using wet methods or a HEPA vacuum. Regardless of asbestos content, debris and materials should not accumulate in enclosed work areas and routine housekeeping must be enforced.

- Never use dry sweeping methods on any asbestos bearing debris or dust.

- Laundry facilities should be available for site workers to launder clothing articles worn on site. Never shake clothing articles out before washing. Launder work clothing separately from other laundry.

- If dusts are created during operations, and are found to be ACM (>1% asbestos) then tools, equipment and articles used or worn by employee's must be decontaminated before removal to occupied areas.

- Allow no visible emissions of dust during transferring, clean up, transportation and disposal of ACM debris. It must be kept wet.

- Employees who handle ACM should wear protective outer coveralls, gloves and outer foot wear to avoid contamination of personal articles. Contaminated articles of clothing should not be worn in, or taken to public areas until being laundered.

TITLE 17. CALIFORNIA AIR RESOURCES BOARD

NOTICE OF PUBLIC HEARING TO CONSIDER THE ADOPTION OF PROPOSED ASBESTOS AIRBORNE TOXIC CONTROL MEASURE FOR CONSTRUCTION, GRADING, QUARRYING, AND SURFACE MINING OPERATIONS

The Air Resources Board (ARB or Board) will conduct a public hearing at the time and place noted below to consider adopting a regulation to reduce the public exposure to asbestos emitted from constructing, grading, quarrying, and surface mining operations that occur in areas where asbestos is found or is likely to be found.

DATE: July 26, 2001
TIME: 9:00 a.m.
PLACE: Ramada Plaza Hotel Whitcomb
Ballroom 1231 Market Street San
Francisco, California 94103

This item will be considered at a two-day meeting of the ARB, which will commence at 9:00 a.m. on Thursday, July 26, 2001, and may continue at 8:30 a.m., Friday, July 27, 2001. This item may not be considered until July 27, 2001. Please consult the agenda for the meeting, which will be available at least ten days before July 26, 2001, to determine the day on which this item will be considered.

This facility is accessible to persons with disabilities. If accommodation is needed, please contact ARB's Clerk of the Board by July 12, 2001, at (916) 322-5594, or TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area, to ensure accommodation.

INFORMATIVE DIGEST OF PROPOSED ACTION AND POLICY STATEMENT OVERVIEW

Sections Affected: Proposed adoption of section 93105, title 17, California Code of Regulations (CCR).

Background

The California Toxic Air Contaminant Identification and Control Program (Program), established under California law by Assembly Bill 1807 (chapter 1047, statutes of 1983) and set forth in Health and Safety Code (HSC) sections 39650–39675, requires the ARB to identify and control air toxics in California. The Board identified asbestos as a toxic air contaminant (TAC) in 1986. Asbestos was identified without a

Board-specified threshold exposure level.

Following the identification of a substance as a TAC, HSC section 39665 requires the ARB, with participation of the air pollution control and air quality management districts (districts), and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance. HSC section 39666(b) requires that this "needs assessment" address, among other things, the technological feasibility of proposed airborne toxic control measures (ATCMs) and the availability, suitability, and relative efficacy of substitute products or processes of a less hazardous nature. A needs assessment for asbestos was conducted between 1989 and 1990 as part of the ARB's development of the Asbestos ATCM for Asbestos-Containing Serpentine ("Asbestos ATCM"; title 17, California Code of Regulations, section 93106). ARB staff has prepared an Initial Statement of Reasons (ISOR) for the proposed Asbestos ATCM for Construction, Grading, Quarrying, and Surface Mining Operations that, together with the 1990 needs assessment, serves as the report on the need and appropriate degree of regulation for the proposed ATCM.

Once the ARB has evaluated the need and appropriate degree of regulation for a TAC, HSC section 39666 requires the ARB to adopt regulations (ATCMs) to reduce emissions of the TAC to the lowest level achievable through the application of best available control technology (BACT) or a more effective control method, in consideration of cost, risk, environmental impacts, and other specified factors. In developing the proposed ATCM, State law also requires assessment of the appropriateness of substitute products or processes.

In 1990, an Asbestos ATCM was adopted by the Board imposing an asbestos limit of five percent for serpentine material for surfacing applications. At the time of the adoption, the Board directed the staff (Resolution 90-27, 1990) to return to the Board at such time that it be deemed necessary to further control emissions of asbestos from existing sources. Since the 1990 adoption of the Asbestos ATCM, additional information from monitoring and modeling studies has been developed. This information shows a potential for significant exposures and risks for individuals living near unpaved roads surfaced with serpentine material meeting the current five percent asbestos limit. In order to address this issue, an amended Asbestos ATCM was approved by the Board in July 2000 restricting asbestos content of surfacing materials to less than 0.25 percent asbestos.

The air monitoring studies, including those conducted in California and Virginia, have also indicated that activities associated with construction, grading, quarrying, and surface mining in areas known to have naturally-occurring asbestos can result in asbestos concentrations in the air that represent a potential public health hazard. Potential asbestos emissions from these activities have also been a source of public concern. Field observations and air monitoring has also demonstrated that actions taken to control dust emissions from these activities are effective in reducing asbestos emissions. Accordingly, staff is proposing a new asbestos ATCM to protect public health by minimizing emissions from construction, grading, quarrying, and surface mining operations.

Description of the Proposed Regulatory Action

The proposed ATCM is designed to minimize the public's exposure to asbestos by requiring work practices that will minimize dust emissions from activities associated with construction, grading, quarrying and surface mining. Three industry sectors are covered by the proposed ATCM: construction, road construction and maintenance, and quarrying and surface mining. The requirements would apply to projects where the area to be disturbed is in an area specified on maps published by the Department of Conservation's (DOC) Division of Mines and Geology showing ultramafic rock units or where ultramafic rock, serpentine, or naturally-occurring asbestos is known to occur, even if not shown on the maps.

The requirements for construction and grading projects are divided into provisions for projects that disturb one acre or less (small construction projects), and those that disturb more than one acre (large construction projects). The requirements for small construction projects include wetting the soil area to be disturbed; wetting, covering, or stabilizing storage piles; limiting vehicle speeds; cleaning equipment before moving it off-site; and cleaning up visible trackout on the paved public road.

Large construction projects are required to obtain an approved dust mitigation plan from the district. The plan must specify measures that will be taken to ensure that no visible dust crosses the property line and must address specific topics. The topics that must be addressed are dust mitigation measures for the following: track-out prevention and removal, disturbed surface areas and storage piles that will be inactive more than seven days, on-site vehicle traffic, active storage piles, earthmoving activities, off-site transport, post construction stabilization, and air monitoring (if required by the district).

The requirements for road construction and maintenance include notifying the district before starting the project, wetting the area to be disturbed, restricting traffic speed, and preventing visible trackout on the paved public roadway. Emergency road repair is exempted from the pre-notification requirement.

Quarries and surface mines must obtain district approval for an asbestos dust mitigation plan that ensures that equipment and processes meet the specified opacity requirements and that visible dust does not pass over the property line. In addition to processing controls, the plan must include air monitoring (if required by the district), trackout control, and control for on-site public roads.

Potentially affected sources can obtain an exemption from the proposed ATCM if a geologic evaluation determines that the area to be disturbed does not contain any ultramafic rock, serpentine, or naturally-occurring asbestos. Road construction and maintenance activities can obtain an exemption if the activity is more than a mile from any receptor. Agricultural operations and timber harvesting, except for road and building construction, are exempted from the proposed ATCM. Sand and gravel operations can obtain an exemption from the proposed ATCM for activities associated with the removal, processing, and storage of material extracted from alluvial deposits.

The proposed ATCM also contains recordkeeping and reporting requirements, test methods, timelines, and definitions. In accordance with Government Code sections 11345.3(c) and 11346.5(a)(11), the ARB's Executive Officer has found that the recordkeeping and reporting requirements of the resolution are necessary for the health, safety, and welfare of the people of the State.

Comparable Federal Regulations

The U.S. EPA has promulgated an Asbestos National Emission Standard for Hazardous Air Pollutants (NESHAP); 40 C.F.R. part 61, subpart M, sections 61.140 et seq. The Asbestos NESHAP established standards that apply to asbestos mills, roadways constructed with asbestos mine tailings or asbestos-containing waste material, manufacturing operations using asbestos, demolition or renovation where asbestos may be present, spraying of asbestos-containing material, fabrication operations using asbestos, insulating material containing asbestos and disposal of waste from various sources. This regulation covers asbestos-containing manufactured products and waste containing asbestos and does not cover naturally-occurring asbestos material.

The U.S. EPA has promulgated a National Pollutant Discharge Elimination (NPDES) storm water program (Phase I); 40 C.F.R. Part 122, 123, 124 to address water discharges from Industrial, Municipal and Construction activities. Quarries and surface mines are covered under the Industrial section of the NPDES regulation. The Construction section covers construction sites that disturb five acres or more. NPDES provide that discharges of storm water to waters of the United States from Industrial, Municipal, and Construction projects are effectively prohibited unless the discharge is in compliance with a state issued NPDES permit. The NPDES permit requires all Industrial, Municipal and Construction dischargers to develop and implement a Storm Water Pollution Prevention Plan which specifies Best Management Practices (BMPs) that will prevent all pollutants (including soil) from contacting storm water with the intent of keeping all products of (wind and water) erosion from moving off site into receiving waters. Phase II of NPDES (40 C.F.R., part 122, subpart B, section 122.26 et seq) goes into affect March 10, 2003. Phase II reduces the size of the covered construction activity to one acre. Both Phases of NPDES require BMPs for fugitive dust emissions and trackout control. However, the BMPs do not require that no visible dust leave the property and they allow dry sweeping of trackout areas. The proposed Asbestos ATCM is more stringent in that it requires that no visible dust leave the property and does not allow dry sweeping in any situation.

AVAILABILITY OF DOCUMENTS AND AGENCY CONTACT PERSONS

The Board staff has prepared a Staff Report: Initial Statement of Reasons (ISOR) for the proposed regulatory action, which includes a summary of the potential environmental and economic impacts of the proposal, if any. The ISOR is entitled, "Staff Report: Initial Statement of Reasons for the Proposed Asbestos Airborne Toxic Control Measure for Construction, Grading, Quarrying, and Surface Mining Operations."

Copies of the ISOR and the full text of the proposed regulatory language may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Environmental Services Center, 1st Floor, Sacramento, CA 95814, (916) 322-2990 at least 45 days prior to the scheduled hearing (July 26, 2001).

Upon its completion, the Final Statement of Reasons (FSOR) will be available and copies may be requested from the agency contact persons in this notice, or may be accessed on the web site listed below.

Inquiries concerning the substance of the proposed regulations may be directed to the designated agency contact persons, Richard Boyd, Manager of the Emissions Evaluation Section, Emissions Assessment Branch, Stationary Source Division at (916) 322-8285 and Carol McLaughlin, Air Pollution Specialist, Stationary Source Division at (916) 327-5636.

Further, the agency representative and designated back-up contact persons to whom nonsubstantive inquiries concerning the proposed administrative action may be directed are Artavia Edwards, Manager, Board Administration & Regulatory Coordination Unit, (916) 322-6070, or Amy Whiting, Regulations Coordinator, (916) 322-6533. The Board has compiled a record for this rulemaking action, which includes all the information upon which the proposal is based. This material is available for inspection upon request to the contact persons.

If you are a person with a disability and desire to obtain this document in an alternative format, please contact the Air Resources Board ADA Coordinator at (916) 323-4916, or TDD (916) 324-9531, or (800) 700-8326 for TDD calls from outside the Sacramento area.

This notice, the ISOR and all subsequent regulatory documents, including the FSOR, when completed, are available on the ARB Internet site for this rulemaking at http://www.arb.ca.gov/regact/asbesto2/asbesto2.htm.

COSTS TO PUBLIC AGENCIES AND TO BUSINESSES AND PERSONS AFFECTED

The determinations of the Executive Officer of the ARB concerning the cost or savings necessarily incurred in reasonable compliance with the proposed regulatory action are presented below.

The ARB's Executive Officer has determined that the proposed regulatory action will create costs, as defined in Government Code section 11346.5(a)(6), to state agencies. Any such costs should be minimal, and affected state agencies should be able to absorb these costs within existing budgets and resources. The Executive Officer has

also determined that the proposed regulatory action will not create costs or savings in federal funding to the State, costs or mandate to any school district whether or not reimbursable by the State pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, or non-discretionary savings to state or local agencies.

The proposed regulatory action will also impose a mandate upon and create costs to local agencies (i.e., local air pollution control and air quality management districts; the "districts"). However, in this case, such administrative costs to the districts are recoverable by fees that are within the districts' authority to assess (see Health and Safety Code sections 42311 and 40510). Therefore, the Executive Officer has determined that the proposed regulatory action imposes no costs on local agencies that are required to be reimbursed by the state pursuant to part 7 (commencing with section 17500), division 4, title 2 of the Government Code, and does not impose a mandate on local agencies that is required to be reimbursed pursuant to Section 6 of Article XIII B of the California Constitution.

In developing this regulatory proposal, the ARB staff evaluated the potential economic impacts on representative private persons and businesses. The Executive Officer has initially assessed that the proposed regulatory action will not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states. The Board is not aware of any cost impacts that a representative private person or business would necessarily incur in reasonable compliance with the proposed action. In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed ATCM should have minimal impacts on the creation or elimination of jobs within the State of California, minimal impacts on the creation of new businesses and the elimination of existing businesses within the State of California, and minimal impacts on the expansion of businesses currently doing business within the State of California. A detailed assessment of the economic impacts of the proposed ATCM can be found in the ISOR.

The Board's Executive Officer has also determined that the regulation will affect small business.

Before taking final action on the proposed regulatory action, the ARB must determine that no reasonable alternative considered by the agency or that has otherwise been identified and brought to the attention of the agency would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons or businesses than the proposed action.

SUBMITTAL OF COMMENTS

The public may present comments relating to this matter orally or in writing at the hearing, and in writing or by e-mail before the hearing. To be considered by the Board, written submissions not physically submitted at the hearing must be received **no later than 12:00 noon, July 25, 2001,** and addressed to the following:

Postal mail is to be sent to:

Clerk of the Board

Air Resources Board

1001 "I" Street, 23rd Floor

Sacramento, California 95814

Electronic mail is to be sent to: asbesto2@listserv.arb.ca.gov and received at the ARB **no later than 12:00 noon, July 25, 2001**.

Facsimile submissions are to be transmitted to the Clerk of the Board at (916) 322-3928 and received at the ARB **no later than 12:00 noon,**

July 25, 2001.

The Board requests but does not require 30 copies of any written submission. Also the ARB requests that written, facsimile, and e-mail statements be filed at least 10 days prior to the hearing so that ARB staff and Board Members have time to fully consider each comment. The ARB encourages members of the public to bring to the attention of staff in advance of the hearing any suggestions for modification of the proposed regulatory action.

STATUTORY AUTHORITY

This regulatory action is proposed under the authority granted to the ARB in the Health and Safety Code sections 39600, 39601, 39650, 39658, 39659, 39666, and 41511. This action is proposed to implement, interpret, or make specific, Health and Safety Code sections 39650, 39658, 39659, 39666, and 41511.

HEARING PROCEDURES

The public hearing will be conducted in accordance with the California Administrative Procedure Act, title 2, division 3, part 1, chapter 3.5 (commencing with section 11340) of the Government Code. Following the public hearing, the ARB may adopt the regulatory language as originally proposed or with non-substantial or grammatical modifications. The ARB may also adopt the proposed regulatory language with other modifications if the modifications are sufficiently related to the originally proposed text that the public was adequately placed on notice that the regulatory language as modified could result from the proposed regulatory action. In the event that such modifications are made, the full regulatory text, with the modifications clearly indicated, will be made available to the public for written comment at least 15 days before it is adopted.

The public may request a copy of the modified regulatory text from the ARB's Public Information Office, 1001 I Street, Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990.

CALIFORNIA AIR RESOURCES BOARD

//s//

MICHAEL P. KENNY

EXECUTIVE OFFICER

Date: May 29, 2001

"The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.arb.ca.gov."

Return to Regulatory Docments Page

APPENDIX G

AMBLER AIRPORT EXPLORATIONS

R&M Consultants, Inc. *Geotechnical Memorandum* to DOT&PF, Northern Region, dated 3 December 2004

R&M CONSULTANTS, INC.
GEOTECHNICAL MEMORANDUM

TO: Ryan Anderson, P.E. 3 December 2004
Alaska DOT&PF

FROM: Bob Scher, P.E. R&M #041030
R&M Project Manager

RE: Task 6 – Supplemental Airport Investigation
Ambler Materials Site and Grizzly Creek Drainage Structure Studies

Task 6 of our contract agreement (No. 368-4-1-016) provided for R&M to drill and sample four geotechnical test holes at the Ambler Airport. Per your direction (e-mail dated 21 October 2004), two holes were to be drilled in each of two areas adjacent to the runways that we understand will be cut for compliance with FAA air space criteria. We have completed this work, as summarized below.

FIELD EXPLORATIONS

R&M drilled four test holes on November 8th and 9th, each 16.5 feet deep: two holes were located in the "high" ground just southwest of the intersection between Runways 18-36 and 9-27, and two holes were located in the "high" ground just west of Runway 9. Briefly, each hole encountered variable silt to silt with sand. No groundwater or permafrost was observed in any of the borings. We did not observe any obvious asbestos fibers in the soils recovered from the four subject borings. Logs for each test hole are attached.

The field work was supervised by Peter K. Hardcastle of R&M Consultants. The drilling services were subcontracted to Discovery Drilling Co., of Anchorage; Alex Cardenas and Darrin Van Dehey were the driller and drill helper, respectively. The borings were drilled using a skid-mounted CME-45 equipped with eight-inch O.D. continuous-flight hollow-stem auger. The drill was pulled with a Caterpillar D-4C dozer provided by the Alaska Native Tribal Health Consortium. Disturbed soil samples were collected at roughly five-foot intervals, using a 2.5-inch (I.D.) split-spoon sampler advanced by a 340-pound hammer with a 30 inch free-fall, otherwise following ASTM D-1586. Grab samples were also collected from the auger cuttings. The actual sampler penetration resistance and percent recovery are recorded on the attached logs. All recovered soil samples were visually described and logged in the field. All soil samples were then returned to R&M's facility in Anchorage for testing.

Mr. Hardcastle determined the location of each test hole using a Garmin Etrex Summit, hand-held Global Positioning System (GPS) unit; the measured coordinates of each boring are provided on the attached logs (UTM UPS Zone 4W {metric}, WGS84 map datum). Note that the unit has a manufacturer reported accuracy of ± 15 meters (49 feet) RMS, subject to accuracy degradation to 100 meters 2DRMS under the United States Department of Defense-imposed Selective Availability Program.

LABORATORY TESTING

Eight samples of the recovered soils, two from each boring, were submitted to Analytica, in Colorado, to inspect for asbestos using "polarized light microscopy" (PLM); the method recommended by the EPA for identification of fibrous constituents in building materials. Briefly, Analytica reported trace chrysotile and total asbestos fibers (<1%, by volume) in all eight soil samples. The Analytica test reports are attached, and the results are also provided on the boring logs.

Additionally, R&M measured the natural moisture content, following ASTM D 2216, of all three soil samples recovered from each boring (12 tests total). Briefly, the measured moisture contents ranged from about eight to 20 percent. The individual test results are provided on the attached boring logs.

Attachments

SOILS
CONSISTENCY AND SYMBOLS

SOIL DENSITY/CONSISTENCY - CRITERIA: Soil density/consistency as defined below and determined by normal field methods applies only to non-frozen material. For these materials, the influence of such factors as soil structure, i.e. fissure systems shrinkage cracks, slickensides, etc., must be taken into consideration in making any correlation with the consistency values listed below. In permafrost zones, the consistency and strength of frozen soil may vary significantly and inexplicably with ice content, thermal regime and soil type.

NON-COHESIVE SOILS *

Consistency	N ** (blows/foot)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>50

COHESIVE SOILS *

Consistency	N ** (blows/foot)
Very Soft	<2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	>30

* From State of Alaska Department of Transportation and Public Facilities "Alaska Geotechnical Procedures Manual" dated October 1, 2003.

** Standard Penetration "N": Blows per 1 foot of a 140-pound manual hammer (lifted with rope & cathead) falling 30 inches on a 2" O.D. split-spoon sampler except where noted.

KEY TO TEST RESULTS

DD - Dry Density
LL - Liquid Limit
MC - Moisture Content
Org - Organic Content
PI - Plastic Index
PL - Plastic Limit

PP - Pocket Penetrometer
P200 - % Passing No.200 Screen
P.02 - % Passing 0.02 mm
SG - Specific Gravity
TV - Torvane

06/29/04 8:45 AM

Z:\PROJECT.041\04000\7\LOGS\B-01&B-02.GDW / DRAWING E - B-01 ENGLISH (DOT&PF)

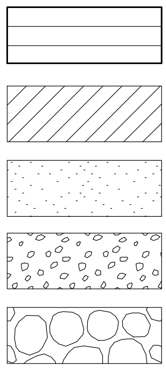
DWN:	P.K.H.
CKD:	C.H.R.
DATE:	JUL. 04
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS, INC.

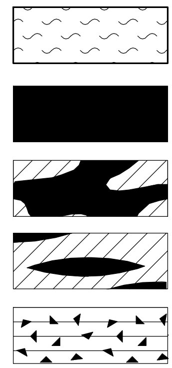
GENERAL NOTES

FB:	N/A
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-01

STANDARD SYMBOLS



NAME	PARTICLE SIZE
CLAY	- 0.002mm, Plastic
SILT	0.002mm, - #200
SAND	#200, - #4
GRAVEL	#4, - 3"
COBBLES & BOULDERS	3" - 12" & > 12"



NAME
ORGANICS
ICE
ICE W/SOIL INCLUSIONS
ICE LENSE IN SILT
ICE CRYSTALS IN CLAY

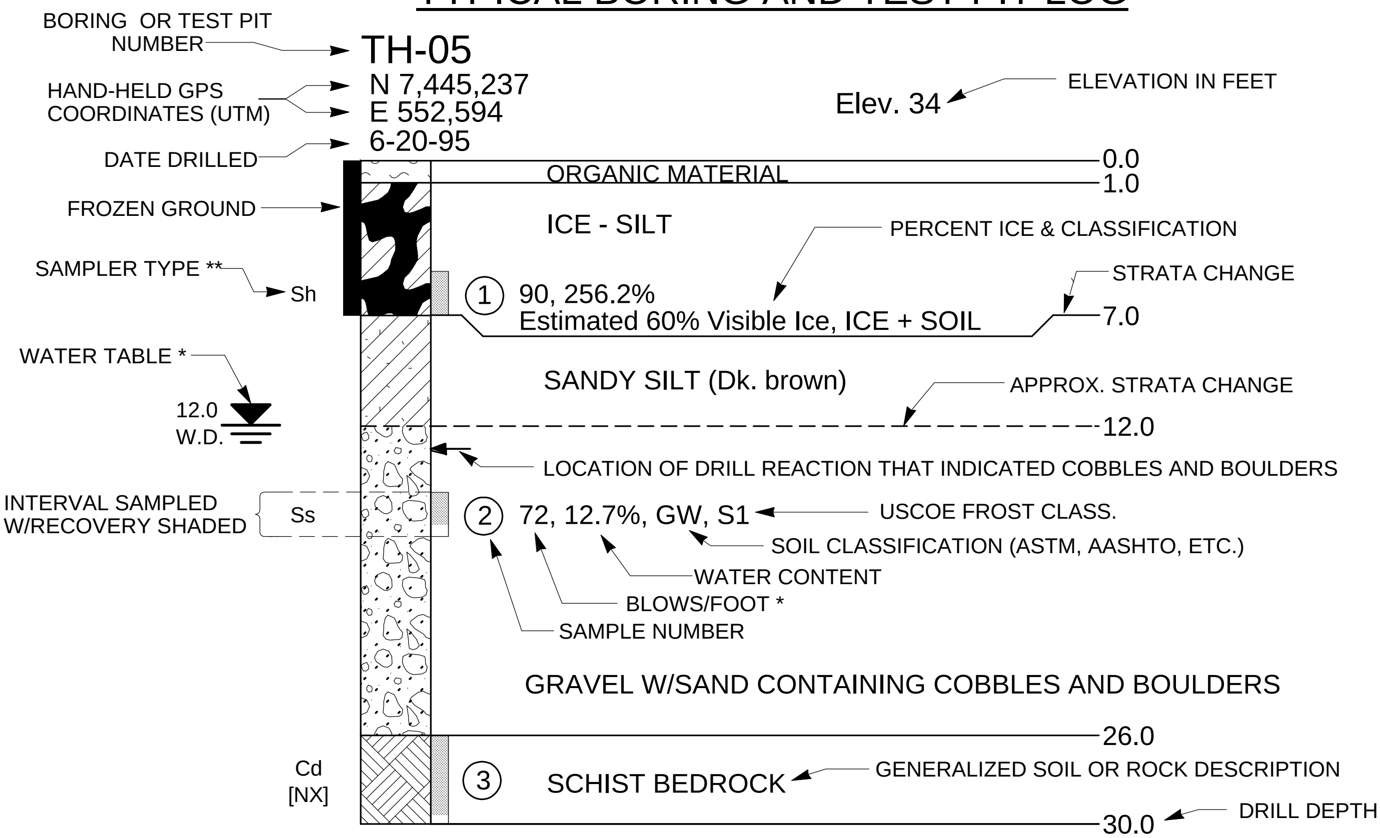
(The symbols shown above are frequently used in combinations, e. g. GRAVEL WITH SAND)

SAMPLER TYPE SYMBOLS

A	Auger Sample
C	Auger Cuttings Sample
Cd	Double Tube Core Barrel
Ct	Triple Tube Core Barrel
Cs	Auger Core Barrel
DS	Drive Sample (1.4 In. Split Spoon w/nonstandard 140-lb. hammer, 8" drop)
Sh	2.5 In. Split Spoon w/340 lb. Manual Hammer
Sha	2.5 In. Split Spoon w/340 lb. Auto Hammer
Sl	2.5 In. Split Spoon w/140 lb. Hammer
Ss	1.4 In. Split Spoon w/140 lb. Manual Hammer
Ssa	1.4 In. Split Spoon w/140 lb. Auto Hammer
Sp	2.5 In. Split Spoon Pushed
Sz	1.4 In. Split Spoon w/340 lb. Hammer
Ts	Shelby Tube
Tm	Modified Shelby Tube
[x]	Sampler I. D. (Added to Symbol)

NOTE: Sampler types are either noted above the boring log or adjacent to it at the respective depth. An individual log may not utilize all of the items listed.

TYPICAL BORING AND TEST PIT LOG



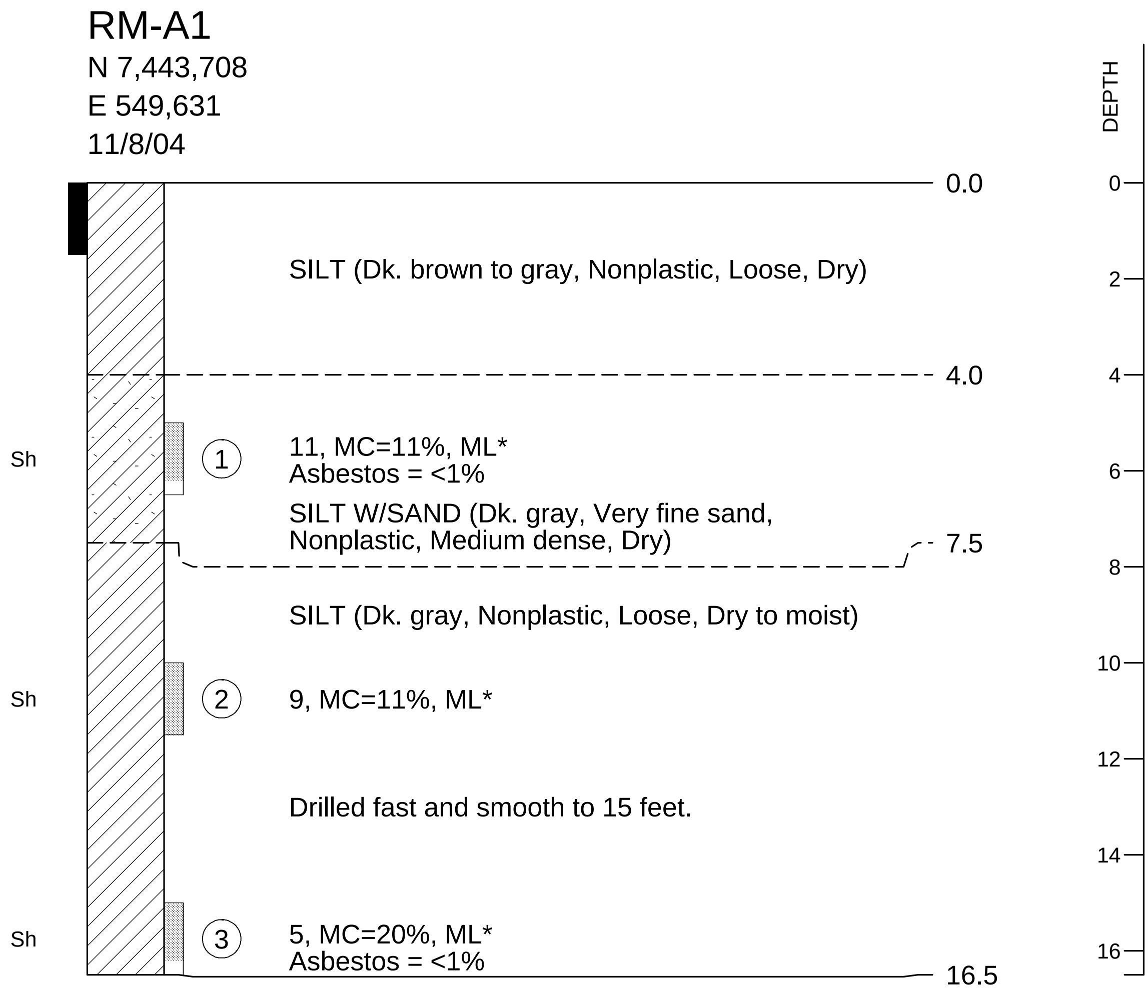
* W.D. - WHILE DRILLING, A.B. - AFTER BORING, Ref. - SAMPLER REFUSAL
** - REFER TO SAMPLER SYMBOL (Ss, Sh, ETC.) FOR SAMPLER I.D. & HAMMER WEIGHT
NOTE: Water levels shown on the boring logs are the levels measured in the boring at the times indicated.

DWN:	P.K.H.
CKD:	C.H.R.
DATE:	DEC 04
SCALE:	NONE

PREPARED BY: R&M CONSULTANTS, INC.

EXPLANATION OF SELECTED SYMBOLS

FB:	N/A
GRID:	AMBLER R.
PROJ.NO:	041030
DWG.NO:	B-02



* Estimated Classification

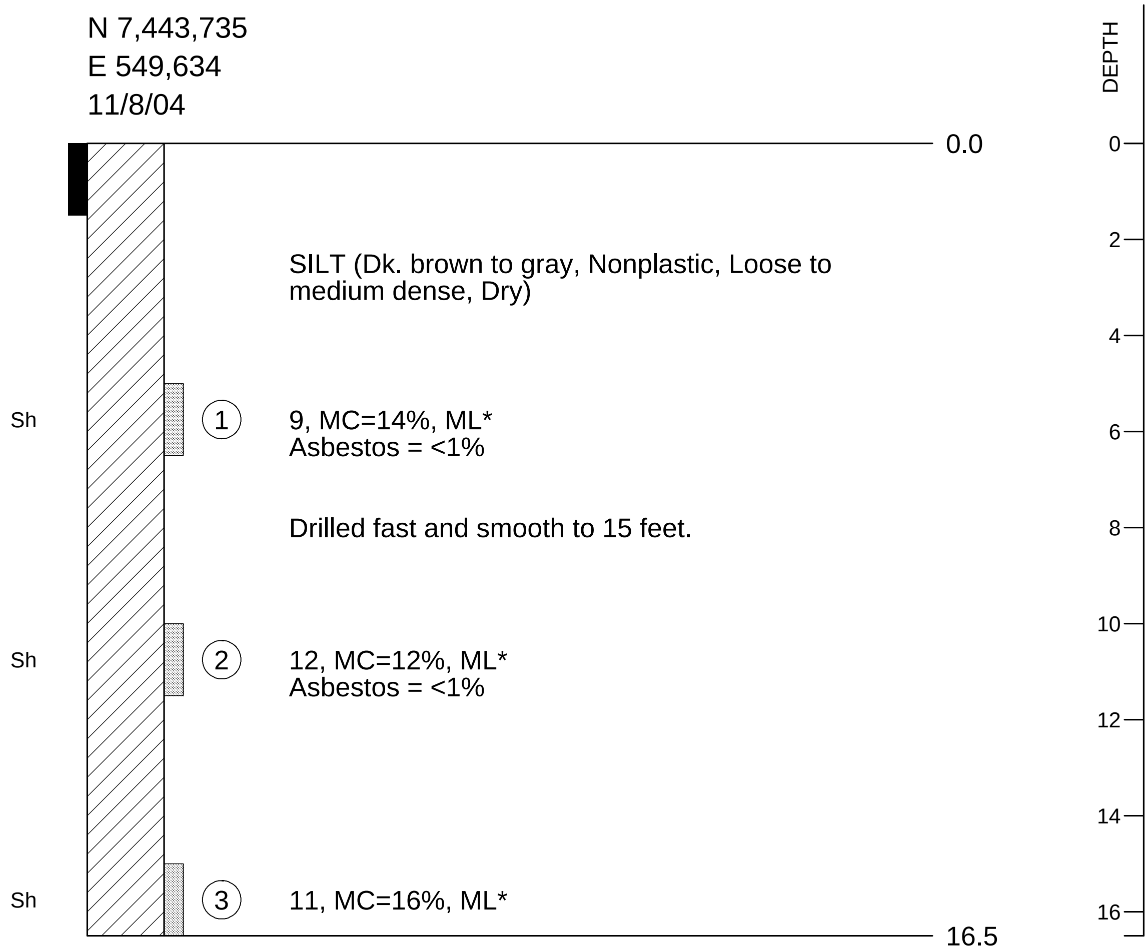
No groundwater was observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-A1	DWG.NO: B-03

RM-A2

N 7,443,735
E 549,634
11/8/04



* Estimated Classification

No groundwater was observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN:	P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB:	NA
CKD:	R.L.S.			GRID:	AMBLER R.
DATE:	NOV. 04		LOG OF TEST BORING RM-A2	PROJ.NO:	041030
SCALE:	1"=4'			DWG.NO:	B-04

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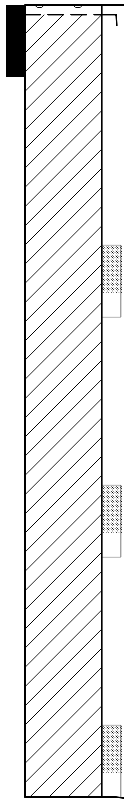
MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

RM-A3

N 7,444,123
E 548,871
11/9/04



Depth (ft)	Sample	Description
0.0–0.2		ORGANIC MAT
0.2–16.5		SILT (Mottled brown-gray, Micaceous, Nonplastic, Loose, Dry)
	Sh (1)	6, MC=7.7%, ML* Asbestos = <1%
		Drilled fast and smooth to 15 feet.
	Sh (2)	7, MC=11%, ML*
	Sh (3)	8, MC=12%, ML* Asbestos = <1%
16.5		

DEPTH: 0, 2, 4, 6, 8, 10, 12, 14, 16

* Estimated Classification

No groundwater was observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION AMBLER, ALASKA	FB: NA
CKD: R.L.S.			GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING RM-A3	PROJ.NO: 041030
SCALE: 1"=4'			DWG.NO: B-05

RM-A4

N 7,444,145
E 548,887
11/9/04

DEPTH

Depth	Sample	Description
0.0 – 0.2		ORGANIC MAT
0.2 – 16.5		SILT (Mottled brown-gray, Nonplastic, Loose, Dry)
6	Sh (1)	6, MC=7.6%, ML* Asbestos = <1%
		Drilled fast and smooth to 15 feet.
11	Sh (2)	6, MC=12%, ML* Asbestos = <1%
16	Sh (3)	8, MC=10%, ML*
16.5		

Depth scale: 0, 2, 4, 6, 8, 10, 12, 14, 16

* Estimated Classification

No groundwater was observed while drilling.

Coordinates are in UTM UPS Zone 4W (meters), WGS84 map datum.

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MASTER ONE COL/PAGE - AMBLER2.GPJ - MASTER2.GDT - 12/1/04

DWN: P.K.H.	PREPARED BY: R&M CONSULTANTS, INC.	MATERIAL SITE EXPLORATION	FB: NA
CKD: R.L.S.		AMBLER, ALASKA	GRID: AMBLER R.
DATE: NOV. 04		LOG OF TEST BORING	PROJ.NO: 041030
SCALE: 1"=4'		RM-A4	DWG.NO: B-06

ANALYTICA
SOLUTIONS
an Analytica Group Company

Analytica Solutions, Inc.
12189 Pennsylvania Street
Thornton, Colorado 80241
(303) 469-8868
(800) 873-8707
Fax: (303) 469-5254

December 2, 2004

Mr. Peter Hardcastle
R & M Consultants, Inc.
9101 Vanguard Drive
Anchorage, AK 99507-

Re: LGN 349394 Project: Ambler Material Site

Dear Mr. Peter Hardcastle:

The bulk samples recently submitted to our laboratory have been analyzed by polarized light microscopy (PLM), the EPA-recommended method for identification of fibrous constituents in building materials. The results of these analyses are summarized in the enclosed table. Also enclosed is a copy of documentation submitted with your samples.

If you have any technical questions concerning these analyses, please feel free to call me. All other calls should be directed to our Customer Service Representatives.

Sincerely,

Jeff Lyons
President

Enclosures

Analytica Solutions, Inc.
12189 Pennsylvania Street
Thornton, Colorado 80241
(303) 469-8868
(800) 873-8707
Fax: (303) 469-5254

ANALYTICA SOLUTIONS
an Analytica Group Company

RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.**

LGN: **349394**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-A1 (1)	/ /	[gray silty sand]
RM-A1 (3)	/ /	[gray silty sand]
RM-A2 (1)	/ /	[gray silty sand]
RM-A2 (2)	/ /	[gray silty sand]
RM-A3 (1)	/ /	[gray silty sand]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-A1 (1)	RM-A1 (3)	RM-A2 (1)	RM-A2 (2)	RM-A3 (1)
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%	Trace <1%	Trace <1%	Trace <1%	Trace <1%
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	Trace <1%	Trace <1%	Trace <1%	Trace <1%
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	Trace <1%	1.0	Trace <1%		Trace <1%
Synthetics					
Other:					
Percent Nonfibrous Material	99.0	98.5	99.0	99.5	99.0

Analyst: Douglas Kent

Date: 12/02/2004

NVLAP
NVLAP LAB CODE 101086-0

"The Science of Analysis, The Art of Service"

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Analytica Solutions, Inc.
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Thornton, Colorado 80241
(303) 469-8868
(800) 873-8707
Fax: (303) 469-5254

RESULTS OF BULK ASBESTOS SAMPLE ANALYSIS BY POLARIZED LIGHT MICROSCOPY (PLM)

Client: **R & M Consultants, Inc.** LGN: **349394**

Project ID: **Ambler Material Site**

Sample Description:

Sample Number	Sample Date	Description
RM-A3 (3)	/ /	[gray silty sand]
RM-A4 (1)	/ /	[gray silty sand]
RM-A4 (2)	/ /	[gray silty sand]

Results of PLM Analysis: Visual Area Estimation: Percentages Detected

Sample Number:	RM-A3 (3)	RM-A4 (1)	RM-A4 (2)		
Asbestiform Minerals:					
Amosite					
Anthophyllite					
Chrysotile	Trace <1%	Trace <1%	Trace <1%		
Crocidolite					
Tremolite-Actinolite					
TOTAL ASBESTOS	Trace <1%	Trace <1%	Trace <1%		
Other Fibrous Materials:					
Fibrous Glass					
Cellulose	Trace <1%	Trace <1%			
Synthetics					
Other:					
Percent Nonfibrous Material	99.0	99.0	99.9		

Analyst: Douglas Kent Michael K. Scales Date: 12/02/2004

ANALYTICA GROUP

Analytica Solutions, Inc.
12189 Pennsylvania Street
Thornton, Colorado 80241-3115
(303) 469-8868
FAX: (303) 469-5254
www.analyticagroup.com

Sample Data Sheet

349394
LGN: ______ (for Analytica internal use only)

Contact: Peter Hardcastle
Company: R&M CONSULTANTS, INC.
Address: 9101 Vanguard Drive
City: Anchorage, Alaska
State: AK Zip: 99507
Phone: 1-907-522-1707
Fax: 1-907-522-3403

Project: Ambler Material Site
P.O.#:

- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Day
- [ ] 3 Day
- [ ] 5 Day
- [x] 10 Day (Standard)

[x] e-mail results to: phardcastle@rmconsult.com
(e-mail address must be clearly specified above)

[ ] EDD (Excel Electronic Data Deliverable)
(additional charges may apply)

(1) Type = A (asbestos) or Pb (lead paint)
(2) Matrix = B (bulk); S (soil); W (wipe); P (paint)

Report Units: [x] % volume (asbestos) [ ] % weight (lead) [ ] mg/kg or ppm (lead) [ ] mg/cm^2 or ug/ft^2 (lead)

↑ FOR PROMPT PROCESSING, PLEASE COMPLETE ALL BOXES ↓

Type (1)	Matrix (2)	Sample Number *(maximum 16 characters in length)*	Sample Date	Sample Description *(maximum 75 characters in length)*	Sampling Area in^2 or cm^2
A	S	RM-A1 (1)			
A	S	RM-A1 (3)			
A	S	RM-A2 (1)			
A	S	RM-A2 (2)			
A	S	RM-A3 (1)			
A	S	RM-A3 (3)			
A	S	RM-A4 (1)			
A	S	RM-A4 (2)			
A	S				
A	S				
A	S				
A	S				

Special Instructions or Other Information:

Relinquished by: ______ Date/Time: ______ Received by: Peacock Date/Time: 11/16/04 400PM

Relinquished by: ______ Date/Time: ______ Received by: ______ Date/Time: ______

Return samples: [ ] YES [ ] NO

057.01.01

ANALYTICA SOLUTIONS

12189 Pennsylvania Street
Thornton, Colorado 80241

POLARIZED LIGHT MICROSCOPY (PLM)

BULK SAMPLE ANALYSIS PROCEDURES

Bulk samples of construction materials are analyzed by a professional mineralogist with a minimum of a Bachelor's Degree in Geology using the July 1993, EPA Test Method, (EPA/600/R-93/116), "Method for the Determination of Asbestos in Bulk Building Materials"[1]. Samples are prepared and analyzed in different Cargille® certified refractive index oils. Estimates of asbestos content are based on visual comparisons using a calibrated graticule. Additional tests and treatments (see below) may also be required for certain samples.

Analytica is accredited by the National Institute of Standards and Technology (Lab Code #101086) under the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos analysis. Analytica participates in the NVLAP bulk asbestos proficiency testing program *(results available upon request)*. An in-house QA/QC program is maintained on a daily basis that requires, at a minimum, 10% of samples submitted to be re-analyzed and logged into a quality control tracking system. Analytica participates in two round robin QA/QC programs annually with accredited laboratories throughout the United States. Unused portions of samples are archived for six months, then disposed of or returned to the client.

ASHING

Ashing is a procedure in which one half of the sample is placed in a crucible and then set in a furnace at 500° C for one hour or more. Most non-silicate interferants are eliminated, leaving only asbestos undisturbed. The amount of ashed material is compared to the original amount to determine the volume percent lost due to ashing. The sample is then analyzed by PLM for the type and amount of asbestos present. The results shown on the final report are the percentage of asbestos in the original material, not the ashed material, i.e. if 50% of the original material is lost due to ashing and the ashed sample contains 10% asbestos, then the final report would show 5% asbestos in the original material.

POINT COUNTING

As of November 20, 1990, the National Emission Standards for Hazardous Air Pollutants (NESHAP) established rules requiring that friable ACM bulk samples with less than 10% asbestos be analyzed by the point count procedures described in the EPA-600/R-93/116 test method. Analytica does have experienced analysts to perform point counts if needed. **Analytica Solutions, Inc. cannot determine bulk sample friability and cannot assume responsibility for client compliance with the NESHAP rule.**

(1) In January 1994, a NESHAP clarification was issued regarding analysis of multi-layered samples. This clarification requires all layers of a sample must be analyzed and reported separately. On August 1, 1994, EPA issued a notice of advisory adopting a new AHERA policy consistent with the NESHAP policy. When reviewing an Analytica Solutions PLM analysis report, do not use the composite result for the determination of positive (> 1%) ACM. Determination of ACM should be made strictly from the individual layers of each sample.

(2) On August 10, 1994, OSHA ruled that to demonstrate that Potential Asbestos Containing Material (PACM) does not contain asbestos, tests shall include analysis of 3 bulk samples of each homogeneous area of the PACM collected in a randomly distributed manner.

(3) This test report relates only to items tested.

(4) NVLAP policy requires that this report may not be reproduced except in full, without the written approval of the laboratory.

(5) NVLAP policy requires that this report must not be used by the client to claim product endorsement by NVLAP or any agency of the United States Government.