

**COAL EXPLORATION PERMIT APPLICATION
FOR MENTAL HEALTH LAND COAL LEASE MHT 9200375
CHICKALOON COAL PROJECT**

Prepared For:

**Riversdale Alaska LLC
A subsidiary of**

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Permit Required Information and Preparatory Statement

This permit application provides information as required by the Alaska Surface Coal Mining Control and Reclamation Act of 1977 (ASCMCRA). Each separate section of the application will state the exact regulation from 11 AAC 90.163 and 167. The regulation will be in *italics*, and the required information will be in normal type-font below each regulation.

It is important for the public reading this permit application to clearly understand that it is for exploration only. This is not a mine permit application. In accordance with Article 8 of AS 27.21 and 11 AAC 90.163 and 167, the applicant is proposing exploration that, according to the regulations, will disturb the natural land surface. This disturbance involves low impact exploration drilling, limited trenching and some off-road travel by large, rubber-tired or tracked vehicles.

State of Alaska coal exploration permits call for baseline data gathering of an area's natural and environmental resources to determine if a prospective resource site will support a mining venture. This data includes information on the geology, as it pertains to coal resource potential, and environmental baseline data such as surface and ground water hydrology, vegetation, soils, fish and wildlife, and cultural or historic resources. Riversdale Resources is fortunate in that there is relevant data from previous coal exploration ventures in and near its coal lease area. This includes the Castle Mountain Mine exploration data from 1989-1990 and very limited information from the old Chickaloon and Kings River mines prospected by the U.S. Navy in the early 1900's. Riversdale Resources will start collecting area environmental baseline data starting with the Phase 1 exploration tasks described in this permit application.

The applicant, by law and regulation, can only incorporate data that is known to exist at the time of the permit application. Riversdale Resources is searching for marketable coking coal deposits on the coal lease in Chickaloon. The purpose of the exploration program is to determine if there are sufficient coal resources to support a coal mine. Consequently, prior to evaluating the results from the exploration program, it is premature to project if a surface mine, underground mine or a combination of the two will be developed. Any future mine development decisions will be made after a thorough evaluation of the area is complete and the required environmental baseline data has been collected and reviewed.

PART A – GENERAL INFORMATION

1.0 APPLICANT INFORMATION

11 AAC 90.163 (a) a person who intends to conduct coal exploration that will substantially disturb the natural land surface shall file an application in the format required by 11 AAC 90.021. The application must include: 11 AAC 90.161 (a)(1) the information required under 11 AAC 90.161(a)(1), (a)(2), and (a)(5); 11 AAC 90.161(a)(1) the name, address and telephone number of the person seeking to explore and the person who will be present at and responsible for conducting the exploration activities;

1.1	Name of Applicant	Riversdale Alaska LLC
	Officers	Steve Mallyon – Managing Director Anthony Martin – Manager Russell Dann - President
1.2	Address of Applicant	c/o Riversdale Resources Pty ltd Level 2 Chifley Tower 2 Chifley Square Sydney, New South Wales 2000 Australia
1.3	Telephone Number	+61 2 9324 4499
1.4	Representative of the applicant who will be present during and be responsible for conducting the exploration	Russell Dann
1.5	Address of Representative	Level 2 Chifley Tower 2 Chifley Square Sydney, New South Wales 2000 Australia
1.6	Telephone Number	+61 2 9324 4496

2.0 LOCATION OF THE EXPLORATION

11 AAC 90.161(a) (3) the boundaries of the exploration activities;

2.1 Legal Description – Coal Exploration Area

Township 20 North, Range 5 East, Seward Meridian

According to the Survey Plat accepted by the United State Department of the Interior, Bureau of Land Management in Denver, Colorado on May 14, 1980.

		<u>Acres</u>
Section 8:	NE1/4, W1/2 of NE1/4 of NW1/4, NW1/4 of NW1/4, S1/2 of NW1/4, S1/2	620
Section 12:	S1/2	320
Section 13:	All	640
Section 14:	All	640
Section 15:	All	640
Section 17:	All	640
Section 18:	E1/2, E1/2 of W1/2, and Lots 1-4 inclusive	599.60
Section 19:	E1/2, E1/2 of W1/2, and Lots 1-4 inclusive	601.68
Section 20:	All	640
Section 21:	S1/2, NW1/4	480
Section 22:	S1/2, NE1/4, S1/2 of NW1/4, NE1/4 of NW1/4, E1/2 of NW1/4 of NW1/4	620
Section 23:	N1/2, N1/2 of SW1/4, SE1/4 of SW1/4, N1/2 of SE1/4, N1/2 of SW1/4 of SE1/4, W1/2 of SW1/4 of SW1/4 of SE1/4, SE1/4 of SW1/4 of SE1/4, SE1/4 of SE1/4	595
Section 24:	All	640
Section 27:	NW1/4	160
Section 28:	N1/2, SW1/4, W1/2 of SE1/4	560
Section 29:	All	640
Section 30:	NE1/4, E1/2 of NW1/4, NE1/4 of SW1/4, NW1/4 of SE1/4, Lots 1-4 inclusive	444.40
Section 31:	E1/2 of SW1/4, Lots 1- 4 inclusive	206.92
Section 32:	W1/2 of NE1/4, NW1/4	<u>240</u>
Total Coal Exploration Area		9,927.60
2.5	Number of Acres of Federal Land	N/A
2.6	Map Areas:	Anchorage, Alaska USGS scale 1:250,000 or Anchorage (D-4, D-5), Alaska USGS scale 1:63,360
2.7	Distance and Direction to Nearest Community	Chickaloon is 1-3 miles SSE

3.0 PERIOD OF EXPLORATION

11 AAC 90.161(a) (2) a statement of the period of intended exploration;

	<u>Month</u>	<u>Day</u>	<u>Year</u>	
3.1	June	1	2012	(Start Date)
3.2	June	1	2014	(End Date)

4.0 OWNERSHIP OF SURFACE/SUBSURFACE MINERAL ESTATE

11 AAC 90.163(a) (3) the names and address of all owners and leaseholders of record of the surface land and the mineral estate in the area to be explored;

4.1 Surface Owner

Alaska Department of Natural Resources
Division of Mining, Land and Water
550 W 7th Ave, Suite 900D
Anchorage AK 99501-3577
(907) 269-8650

4.2 Mineral Estate Owner

Alaska Mental Health Trust Authority
c/o Alaska Mental Health Trust Land Office
2600 Cordova Street, Suite 100
Anchorage, Alaska 99503
(907) 269-8657

4.3 Surface Land Lease Holder

MHT 9200510
Riversdale Alaska LLC
c/o Riversdale Resources Pty Ltd
Level 2 Chifley Tower,
2 Chifley Square
Sydney, New South Wales 2000
Australia

- 4.3.1 Adjacent Surface Land Lease Holder
*no activity proposed on this lease

MHT 9200442
Hobbs Industries, Inc.
P.O. Box 436
Palmer, Alaska 99645-0436

- 4.4 Mineral Estate Lease Holder

MHT 9200510
Riversdale Resources Pty Ltd
Level 2 Chifley Tower,
2 Chifley Square
Sydney, New South Wales 2000
Australia

- 4.4.1 Adjacent Mineral Estate Lease Holder
*no activity proposed on this lease

MHT 9200442
Hobbs Industries, Inc.
P.O. Box 436
Palmer, Alaska 99645-0436

- 4.5 Right to Enter

11 AAC 90.161(a)(5) an explanation of the right of the person seeking to explore to enter and conduct exploration activities;

The applicant, Riversdale Alaska LLC (RAL), a wholly owned subsidiary of Riversdale Resources Pty Ltd confirms their right to enter the property for the purposes of conducting exploration and reclamation on its acquisition of Mental Health Trust Coal Lease #9200510. This coal lease was obtained through a competitive coal lease sale which closed on January 6, 2012. RAL won the lease. After satisfying the General Conditions of the lease package, RAL consummated the Chickaloon Coal Lease on February 21, 2012. Alaska Earth Sciences Inc. (AES) of Anchorage, Alaska, is a consultant to RAL in respect of geology, stakeholder relations and also regulatory compliance consultants in Alaska. Representatives of AES, therefore, will have the right to enter the coal lease property for RAL.

5.0 CHICKALOON LAND OWNERS

The following list shows the names and addresses for Chickaloon property surface owners.

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
ADAMS DANIELA			520 W JACKFISH RD	WASILLA	AK		99654
AKSAMIT RONALD E	LOKEN EVA		101 WOLF DR	EAGLE RIVER	AK		99577
ALASKA PACIFIC UNIVERSITY		% ACCOUNTS PAYABLE	4101 UNIVERSITY DR	ANCHORAGE	AK		99508-4625
ALASKA STATE OF	DNR AK MENTAL HEALTH TR AUTH	TRUST LAND OFFICE	718 L ST	ANCHORAGE	AK		99501-3336
ALASKA STATE OF	DNR DIV OF OIL		550 W 7TH AVE	ANCHORAGE	AK		99501-3579
ALASKA STATE OF	DNR DIV OF LANDS		550 W 7TH AVE	ANCHORAGE	AK		99501-3579
ALEXAKIS PETE			13000 NORA DR	ANCHORAGE	AK		99515
ALFORD JILL			26616 N GLENN HWY	SUTTON	AK		99674
ALPINE DEVELOPMENT LLC	HOBBS RANDY		PO BOX 436	PALMER	AK		99645-0436
ANDREWS MARGARET	LUTZ VIRGINIA		207 LAKEVIEW DR	SITKA	AK		99835
ARCHIBALD PETER D			15600 E MOTHERSHEAD LN	PALMER	AK		99645
BABUSCIO PAUL & CATHERINE			15436 E REPUBLICAN WAY	PALMER	AK		99645-8536
BAER CRAIG L & JENNIFER W			PO BOX 245	SUTTON	AK		99674-0245
BAKER STACIA A			1700 TALKEETNA ST	ANCHORAGE	AK		99508
BALES JAS T & JOHANNA D			10427 NABESNA CIR	EAGLE RIVER	AK		99577
BARKER ALLISON			PO BOX 1223	CHICKALOON	AK		99674-1223
BARRIER SUSAN DOWD			PO BOX 1147	CHICKALOON	AK		99674-1147
BELL E WYATT			15316 ESTANCIA LN	WELLINGTON	FL		33414
BELL ROSEMARIE			4135 KACHINA WAY	PRESCOTT	AZ		86314
BELLAMY BENJAMIN WAYNE			5900 E YADON DR	WASILLA	AK		99654-7805
BENNETT ALLEN LEE			PO BOX 850	HOMER	AK		99603-0850
BENNETTS ROCKY W			505 N OAK	FRUITA	CO		81521
BENTON KIMBERLEY A			2019 BRANDILYN ST	ANCHORAGE	AK		99516
BERNHARDT EMILY			PO BOX 1128	CHICKALOON	AK		99674-1128
BEWAK THOS R			PO BOX 492	SUTTON	AK		99674-0492
BISCHOFF HERBERT G W	KONOPASEK DEAN E		12621 NEHER RIDGE RD	ANCHORAGE	AK		99516-3378
BISSELL GORDON L& ROBERTA			PO BOX 304	SUTTON	AK		99674-0304
BLACKBURN GERALD & JOY L			1401 BIRCHWOOD ST	ANCHORAGE	AK		99508
BONAUD MARY E			PO BOX 112822	ANCHORAGE	AK		99511-2822
BOUTET JACQUES	GRYDER-BOUTET DONNA		9043 SNOWY OWL CIR	ANCHORAGE	AK		99507
BOWES MATTHEW J	LOMBARDO VINCENT N		PO BOX 90278	ANCHORAGE	AK		99509-0278
BOYLE EDW W & DARLENE R			26129 N GLENN HWY	PALMER	AK		99645
BOYNTON PHILLIP			PO BOX 1205	CHICKALOON	AK		99674-1205
BRAENDEL KARL & DONNA			PO BOX 1148	CHICKALOON	AK		99674-1148
BRAEUTIGAM NORMAN JOSEPH	BRAEUTIGAM ARTHUR C		19626 BIG DIOMEDE CIR	EAGLE RIVER	AK		99577
BRENNER JOS E & LINDA			342 S ALASKA ST	PALMER	AK		99645
BROLINE JONATHAN D	BROLINE GREGORY A		1514 3RD AVE	FAIRBANKS	AK		99701
BROOKS MARKA A			1704 BANNISTER RD	ANCHORAGE	AK		99508
BROWN KRISTEN A		% NANCY A BROWN	654 S 200TH ST	DES MOINES	WA		98198-3708
BRUMMETT SAMUEL J& BONNIE			PO BOX 1253	CHICKALOON	AK		99674-1253
CAMBELL RYAN		% RYAN CAMPBELL	PO BOX 200867	ANCHORAGE	AK		99520-0867
CAMPBELL RYAN		APT 5	5300 LAKE OTIS PKY	ANCHORAGE	AK		99507-1748
CARNAHAN PATRICK G			232 E 10TH AVE	ANCHORAGE	AK		99501
CARROLL DAVIDA L			PO BOX 89	SUTTON	AK		99674-0089
CARROLL HELEN			PO BOX 1144	SUTTON	AK		99674-1144

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
CARROLL LAURA F			PO BOX 0009	SUTTON	AK		99674-0009
CASELLI MADELENE J			PO BOX 402	WILLOW	AK		99688-0402
CASEY J C			613 CLOSHIRE LN	BIRMINGHAM	AL		35214-4681
CHICKALOON COMM COUNCIL			PO BOX 1145	SUTTON	AK		99674-1145
CHICKALOON FIRE SERVICE INC			PO BOX 1163	CHICKALOON	AK		99674-1163
CHICKALOON MOOSE CRK NV A			PO BOX 875046	WASILLA	AK		99687-5046
CHICKALOON TRDG POST INC			PO BOX 2984	PALMER	AK		99645-2984
CHICKALOON VILLAGE			PO BOX 1105	CHICKALOON	AK		99674-1105
CHRISWELL BENJAMIN ISACC		# 1401	8050 PIONEER DR	ANCHORAGE	AK		99504-4764
CLARK WAYNE A			PO BOX 313	SUTTON	AK		99674-0313
COBB IRA S & TERESA L			1115 LAKE DR	CAWKER CITY	KS		67430-9783
COBB JONATHAN			2018 SUNRISE DR	ANCHORAGE	AK		99508
COLE PAUL		# 261	2360 COMMERCIAL DR	ANCHORAGE	AK		99501-3009
COLEN GLENN L			PO BOX 872660	WASILLA	AK		99687-2660
COLLINS LAYFORD B			PO BOX 1174	CHICKALOON	AK		99674-1174
COMBS A B & HENRIETTA		% SUSAN K SHELTON	11481 CRIMSONVIEW DR	PALMER	AK		99645
COMER RANDY D & SHARON L	% SHARON L COMER		3541 KNIK AVE	ANCHORAGE	AK		99517-1045
COOK INLET REGION INC			PO BOX 93330	ANCHORAGE	AK		99509-3330
COON DAVID		APT 75C	7913 HARWOOD RD	NORTH RICHLAND HILLS	TX		76180-5917
CORBUS KIENAN WHALEY JEFF KIMMEL JEREMY	ROED THOMAS LEE&WRIGHT TR GESTEN JESSE K	% KIENAN CORBUS	PO BOX 1249	CHICKALOON	AK		99674-1249
CORDON CHAS T			PO BOX 670531	CHUGIAK	AK		99567-0531
COTTER DAUGHTERS & SONS LLC			985 W EDINBOROUGH DR	PALMER	AK		99645-6558
COTTER JESSI			985 W EDINBOROUGH DR	PALMER	AK		99645-6558
COWLEY MARK C & REBECCA M			PO BOX 282	SUTTON	AK		99674-0282
COX DARLENE			PO BOX 692	PALMER	AK		99645-0692
CRAIG JANET J			12100 TIMBERLANE DR	ANCHORAGE	AK		99515
CRISTIN CAROLYN JOY LVG TR	CRISTIN CAROLYN JOY TRE		PO BOX 34015	SAN DIEGO	CA		92163-4015
CRISWELL FRANCIS M&JOAN A			375 S SERRANO DR	WASILLA	AK		99654
CROW JOHN W			9054 MAPLE GLEN	DALLAS	TX		75231
CRUM CONSTANCE E			8471 BROOKRIDGE DR	ANCHORAGE	AK		99504-4197
CUNNINGHAM RAYMOND & D		# C	4401 LEYDEN RD	ANCHORAGE	AK		99516
CZAJKOWSKI JACK	STEWART PHYLIS		142 KEYT WAY	COTATI	CA		94931-5359
CZAJKOWSKI JACK & PHYLIS			142 KEYT WAY	COTATI	CA		94931-5359
DAILEY RONALD	EASH ARTHUR S & KAREN M		16415 SOUTHCLIFF RIDGE CIR	ANCHORAGE	AK		99516
DAILEY RONALD H			16415 SOUTHCLIFF RIDGE	ANCHORAGE	AK		99516-5416
DAVIS DANNY T			PO BOX 1207	CHICKALOON	AK		99645-1207
DAVIS WM E CHICKALOON TR	DAVIS WM EVANS TRE		PO BOX 6494	SITKA	AK		99835-6494
DEAN WM SHANE	DEAN ROBT WM		PO BOX 35	SUTTON	AK		99674-0035
DEFREEST CHAS R&LILLIAN J			PO BOX 1110	CHICKALOON	AK		99674-1110
DEMSKE ADINDA		# 202	155 SMITHWAY	SOLDOTNA	AK		99669
DERYLO ERIC M			PO BOX 1232	CHICKALOON	AK		99674-1232
DEUSSING FRED C	DOUGLAS ELLEN E		PO BOX 1238	CHICKALOON	AK		99674-1238
DIEKEMPER BRIAN			PO BOX 190673	ANCHORAGE	AK		99519-0673
DODGE KIM			PO BOX 111944	ANCHORAGE	AK		99511-1944
DONNELLY CHRISTOPHER & M			PO BOX 1002	GIRDWOOD	AK		99587-1002

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
DOTY DANIAL			PO BOX 65	TALKEETNA	AK		99676-0065
DUBBINS JULIE A			PO BOX 110085	ANCHORAGE	AK		99511-0085
DUFF JACOB J	HELMS NICHOLAS J		276 TECUMSEH LN	MARY ESTHER	FL		32569-2225
DURNELL ROBT E			PO BOX 675	GIRDWOOD	AK		99587-0675
DUSEK DIANE			PO BOX 521902	BIG LAKE	AK		99652-1902
DYER RICHARD C& BARBARA A			PO BOX 4741	PALMER	AK		99645-4741
EARL HOWARD E & SHANNON R			PO BOX 388	GIRDWOOD	AK		99587-0388
EARL WM E & CAROLINE E			6612 CUTTY SARK ST	ANCHORAGE	AK		99502
EHRlich JUDITH E			PO BOX 1216	CHICKALOON	AK		99674-1216
ELLIS GARY R		APT 428	2205 KIMBERLY RD	BETTENDORF	IA		52722-3620
ERVIN HUNTER G & TINA R			PO BOX 4455	PALMER	AK		99645-4455
ESLER JACK I & MARJORIE			PO BOX 907	THOMPSON FALLS	MT		59873-0907
EVANGELICAL COVENANT CHUR	OF ALASKA		PO BOX 770749	EAGLE RIVER	AK		99577-0749
EVANS DAVID R & BETTIE L			PO BOX 445	SUTTON	AK		99674-0445
FALLDORF LOIS H DEC OF TR	FALLDORF LOIS H TRE	% DENNIS FALLDORF	9271 SHORECREST DR	ANCHORAGE	AK		99502-1334
FANCHER WILLARD L	FANCHER DEBORAH R		17900 SPAIN DR	ANCHORAGE	AK		99516
FARMER JAMES PAUL			11711 BIRCH HILLS DR	EAGLE RIVER	AK		99577-7906
FARNSWORTH ERWIN & RUTH			2605 JEFF CIR	ANCHORAGE	AK		99516
FEIGE ERIC A & CORRI A			PO BOX 1208	CHICKALOON	AK		99674-1208
FERRALL MICHAEL W	GROTH-FERRALL SHARYL L		PO BOX 1233	CHICKALOON	AK		99674-1233
FETTER AARON M & ADELE J			1747 TALKEETNA ST	ANCHORAGE	AK		99508-3244
FEY HERBERT L	ROY BARBRA E		13437 94A AVE	SURREY	BC	CA	V3V1M9
FIRMIN JOHN A			39 YOLANDA CT	SAN ANSELMO	CA		94960
FLETCHER DAN'L R			12327 4TH AVE S	SEATTLE	WA		98168
FLETCHER ROBERT D	FLETCHER RUBY M		PO BOX 100143	ANCHORAGE	AK		99510-0143
FOLLEN KEVIN		PMB 432	3060 N LAZY EIGHT STE 2 CT	WASILLA	AK		99654-4319
FOSTER RICHARD & D LVG TR	FOSTER RICHARD M TRE FOSTER DIANE LEE TR		3321 W 31ST AVE	ANCHORAGE	AK		99517
FRANK DOUGLAS D			211 W COOK AVE	ANCHORAGE	AK		99501-1131
FREDRICH TIMOTHY			PO BOX 1116	CHICKALOON	AK		99674-1116
FREEBERG KENNETH J TRE	FREEBERG LVG TR		PO BOX 221511	ANCHORAGE	AK		99522-1511
FREEMAN JIMMY D SR & MARY F	FREEMAN JIMMIE D JR		720 W 86TH AVE	ANCHORAGE	AK		99515-1564
FREITAS SHAWN R	ZIEMBA MARY ROSE		PO BOX 190488	ANCHORAGE	AK		99519-0488
FRISBY ELEANORA A			5864 N FARM LOOP	PALMER	AK		99645
FRY WINNIE DUTMER			1957 CHATEAU DR SW	WYOMING	MI		49519-4922
GAUTREAU PETER F			PO BOX 1173	SUTTON	AK		99674-1173
GERETY DAWN			PO BOX 222	GIRDWOOD	AK		99587-0222
GERIK ROBT G & REBECCA			7201 CHAD ST	ANCHORAGE	AK		99518
GERRETY LOREN			1826 BANNISTER RD	ANCHORAGE	AK		99508-4023
GOSSETT CHRIS & LISA A			4200 E MARIAH DR	WASILLA	AK		99654-4411
GOURLEY OWEN B	MILLS KATHY D		11143 KASHAWAK DR	EAGLE RIVER	AK		99577
GOW DOUGLAS G			PO BOX 0181	SUTTON	AK		99674-0181
GRAHAM MARK			1852 E 57TH AVE	ANCHORAGE	AK		99507-1941
GRANT DONNA COTTER			3021 E 142ND AVE	ANCHORAGE	AK		99516-3908
GRAY BENJAMIN L			15705 E ROCKY RIDGE CIR	PALMER	AK		99645
HAACKE LORI M			2411 TASHA DR	ANCHORAGE	AK		99502

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
HAGER WM & BONNIE JO			11591 N WOLVERINE RD	PALMER	AK		99645-7815
HALLER CHESTER R & K			PO BOX 875131	WASILLA	AK		99687-5131
HAMMONS JOYCE COTTER			PO BOX 92575	ANCHORAGE	AK		99509-2575
HANCOCK RODERICK J	BERGER CYNTHIA L		1133 N ST	ANCHORAGE	AK		99501
HANNAH TONEY A & LINDA M			1711 WOO BLVD	ANCHORAGE	AK		99515
HANSEN CHAS A & SANDRA A			2530 TRISHA AVE	ANCHORAGE	AK		99516
HARP BRAD D & SUSAN L			3724 N CHEYENNE ST	TACOMA	WA		98407
HARRISON G D HARRISON P L	HARRISON L R HARRISON T E HARRISON D B &		32601 N GLENN HWY	PALMER	AK		99645
HARRISON GARY D			PO BOX 1189	CHICKALOON	AK		99674-1189
HARRISON TIM			PO BOX 206	SUTTON	AK		99674-0206
HARTIGAN J F & FLORENCE			5065 N 109TH ST	LONGMONT	CO		80501-8409
HELGELIEN PROP LLC	HELGELIEN DONNA MGR SWANSON NANCY MGR	HELGELIEN CLARE G EST	PO BOX 1133	ABERDEEN	SD		57401
HENDRICKSON D WAYNE			PO BOX 251	SUTTON	AK		99674-0251
HENRY CRAIG			PO BOX 1227	CHICKALOON	AK		99674-1227
HESTER CLARENCE & SUANNA	SCHWARTZ JOS A & HESTER W J		25544 E KNIK RIVER RD	PALMER	AK		99645
HILLMAN FREDERICK J	CHUN LEON L M & ALMA L		1685 STANTON AVE	ANCHORAGE	AK		99508-5034
HIRSCH BRIAN H			1210 W 15TH AVE	ANCHORAGE	AK		99501-4903
HIRZINGER KATHARINA E			PO BOX 1125	CHICKALOON	AK		99674-1125
HOBBS REBECCA A			PO BOX 533	SUTTON	AK		99674-0533
HOCKLANDER SCOTT			329 NEVADA ST	GOODING	ID		83330
HOFFMAN GREGORY PAUL			6833 E 12TH AVE	ANCHORAGE	AK		99508
HOKANSON RYAN C			PO BOX 1195	CHICKALOON	AK		99674
HOLLAND RICHARD M & K L			7730 JASON PL	ANCHORAGE	AK		99520
HOOSER CRAIG A			3040 SNOW GOOSE DR	WASILLA	AK		99654-2500
HORST LEONARD F & MAIDY			PO BOX 1241	CHICKALOON	AK		99674-1241
HUDSON FAMILY TR	HUDSON OREN B TRE		PO BOX 803	GIRDWOOD	AK		99587-0803
HUDSON STEVEN H			PO BOX 1242	CHICKALOON	AK		99674-1242
HULL G RICHARD & TERESA M			PO BOX 90499	ANCHORAGE	AK		99509-0499
HUNT HAROLD			1707 E 58TH AVE	ANCHORAGE	AK		99507
HUNT ROBERT H			PO BOX 131	WALKER	MN		56484-0131
HUSKEY L J & J R JT LVG TR	HUSKEY LAWRENCE J TRE HUSKEY JOSEPHINE R		7100 OLIVE CIR	ANCHORAGE	AK		99507
IDA LK ADD #1 SUB OWNERS			GENERAL DELIVERY	SUTTON	AK		99674-9999
IHRIG & THORNTON		% DONALD IHRIG	11872 ETON DR	GRNAD TERRACE	CA		92313
IVEY SAMUEL S & EOWYN L			PO BOX 3468	PALMER	AK		99645-3468
JACKSON PAUL D		# B5	903 AUK AVE	KENAI	AK		99611-6891
JAFC LLC		% ROOT	2910 CONCORD LN	ANCHORAGE	AK		99502-3118
JENKINS GARY			PO BOX 1168	CHICKALOON	AK		99674-1168
JENNINGS RAMONA		# 4	348 IDAHO ST	ANCHORAGE	AK		99504-1359
JENSEN PATRICIA M			13230 MESSINIA ST	ANCHORAGE	AK		99516-3809
JOHNSON DOUGLAS W	COMERCI LINDA R		1348 W 11TH AVE	ANCHORAGE	AK		99501-4247
JOHNSON HAZEL R			2060 CAMPBELL PL	ANCHORAGE	AK		99507-1330
JOHNSTON DAVID W & SHIRLEY			11400 HAWKINS LN	ANCHORAGE	AK		99516-1377
JOHNSTON ZACKARY			19575 N GLENN HWY	SUTTON	AK		99674
JONES RICHARD A			PO BOX 436	COPPER CENTER	AK		99573-0436
KALEMIS KONSTANTINOS	KALEMIS VASSILLOS KALEMIS MARIA-ANGELIKI		14 DIONYSOU ST	N VOUTZAS		GR	19009

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
KAMMERMEYER LEO M SR			PO BOX 636	PALMER	AK		99645-0636
KANDRICK MATTHEW A & KRISTA V			2020 BOREALIS DR	ANCHORAGE	AK		99503-1877
KELZENBERG MATT C	LOCHNER DAN'L J		3340 NEWCOMB DR	ANCHORAGE	AK		99508-4848
KEOGH WARREN J & SALLEY R			PO BOX 1166	CHICKALOON	AK		99674-1166
KERNS KEVIN LEE	WAGNER HEIDI ANNE		PO BOX 1161	CHICKALOON	AK		99674-1161
KEROSKY MICHAEL			2921 SPINNAKER DR	ANCHORAGE	AK		99516
KETCHENER GERALD			2260 ABRONIA CIR	ST GEORGE	UT		84790
KETCHUM CY & LINDA			PO BOX 1132	CHICKALOON	AK		99674-1132
KINDSETH JAS M			PO BOX 1200	CHICKALOON	AK		99674-1200
KINDSETH JAS R & VICKI L			PO BOX 1200	CHICKALOON	AK		99674-1200
KING MOUNTAIN LODGE LLC			12502 CRESTED BUTTE	EAGLE RIVER	AK		99577-7654
KIRKMEYER JAMIE CHAD	DANIELS SHARON L		PO BOX 1023	PALMER	AK		99645-1023
KLATT LESTER A & DORA A			501 W KLATT RD	ANCHORAGE	AK		99515-3319
KLEIN RACHEL			PO BOX 925	GIRDWOOD	AK		99587-0925
KLIMEK STANLEY EST	RIPPLEMAN BEN L	% PHILIP KAUFMANN	3475 RIDGEWOOD DR	AKRON	OH		44333-3119
KNEFF CHARLES G	CZAJKOWSKI PHYLLIS A		501 N PINE RIDGE LOOP	WASILLA	AK		99654-4162
KNIGHT RICHARD W			PO BOX 2671	PALMER	AK		99645-2671
KOEKKOEK DENNIS H& CONNIE			PO BOX 1252	CHICKALOON	AK		99674-1252
KOHINKA MICHELE L			2713 JEFFORD PL	ANCHORAGE	AK		99517-1039
KOLEHMAINEN JOHN G & K A			1251 N CALEVO DR	PALMER	AK		99645
KREFT ROBERT W & MARY A			PO BOX 1214	CHICKALOON	AK		99674-1214
KREMER KIRSTEN A			PO BOX 1204	CHICKALOON	AK		99674-1204
KRUEGER BERNARD& LORRAINE			19107 WHIRLAWAY RD	EAGLE RIVER	AK		99577-7203
LANCE SYLVIA A			PO BOX 2884	PALMER	AK		99645-2884
LANGE DOUGLAS A & BECCI S	STRYKEN RICHARD L		PO BOX 1974	PALMER	AK		99645-1974
LANNERS STEVEN J& KAREN S			7650 E TIMBER WAY	PALMER	AK		99645
LANNERS THOS P			PO BOX 1162	CHICKALOON	AK		99674-1162
LAROSE GAROLD BERTRAM			PO BOX 3412	PALMER	AK		99645-3412
LARSON JOEL P & JANE F			4785 ALMADEN DR	PALMER	AK		99645-8309
LAST FRONTIER GUEST RANCH			39901 N GLENN HWY	SUTTON	AK		99674
LAUX FERDINAND	VAN GILDER JOHN H		10516 CHAIN OF ROCK	EAGLE RIVER	AK		99577
LAWLER MARITA ANN			PO BOX 1187	CHICKALOON	AK		99674-1187
LAWRENCE SUSANNE			5016 MILLS DR	ANCHORAGE	AK		99508-4770
LEADMAN BRUCE			2208 CLEVELAND	ANCHORAGE	AK		99517
LECLAIR MATTHEW J			PO BOX 1194	SUTTON	AK		99674-1194
LECLAIRE JESSE & CHERYL			PO BOX 136	NEW MUNICH	MN		56356-0136
LECLAIRE MATTHEW	LECLAIRE MATT		PO BOX 1194	CHICKALOON	AK		99674-1194
LEMAY JOHN S			PO BOX 192	SUTTON	AK		99674-0192
LIVESAY MILDRED IRENE TRE	LIVESAY MILDRED I REV TR		11446 JEROME ST	ANCHORAGE	AK		99516-1420
LRC/DWJ REV LIV TR			1348 W 11TH AVE	ANCHORAGE	AK		99501-4247
LUST TR THE			PO BOX 1190	CHICKALOON	AK		99674-1190
LUTERAN EDW B			5731 N WILDWOOD DR	WASILLA	AK		99654
LYDIC GABRIEL B	DEMSKE ADINDA		PO BOX 1197	CHICKALOON	AK		99674-1197
LYTLE TERRY D			PO BOX 1247	CHICKALOON	AK		99674-1247
MARIN JOSE N & MARTA E		APT 310	1110 W 6TH AVE	ANCHORAGE	AK		99501-1950

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
MARLEY LVG THE TR	WILLING MARION L TRE MARLEY RAY E& MARY	# 2 CR 3540	PO BOX 69	FLORA VISTA	NM		87415-0069
MASCO SARAH			PO BOX 1951	PALMER	AK		99645-1951
MASON MITCHELL	MASON MARLA		PO BOX 271	SUTTON	AK		99674-0271
MATANUSKA-SUSITNA BOROUGH			350 E DAHLIA AVE	PALMER	AK		99645-6488
MCCALL CAROL			PO BOX 4364	COSTA MESA	CA		92628-4364
MCCAULEY EUGENE P&NANTANA			PO BOX 1117	CHICKALOON	AK		99674-1117
MCCRACKEN JOHN D	MCCRACKEN MARTA JUNE O		1334 E 26TH AVE	ANCHORAGE	AK		99508
MCCRACKEN JOHN DAVID	OVERPECK-MCCRACKEN MARTA JUNE		1334 E 26TH AVE	ANCHORAGE	AK		99508
MCDOWELL STEVEN W & SANDRA L			PO BOX 1248	CHICKALOON	AK		99674-1248
MCKENNA-JOHNSTON ZACKARY			19575 N GLENN HWY	SUTTON	AK		99674
MELSON JOHN E JR & C C		PMB 826	200 W 34TH AVE	ANCHORAGE	AK		99503-3969
MERCHANT KATHARINA			PO BOX 1125	CHICKALOON	AK		99674
MEYER NORMAN R& ORLANDA K			3252 E SERENDIPITY LOOP	WASILLA	AK		99654-2826
MICHEL ROBT E			PO BOX 1196	CHICKALOON	AK		99674-1196
MILLER JAMES G			8620 E NEW HOPE ST	PALMER	AK		99645-8023
MILLER WILLIAM F	LEVI FRANCES K		1209 OXFORD DR	ANCHORAGE	AK		99503-6939
MILLER WM L & MARIAN L		# 1	7329 FOXRIDGE CIR	ANCHORAGE	AK		99518
MINERVINI ELAINE W	LARSSON MARTIN R & LARSSON MICHAEL C		107 JAMES ST	WESTWOOD	NJ		07675
MOE THOMAS SVEN			4690 W STILSON	WILSON	WY		83014
MOFFITT JOHN JAS		% VA DOMM HVS	3001 C ST	ANCHORAGE	AK		99503
MONTAGUE KEVIN			PO BOX 371	GIRDWOOD	AK		99587-0371
MORTON MARLO E & MICHELE			PO BOX 1251	CHICKALOON	AK		99674-1251
MUTH JAS A & CAROL ANN			PO BOX 0188	PALMER	AK		99645-0188
NAGEL FRED R			PO BOX 521732	BIG LAKE	AK		99652-1732
NAY'DINI'AA NA'KASKA IRREV TR		% GARY D HARRISON, TRE	PO BOX 1189	CHICKALOON	AK		99674-1189
NEALE TIMOTHY F			3550 WESLEYAN DR	ANCHORAGE	AK		99508-4867
NELSON ROBIN J			29197 SE WHEELER RD	BORING	OR		97009
NEUSTEL RAYE ANN			430 W 21ST AVE	ANCHORAGE	AK		99503
NEWTON ROBERT R			PO BOX 539	SUTTON	AK		99674-0539
NIENHUESER GAYLE E& HELEN			2561 LOVEJOY DR	ANCHORAGE	AK		99508
NIKOLAS CHAS J			44990 CARVER DR	KENAI	AK		99611
NILES LARRY E & JASMINE A			PO BOX 473	SUTTON	AK		99674-0473
NOBLE CALEB	MORTON TERESA		HC 01 BOX 2365	GLENNALLEN	AK		99588
NORTH DINO R			PO BOX 271	CAMERON	WI		54822-0271
NORTH JAY F			N14243 860TH ST	NEW AUBURN	WI		54757-9427
NOVAK JOHN S & BRENDA S			8750 BROOKRIDGE DR	ANCHORAGE	AK		99504
NOYES JOS L			759 E CARNEY RD	WASILLA	AK		99654
NUNN HEATHER R			PO BOX 2776	PALMER	AK		99645-2776
NYGARD CHANCE B& BRIGHT L			7820 CASEY CIR	ANCHORAGE	AK		99507
OCHOA ERNEST J	KLINE ROSEMARY J		2550 GLENKERRY	ANCHORAGE	AK		99504
OGLESBY DAVID R & A S		% J RILEY OGLESBY	2440 BARRYMAN LN	ANCHORAGE	AK		99502
OKLAND HOWARD D & LINDA E			2702 MCKENZIE DR	ANCHORAGE	AK		99517-1142
OLDENBURG RANDALL & P			7601 E 34TH ST	ANCHORAGE	AK		99504
OMHOLT BRUCE D & DARLA K			1034 HOLLY AVE	ROHNERT PARK	CA		94928-1428
OWENS PATRICIA			PO BOX 1212	CHICKALOON	AK		99674-1212

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
PACINI EDO			17494 EHLE ST	CASTRO VALLEY	CA		94546-3824
PANCOWSKI PAUL	PANKOWSKI JOS		PO BOX 1203	CHICKALOON	AK		99674
PEDERSON HANS R			PO BOX 235	SELDOVIA	AK		99663-0235
PERROZZI JOS A & JANE I			1559 L ST	ANCHORAGE	AK		99501
PERSON JAMIE			6311 E 6TH AVE	ANCHORAGE	AK		99504
PHARRIS WARREN JAS I			PO BOX 210	SUTTON	AK		99674-0210
PITTA JAS E & CHARLEEN D			PO BOX 458	SUTTON	AK		99674-0458
PLACK RICHARD & PATRICIA			PO BOX 1213	PALMER	AK		99645-1213
PORTER DAVID & SANDRA			PO BOX 13152	TRAPPER CREEK	AK		99683-0152
PRATT KENNETH L	PRATT CAROLYN A BYRNE		5215 E 147TH AVE	ANCHORAGE	AK		99516
PRICE MICHAEL	BROTHERTON JAMEE		67 PILOT STREET	VICTORIA	BC	CA	V8V2A5
PUTNAM JAS W	BRAUMILLER SUE		5500 NEWTON RD	CARSON CITY	NV		89706-2401
RANDALL GORDON A	HAYNES LYNNE J		PO BOX 1149	CHICKALOON	AK		99674-1149
RAVINE WAYNE S			PO BOX 3739	PALMER	AK		99645-3739
REED ROY & DIANE			PO BOX 1201	CHICKALOON	AK		99674-1201
REED ROY L & LORETTA D			PO BOX 1201	SUTTON	AK		99674-1201
REIN RICHARD R	REIN ALETA P STEBBINS		PO BOX 1	SUTTON	AK		99674-0001
RENFER WM D JR& MARY JANE			PO BOX 558	SUTTON	AK		99674-0558
REYNOLDS JANICE			9150 E 8TH ST	TUCSON	AZ		85710-3114
ROBBINS PHILIP R			PO BOX 1255	CHICKALOON	AK		99674-1255
ROBERTS CARRIE JEAN			8790 COUNTY RD F8	CORNELL	MI		49818
ROGERS DONNETTA			1226 COUNTY RD 33200	SUMNER	TX		75486-5536
ROMRIELL GORDON LEE & K L			29731 N GLENN HWY	SUTTON	AK		99674
ROOT JEREMY S & NANCY L			2910 CONCORD LN	ANCHORAGE	AK		99502
ROUB MIKE W & JODY A			PO BOX 1236	CHICKALOON	AK		99674-1236
ROY BARBRA E			13437 94A AVE	SURREY	BC	CA	V3V1M9
RUCKEL DEREK & LORNA			PO BOX 1341	GIRDWOOD	AK		99587-1341
RUCKMAN SHARON			PO BOX 373	SUTTON	AK		99674-0373
RUMMINGER FAMILY TRUST	RUMMINGER WALTER E & BEVERLY J TRES		610 HOPEWELL RIDGE	ANDERSON	SC		29621
RUMSEY DONALD E			PO BOX 3897	SONORA	CA		95370
RUMSEY JERRY			523 CURIE DR	SAN JOSE	CA		95123-4912
SALERNO CHRISTOPHER		# B8	5400 W DIMOND BLVD	ANCHORAGE	AK		99515
SHELL JIM L & LYNNETTE			PO BOX 210281	AUKE BAY	AK		99821-0281
SCHMIDT CARL GEO		#6	3407 SPENARD RD	ANCHORAGE	AK		99503
SCHMITT BRIAN J SCHELLSCHMIDT SUSAN E	TODD THOMAS & DEBRA LIV TR TRES		HC 89 BOX 602	WILLOW	AK		99688
SCHROEDER JILLIAN S	SCHMITZ STACY M	# B	943 W 19TH	ANCHORAGE	AK		99503
SEXTON VIRGIL T			PO BOX 143433	ANCHORAGE	AK		99514-3433
SEYMOUR SHILOH		# A	11142 MAUSEL ST	EAGLE RIVER	AK		99577-8019
SHEARER DAN'L P & NANETTE			27220 TWP RD 511	SPRUCE GROVE	AB	CA	T7Y1H5
SHINDER FAMILY TRUST	SHINDER DANNY M & LINDA S TRES		10012 GRANDVIEW DR	LA MESA	CA		91941-6838
SHUMAKER FREDERICK D EXEC	LONE WOLF FAMILY TR % CHARLES W LONE WOL		PO BOX 1213	CHICKALOON	AK		99674-1213
SICKLES DOUGLAS M&KAREN K			PO BOX 1171	CHICKALOON	AK		99674-1171
SIMPSON TERRY LIDVIN			4514 N 35TH PL	PHOENIX	AZ		85018
SMITH D G	SMITH VIVIAN		3271 N BALD EAGLE DR	WASILLA	AK		99654
SMITH ERIN LEE LAMMIE	KEEN CARINA LYNNE LAMMIE LAMMIE JAS R JR		18820 93RD AVE Est	PUYALLUP	WA		98375

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
SMITH JOHN D			PO BOX 1169	CHICKALOON	AK		99674-1169
SMITH ROBT A & JANE A			PO BOX 404	SUTTON	AK		99674-0404
SNYDER FORREST C		% JUDY BUMPASS	2511 58TH ST SW	EVERETT	WA		98203
SODERSTROM GARY L & ALICE			PO BOX 13381	TRAPPER CREEK	AK		99683-3381
SPARROW ANTONIA CAROLINE	GESSNER BRADFORD DAVID		11100 STONY BROOK DR	ANCHORAGE	AK		99516
SPAULDING CHAS A JR& MARY			PO BOX 1129	CHICKALOON	AK		99674-1129
SPRADLING ELDON H& JUDY A		PMB 142	1150 S COLONY WAY STE 3	PALMER	AK		99645-6967
SPRINGER CUIINN B	SPRINGER KOVIA ANNE		10197 WILLMINGTON DR	SUMMERSET	SD		57718
STAGGS WARREN L&MARILYN E			PO BOX 1170	CHICKALOON	AK		99674-1170
STANDARD BILL E	MILLER-STANDARD MELODY K		137 SYLAMORE CREEK RD	MOUNTAIN VIEW	AR		72560
STANLEY JEFFREY			PO BOX 2071	MELBOURNE	FL		32902-2071
STEVENSON LISA R WOLCOTT	ELSBERG ANDREW M		PO BOX 1222	SUTTON	AK		99674-1222
STOCK CORINNE M BROUHARD			37945 N GLENN HWY	SUTTON	AK		99674
STOCK MARCIA K & WM R REV TR			3353 WILEY POST LOOP	ANCHORAGE	AK		99517
STOCK RAYMOND & ELAINE M			37945 N GLENN HWY	SUTTON	AK		99674
STOCK RAYMOND III & C A			37928 N GLENN HWY	SUTTON	AK		99674-8010
STOCKER JOS D			7205 E DENELLE ST	PALMER	AK		99645
STOFER MARTIN H & L KAY			2901 LILY ST	ANCHORAGE	AK		99508
STOUFFER TRACY			1330 E WASHINGTON ST	SOUTH BEND	IN		46617
STYNO COLLEEN A	STYNO JEREMY J		1130 W BEAVER AVE	PALMER	AK		99645-6802
STYNO JEREMY JAS			1130 W BEAVER AVE	PALMER	AK		99645-6802
TALCOTT JAS			PO BOX 42	SUTTON	AK		99674-0042
TANGHE GERALD GERARD			PO BOX 91	STERLING	AK		99672-0091
TAYLOR NANCY E			PO BOX 1234	CHICKALOON	AK		99674-1234
TERRY GREGG R			16905 MERCY DR	EAGLE RIVER	AK		99577-7611
THEISEN ROSEMARY E			4120 DEFIANCE ST	ANCHORAGE	AK		99504-4399
THOMAS MICHAEL S			1217 SHATTUCK AVE	BAKERSFIELD	CA		93305
THORP LYNETTE RENE		APT A	2206 ROOSEVELT DR	ANCHORAGE	AK		99517-3040
TINIUS JAS R & BLANCHE			30626 PRUDHOE BAY AVE	EAGLE RIVER	AK		99577-9737
TODD HAROLD H & DOROTHY W			147 OUR ST	VERNON	FL		33462-6339
TOWNE CHERYL			PO BOX 1110	CHICKALOON	AK		99674-1110
TRAPP SHARON VIRGINIA		% ELLEN MAYER	4858 SCRABBLE RD	SHEPHERDSTOWN	WV		25443-3538
TRAUTWEIN JOHN W	ELDRIDGE SARAH MCGIMSEY ROBT G & DEBRA		18945 TIMBERLINE DR	EAGLE RIVER	AK		99577
TURECKI PAUL			HC 1 BOX 1127	JOSHUA TREE	CA		92252-9728
UNITED STATES OF AMERICA		% FIELD MGR/ANCH FLD C	6881 ABBOT LOOP RD	ANCHORAGE	AK		99507
VAN DIEST CHAS R& LAURA M			PO BOX 331	SUTTON	AK		99674-0331
VAN PELT KANA L TR AGRMT	VAN PELT KANA L TRE GRANT GEO G TR AGRMT		4033 CLOVER CREEK CT	RENO	NV		89519-0629
VANCLEVE DAVID G & C C			PO BOX 366	SUTTON	AK		99674-0366
VARAH CHERI			PO BOX 10	SUTTON	AK		99674-0010
VARAH CHERIE L	HARRIMAN MARGARET		PO BOX 10	SUTTON	AK		99674-0010
VERZONE THAI GENE			1002 WILSHIRE AVE	ANCHORAGE	AK		99503-5623
VESSEY JOHN J & JANIE J			1150 N HICKORY ST	PALMER	AK		99645
VIG HOPE C			17570 VIG PL	MUD BUTTE	SD		57758-7105
VOGLER WARREN D& CHARLENE			15070 LULU RD	PETERSBURG	MI		49270
VOLLENDORF WM A & P A			5403 N STAR ST	ANCHORAGE	AK		99518-1045

OWNER_1	ADDITIONALLY LISTED OWNER	ADD_LINE_B	OWNERS ADDRESS	OWNERS_CITY	ST	COUNTRY	ZIP
WAHRER INA G			PO BOX 1229	CHICKALOON	AK		99674-1229
WAX LISA			SR 80	VALDEZ	AK		99686
WEIMER DAVID M			3854 S HALIFAX ST	AURORA	CO		80013-3973
WELLS CHRISTINE M			2741 W 69TH AVE	ANCHORAGE	AK		99502
WETZEL RANDALL E	WETZEL HENRY		20040 E CHICKALOON RD	CHICKALOON	AK		99674-9803
WHALEY DARLENE			PO BOX 1177	CHICKALOON	AK		99674-1177
WHALEY DARLENE M			PO BOX 1177	CHICKALOON	AK		99674-1177
WHISMAN JOHN R & JUDITH C			11835 WILDERNESS DR	ANCHORAGE	AK		99516
WIGET JULIE C	HARPER MARY K		3616 FIELD ST	OAKLAND	CA		94605
WILDER JORDAN MICAH			16578 N PERMANENTE RD	CHICKALOON	AK		99674
WILDER RICKY & SHANNON			16578 N PERMANENTI RD	CHICKALOON	AK		99674
WILKEN KURT			22750 MCMANUS DR	CHUGIAK	AK		99567
WILL DAWN L			PO BOX 3596	LACEY	WA		98503-3596
WILLIAMS JEFFREY M & D A			3660 E RUTH DR	WASILLA	AK		99654
WILSON LINDA J PIEKARSKI			170 W KLATT RD	ANCHORAGE	AK		99515
WILSON PETE			PO BOX 298062	WASILLA	AK		99629-8062
WILTSE PAUL J & LAURA SUE			PO BOX 770774	EAGLE RIVER	AK		99577-0774
WINEINGER DAN'L L & L J			PO BOX 1111	CHICKALOON	AK		99674-1111
WOMACKS JOS & GRACE			7355 EAGLE CREEK DR	DAYTON	OH		45459-3405
WOOD RICHARD			20405 W GLENN HWY	SUTTON	AK		99674
WORKMAN JED	BARKER ALLIE		PO BOX 1223	CHICKALOON	AK		99674-1223
WRAY DONALD W	GREEN KRISTINA V	PMB 82	200 W 34TH AVE	ANCHORAGE	AK		99503-3969
WRITER KATIE			PO BOX 440	TALKEETNA	AK		99676-0440
WYSOCKI ALEXANDER III	WYSOCKI TEENA		2286 COLLIER CT	BELLEVUE	WA		54311
YARBRO DONNA			32964 N GLENN HWY	SUTTON	AK		99674-8003
ZAPPA RALPH & CECILA			447 22 1/2 AVE	CUMBERLAND	WI		54829-0209

PART B – EXPLORATION AREA DESCRIPTION

11AAC 90.163(a) (2) An exploration and reclamation plan of operations that includes:

11 AAC 90.163(a) (2) (A) a brief description of the proposed area, cross-referenced to the map required under (4) of this section, including available information on the following:

1.0 LOCATION, ACCESS, AND PHYSIOGRAPHY

11 AAC 90.163 (a) (2) (A) Surface topography and other physical features

11AAC 90.167 (f) Existing roads, trails, runways, and marine facilities may be used under the following conditions: 11 AAC 90.167(1) all applicable federal, state, and local requirements must be met.

The Chickaloon Coal Lease recently acquired by RAL is located near the middle of the Matanuska Valley, a narrow 5 to 10 mile wide and 50 mile long lowland structural trough that extends from Moose Creek on the west to the Matanuska Glacier on the east (Figure 1). This lowland is bounded on the north by the Talkeetna Mountains and on the south by the Chugach Mountains.

The coal lease is located in the Chickaloon coal district, one of three major coal districts of the Matanuska Coal Field. The other districts are at Wishbone Hill and Anthracite Ridge (Merritt and Belowich, 1984). The 9,927.60 acre lease to RAL encompasses only that part of the coal district north of the Matanuska River, east of Kings River and west of the Chickaloon River (Figure 2). The coal lease lies entirely within the Anchorage Quadrangle (scale 1:250,000) and the Anchorage D-4, D-5 Quadrangles (scale 1:63,360).

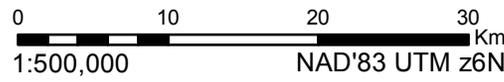
Land physiography within the leased portion of the Chickaloon coal district can be described as a series of undulating low ridges and knolls with interspersed kettle topography. Some of the lower ridges are possibly old river terraces. A few small tributaries to the major rivers cut through the undulating ridges, kettles and terraces.

Access to the coal exploration area is possible from the Glenn Highway at two locations (Figure 2). One is at Fish Lake Road near Mile 73 of the Glenn Highway, and the other is at Chickaloon River Road near Mile 78 of the Glenn Highway. Private property lines both sides of these gravel-surfaced roads. Fish Lake Road turns into East Chickaloon Road traveling eastward after leaving state maintenance. Most of the private property and a large percentage of the local population are concentrated along Fish Lake Road and East Chickaloon Road.

The primary access into RAL's coal lease area will be the old road to the old Castle Mountain Mine (Figure 2), which is presently covered by a small active coal lease. This old road, now mainly a trail, leaves East Chickaloon Road approximately one-half mile west of its intersection with Chickaloon River Road. It is an unimproved and unmaintained 2½ mile gravel and dirt trail going north and then west to the old mine site. There is also ATV access to the extreme western portion of the coal lease area



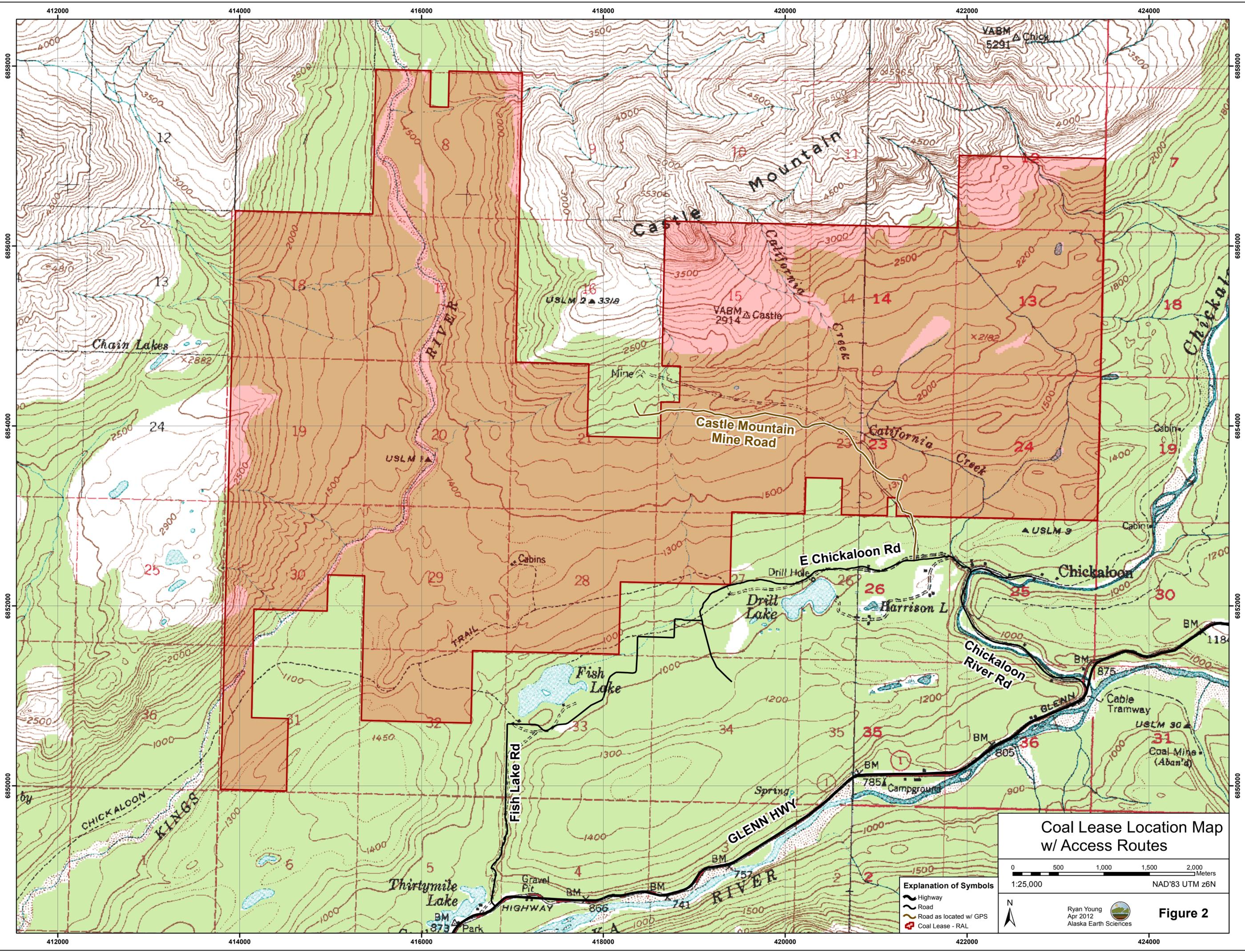
Regional Location Map



Ryan Young
Apr 2012
Alaska Earth Sciences



Figure 1



**Coal Lease Location Map
w/ Access Routes**

0 500 1,000 1,500 2,000 Meters
 1:25,000 NAD'83 UTM z6N

- Explanation of Symbols**
- Highway
 - Road
 - Road as located w/ GPS
 - Coal Lease - RAL



Ryan Young
 Apr 2012
 Alaska Earth Sciences

Figure 2

via the Permanente Trail from its trailhead near Mile 71 of the Glenn Highway. Prior to the start of the 2012 exploratory drilling program and the 2012 ground based field studies, a complete review of land access and easements will be conducted.

2.0 GEOLOGY – GENERAL

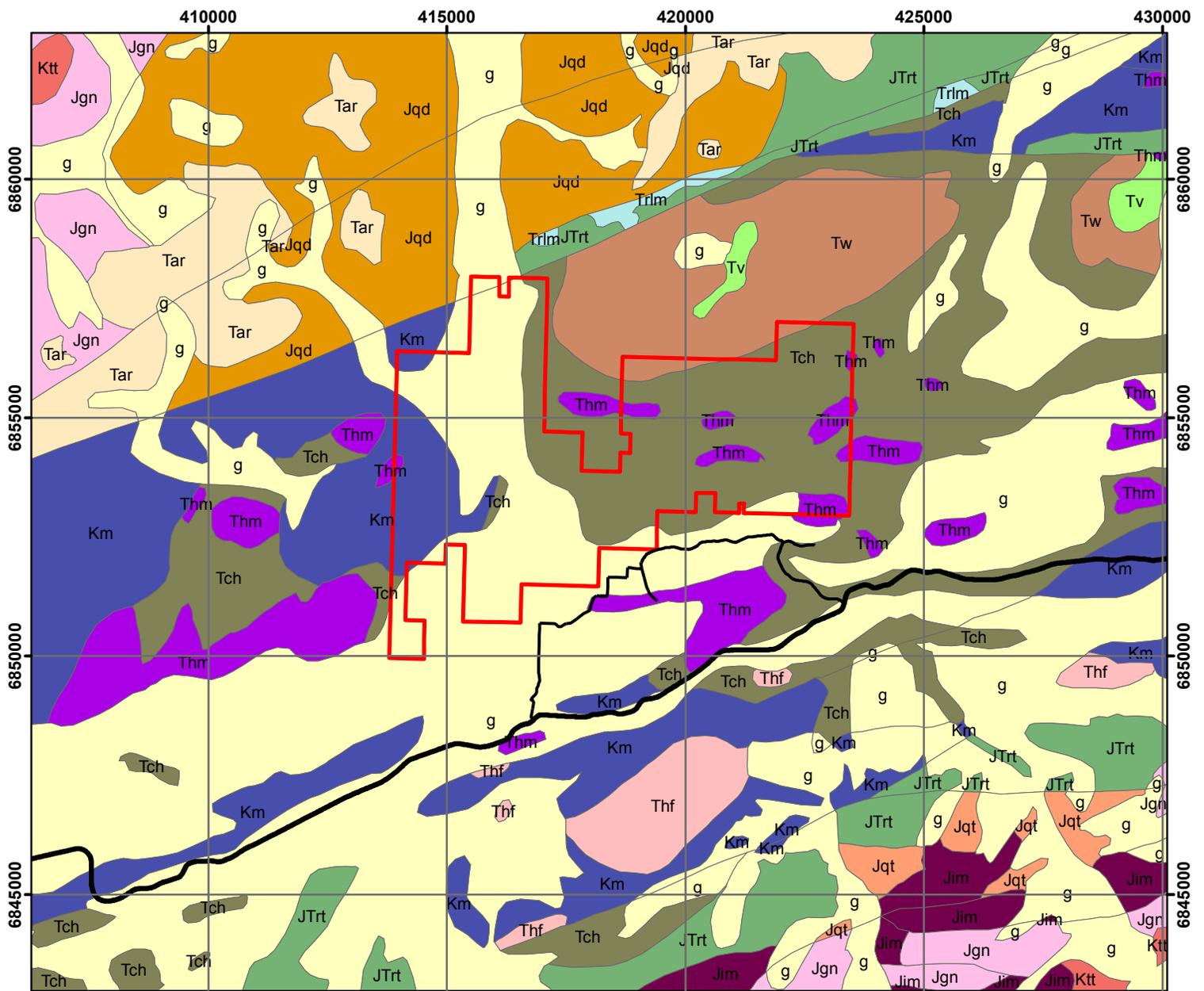
11 AAC 90.163 (a) (2) (A) Geology

The geology of the Matanuska River Basin, which contains the Chickaloon Coal Lease area, includes four principle lithologic groups. They are, from oldest to youngest, Precambrian low-grade metamorphic rocks, late Mesozoic and early Tertiary marine and terrestrial sedimentary rocks, mid Tertiary hypabyssal igneous complexes, and Quaternary glacial and fluvial-related deposits. Chickaloon area geology, taken from an Alaska Geological Society Guidebook map (Trop and Plawman, 2006), is illustrated in Figure 3. The Matanuska Valley is a northeast-trending structural trough underlain predominantly by Mesozoic and Tertiary sediments and bounded on the north and south by major deformational systems. The sedimentary section is underlain by low-grade metasedimentary rocks, which are exposed south of the valley in the Chugach Mountains. Metamorphosed volcanic basement rocks of the lower Jurassic Talkeetna Formation and the plutonic rocks of the Talkeetna Mountains batholith are exposed north and east of the valley. In general, bedrock formations are well exposed in the higher elevations of the valley, while in lower areas of the valley, exposures are limited to fluvial cutbanks and road cuts. Most of the valley floor is overlain by poorly consolidated Pleistocene and Holocene units of glacial and glacialfluvial origin (Clardy, 1984). In the Chickaloon area, however, these glacial and glacial-fluvial deposits are thin or absent.

In the area of interest, the Mesozoic and Tertiary sedimentary lithologies are comprised of five major formations (Figure 4). The lowermost formation (Arkose Ridge Formation) is primarily located south and west of the Hatcher Pass area and is separated from general Matanuska Valley geology by a major fault. This formation consists of arkosic sandstones and conglomerates derived from granitic rocks to the north in the Talkeetna Mountains. It also contains volcanoclastics such as breccias and tuffs. There remains a question to the age of this formation, which is shown by a query in the figure.

The base of the Matanuska Valley sedimentary section is the Matanuska Formation, a Cretaceous-aged marine sandstone and shale sequence that comprises more than one-third of the bedrock outcrops in the Matanuska Valley. The formation is more than 4,000 feet thick at its type section along Granite Creek east of Wishbone Hill. Many of the steep cliff-forming rocks along the Glenn Highway and Matanuska River belong to the Matanuska Formation.

The Chickaloon Formation unconformably overlies the Matanuska Formation and evidence indicates, at one time, it may have been over 5,000 feet thick in the Matanuska Valley. It was named for the river on which these coal-bearing deposits were originally discovered in 1894. These rocks contain non-marine sandstone, siltstone, claystone, carbonaceous shale, and minor conglomerate in addition to coal. The Chickaloon Formation is Paleocene to Eocene in age (approximately 54 million years old based on fossil and volcanic ash dating). Due to folding, faulting, intrusions by younger igneous rock, and subsequent erosional activity, the formation



Generalized geologic map of the Chickaloon Area. Modified from USGS OF 98-133.

Generalized Geology

Explanation of Symbols

- Lease Block Outline
- Highway / Road
- Geologic Contact
- Lake

Lithology

Intrusives

- Thf - Eocene - Hypabyssal felsic and intermediate intrusions
- Thm - Eocene - Hypabyssal mafic intrusions
- Ktt - Early Cretaceous - Leucotonalite and trondhjemite
- Jqd - Middle Jurassic - Quartz diorite
- Jqt - Middle Jurassic - Quartz diorite and tonalite
- Jgn - Middle to Early Jurassic - Gabbonorite
- Jim - Middle to Early Jurassic - Mafic and intermediate plutonic

Layered Rocks

- g - Holocene - Glaciers and superglacial moraines
- Tv - Miocene to Paleocene - Volcanic Rocks
- Tw - Eocene - Wishbone Formation
- Tch - Eocene and Paleocene - Chickaloon Formation
- Tar - Eocene and Paleocene - Arkose Ridge Formation
- Km - Cretaceous - Matanuska Formation
- Jtx - Middle Jurassic - Tuxedni Group
- JTrt - Early Jurassic to Late Triassic - Talkeetna Formation
- Trlm - Late Triassic - Limestone and marble
- KmX - Mesozoic - McHugh Complex of the Valdez Group
- JPzmu - Metamorphic rocks undivided

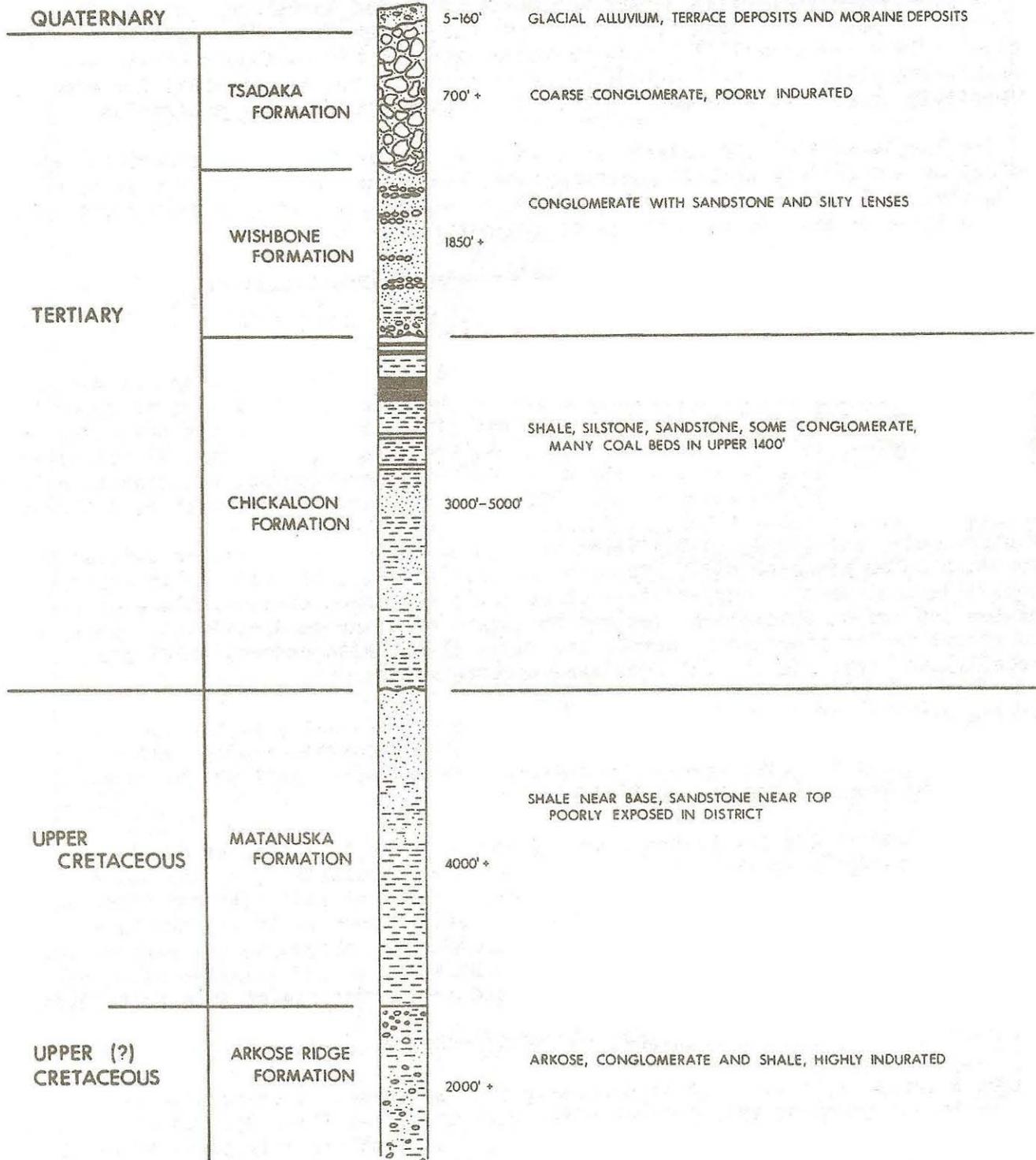


FIGURE 4: Generalized geologic section, lower Matanuska Valley

occupies several irregularly shaped areas in the Matanuska Valley. The structural deformation is more severe to the east, up the Matanuska Valley. This means that the Anthracite Ridge coal district exhibits the most severe deformation, followed by the Chickaloon and Wishbone Hill coal districts, respectively. The increase in regional deformation and concurrent thermal igneous activity in an easterly direction up the valley has resulted in an increase in coal rank in that direction. As a result, coals in the Matanuska Valley range from high volatile bituminous near Moose Creek in the Wishbone Hill District to anthracite at Anthracite Ridge. Chickaloon area coals are medium to low volatile bituminous with some semi-anthracitic coals present locally. These latter ranks of coal often exhibit a particular quality that allows them to coke, which is necessary in metallurgical enterprises such as steel making.

Coal-bearing rocks contained within the Chickaloon Formation appear to lie at different stratigraphic intervals within the formation. At Wishbone Hill, these coal-bearing rocks are located within the top 1,400 feet of the formation (Barnes and Payne, 1956). In the Chickaloon area, the coal-bearing rocks appear to be located in the middle of the formation (Hill, 1923). Eastward, near Anthracite Ridge, the prominent coal zones lay nearer the base of the Chickaloon Formation (Waring, 1936).

The third major sedimentary formation in the Matanuska Valley is the Eocene-aged Wishbone Formation. This formation consists of approximately 1,800 to 2,000 feet of massive cobble conglomerate with minor sandstone and siltstone. Its type section is located at Wishbone Hill, where it got its name. In the Chickaloon area, the Wishbone Formation strata form the steep cliffs of Castle Mountain and Puddingstone Hill north and east of the coal lease areas where maximum thickness is estimated to exceed 3,000 feet (Clardy, 1984). In most localities, the Wishbone Formation conformably overlies the Chickaloon Formation, although there is an erosional contact in the Wishbone Hill area.

Overlying the Wishbone Formation in the western portion of the Matanuska Valley is the Tsadaka Formation. This Oligocene-aged formation is similar to the Wishbone Formation in that it is a conglomerate with varying amounts of sandstone. However, the clasts within the formation are different. The Tsadaka Formation clasts are plutonic in origin while the Wishbone Formation clasts are primarily volcanic in origin. Since the 500+ foot formation is found mainly at Wishbone Hill and the Tsadaka Canyon of Moose Creek and not in the Chickaloon area, it will not be discussed further.

The Matanuska Valley is mantled by variable thicknesses of Quaternary-aged glacial deposits, stream terrace gravels, landslide debris, and alluvial deposits. As noted earlier, these younger deposits are not well developed in the Chickaloon Coal Lease area which will be a benefit to the coal exploration program.

Understanding the geologic structure of the area and the mid-Tertiary volcanic intrusive activity relationship to the coal-bearing units in the area is critical. Volcanic and intrusive activity has affected the coal-bearing rocks since the initial deposition of peat in the Paleocene/Eocene periods. Structural deformation in the Chickaloon area has folded the Chickaloon Formation into a series of synclinal and anticlinal fold complexes with some areas locally overturned. Many of these folds were then cut by faults. Complicating this deformation is

interjection of mid-Tertiary basaltic flows and hypabyssal intrusive rocks, such as diorite porphyries, trachytic rocks, diabases and gabbros. Many of these rocks have intruded along fault and fracture planes. In order to understand and delineate the complex geologic setting in the Chickaloon Coal Lease area, the activities proposed in this exploration permit application are absolutely necessary. The structural complexity of the area must be combined with a thorough evaluation of the coal's quality and character in order to quantify the coal resources as to their economic potential.

3.0 PREVIOUS MINE HISTORY AND EXPLORATION DRILLING

3.1 Chickaloon, Kings River, and Coal Creek Mines

While gold mining was opening up the north and western side of the Matanuska Valley in the late 1800's, coal was gaining interest in northeastern side of the valley, along the Matanuska River. In late 1894, Native Americans informed trappers and prospectors of the exposed coal seams along the area's rivers and streams. Although some attempts at mining these coal seams were made between 1894 and 1896, they were soon abandoned.

In 1898, H.H. Hicks was reportedly the first person of European descent known to visit the headwaters of the Matanuska River. The federal government, at this time, was looking for a trail from Cook Inlet to the gold fields near Circle City. Hicks was hired as a guide for Captain E.F. Glenn and Lt. J.C. Castner to layout this new trail. After accompanying Lt. Castner for the first 50 miles up the Matanuska River Valley, Hicks left that field party since he was only familiar with the Matanuska River district and the expedition was continuing on to the north. Meanwhile, E.F. Glenn and W.C. Mendenhall of the third Military Expedition were tasked with surveying the region. They reported finding "steam-producing quality" coal within the Matanuska Valley.

Following the 1898 expedition, the Army Department, at Glenn's recommendation, sent W.C. Mendenhall into the Matanuska area to map the coal fields. His preliminary surveys were followed by several years of extensive mapping by the U.S. Geologic Survey. In a 1905 article on the Matanuska Coal Field by William Griffith (in the Mines and Minerals section of the Alaska Monthly), Griffith noted the high quality of the coals for blacksmiths fuel and coking quality (Griffith, 1905).

In 1904, the Alaska Central Railway began construction of a railroad intended to tap the Matanuska Valley coal fields for fuel. The railroad was backed by private financiers. They chose Seward, an open water port on the southeastern side of the Kenai Peninsula, as their southern terminal, and targeted the Tanana River as their northern terminus to connect with Yukon River traffic. The entire scheme was based on the prospect of using Matanuska coal for their engines. Frank Watson in 1906 had a producing coal mine on the Chickaloon River near Castle Mountain. After the Alaska Central Railway had laid about 47 miles of track, the U.S. Government withdrew the rights to lease coal lands and the Alaska Central Railway went bankrupt. For the following six years, the coalfields lay dormant. The Alaska Central Railway reorganized briefly in 1909 to become the Alaska Northern Railroad and laid 25 more miles of track, but financial stress again stopped work.

When Alaska became a territory in 1912, there was renewed interest in the coalfields. The U.S. Navy became interested in Chickaloon for its excellent steam coal which they needed for their Pacific Fleets. The coal also generated interest in completing a railroad to help open up and support mineral exploration and development in the interior. During the winter of 1913-14, 800 tons of Matanuska coal from the old Watson's Camp area at Chickaloon, now called Camp Daniels, was sledded down the Matanuska River, south through the Kenai Peninsula to Seward, where it was tested aboard the U.S.S. Maryland and found entirely satisfactory (Chapin, 1920).

On March 12, 1914, President Wilson signed a bill authorizing a government-built Alaska railroad. The railroad objective was to locate, construct, and operate a railroad by which the Pacific could be united with the navigable waters of interior Alaska, similar to the earlier Alaska Central Railways objective. The president appointed the Alaskan Engineering Commission (AEC) to examine the best possible routes for a railroad to fulfill these objectives. The AEC submitted their report with railway route discussions on February 11, 1915. One of the routes involved a rail line spur into the Matanuska coal fields. Also in 1914, Congress passed the Coal-Land Leasing Act, which opened coal lands for leasing and consequently private development. When Congress opened land for coal leases in 1916, it withheld Leasing Unit 12, the Chickaloon mine area, for government use.

By February 17, 1915, materials were being gathered for construction of the railroad from Ship Creek (the present site of Anchorage) to the Matanuska Coal Field. The railroad from Ship Creek to the Matanuska Coal Fields was being constructed even as the Seward-Ship Creek section of track had yet to be completed. The rail connection to the Matanuska coal fields at Chickaloon was completed on October 20, 1917 for the railroad line to be completed up the Matanuska Valley to its terminus on the Chickaloon River. The railroad spur ran 38 miles from Matanuska, a small town that sprang up at the intersection of the main line to the interior and the spur line up the Matanuska River valley to the Chickaloon River.

There are old coal leasing units in the area that encompass portions of Riversdale Alaska LLC's (RAL) current MHT coal lease. They are Leasing Units 8-11 in the Kings River and southern Castle Mountain foothill area. Areas south of the Matanuska River in the vicinity of Coal Creek were in old Leasing Units 13-15. Exploration for economic coal deposits in these areas began at the turn of the century. At that time the areas determined to have the best potential for coal mine development were along the Chickaloon River, Kings River, and Coal Creek.

A town site was established along the Chickaloon River in 1917. Mining operations were managed by AEC and the coal was designated for use exclusively by the U.S. Navy. Coals from leasing blocks other than Unit 12 were set up for local and possible Alaska Railroad usage. Ten exploratory tunnels, some of which were originally started as Watson Camp prospect tunnels in 1905 and became the so-called Camp Daniels tunnels in 1913 were opened. World War I interrupted development of the Chickaloon Mine because it was U.S. Navy funded. After the end of the war, the Navy's interest in the Chickaloon coal was quickly renewed. While the Chickaloon Mine was expanding, new exploration was initiated at known coal outcrops along the Kings River and at Coal Creek.

A total of 13 separate coal beds were mined from the ten Chickaloon tunnels during the next 5 years. The coal beds ranged in thickness from 2.5 feet to 17 feet. Two coal beds, one 10 feet thick and the other 5 feet thick were being developed at the same time along the Kings River, just southwest of Castle Mountain. Exploration and development work on the above coal seams in the Chickaloon Coal District were being managed at this time by the Navy Alaskan Coal Commission. No published coal tonnage was noted from the development work at Kings River.

As part of the exploration strategy of the Navy Alaskan Coal Commission at this time, numerous stratigraphic sections were measured along stream exposures. The measurements were made in order to get a better understanding of the lateral continuity of the coal seams. In addition, some exploration drilling was conducted. Drilling exploration totaled nine boreholes, with eight of those drilled on just a 20 square acre area 1/4 mile east of the old Coal Creek Mine south of the Matanuska River.

The only other Navy borehole was located in the southeast quarter of Section 24 within Township 20 North, Range 5 East, about 3/4 mile north of the old Chickaloon Mine tunnels (W.P.T. Hill, 1923). This vertical hole was drilled to a depth of 1,345 feet. It was not deep enough to reach the thick coal measures found at the Chickaloon Mine since it appeared to have been drilled just north of a synclinal axis first noted by Martin and Katz (1912). This borehole did, however, prove that the Chickaloon syncline was a much broader structure to the north of the Chickaloon Mine than previously thought. The Chickaloon Mine itself was located on the steeply dipping southern limb of this asymmetrical syncline. The northern limb of the syncline appears to be dipping more gently based on bedding strikes and dips exposed on rock outcrops seen along the Chickaloon River north of the mine site.

A few exploration wells were drilled by the Chickaloon Coal Company of San Francisco between 1918 and 1922, but little information is known about them, except that they were drilled in Lease Unit 11 west of the Chickaloon Mine workings (Chapin, 1920, Hill, 1923). These exploratory holes, named the Gompertz holes by W.P.T. Hill (after the company's superintendent), showed the flattening of the Chickaloon syncline to the west. With the exception of a 658 foot section from their drill hole #1, no other information on these holes is known. The exploration by the Chickaloon Coal Company revealed that most of the coal measures seen at Chickaloon were missing at the Chickaloon Coal Company exploration. This was thought to be due to fault displacement.

During the years from 1917 to 1922, the Chickaloon Mine coal seemed to be the answer to refueling problems sustained by naval fleets in the Pacific. Alaska was along the great circle route to the Far East, and the quality of coal from Chickaloon met the strict standards of the Navy fleet. In 1920, Congress appropriated \$1 million for the Navy to invest in the Chickaloon Mine. Overseeing the project became the responsibility of the Alaska Coal Commission (ACC). The ACC contracted with the Alaskan Engineering Commission (AEC) to oversee and supervise the entire operation. Part of this money went to a new coal washing plant to separate the heavier rock and mineral impurities from the lighter coal. This coal washing plant was set up in Sutton, south of the other AEC mine at Eska, so that coal from both mines could be washed. In the meantime, workers at Chickaloon continued to build up the town adjacent to the coal mine.

Approximately 158 civilian workers were employed by September of 1921 besides the coal miners.

By the spring of 1922, the state-of-the-art coal washery was completed, but served the Chickaloon Mine for only a short time. Just a few tons of coal had been processed before the entire coal mining effort at Chickaloon ceased. The reason was twofold: First, the complex geology of the underground mines in Chickaloon had resulted in slow mining progress. More miners were hired to increase coal production, but this drove the labor costs to prohibitive levels. Second, petroleum began to gain greater attention as a potential fuel source for the naval fleet. Finally on April 2, 1922, the Navy directed the ACC to cease all development work. The Chickaloon Mine was put on a standby status. A total of 25,000 tons were produced at Chickaloon between 1913 and 1922, most of which went to the on-site powerhouse and Navy ship testing.

A wildcat exploration well for oil was completed in 1929 by Peterson Oil near Drill Lake. This well was drilled on Navy coal leased acreage in a last ditch effort by the government to make something of its investment in Alaska. It was drilled to 1,362 feet and encountered gas and no oil. Although the Navy wildcat oil well proved to be a dry hole, it encountered about 13 separate coal seams, totaling 37 feet of coal, between 224 feet and 809 feet. This zone of coal-bearing rocks was comparable in thickness to that mined at Chickaloon, but the total cumulative coal thickness was considerably less.

The rest of the known coal exploration boreholes in the vicinity of the RAL's coal lease were associated with the Castle Mountain Mine development activities in 1989 and 1990. During this exploration program, a total of 21 vertical boreholes were drilled to an average depth of 150 feet. This program covered an area of approximately 7 acres of Hobbs Industry's 180-acre coal lease block. In contrast to the deeper drilling for underground coal reserves during the U.S. Navy days, the shallow bore holes at Castle Mountain were intended to define a surface mineable coal reserve.

3.2 Castle Mountain Mine

The Castle Mountain area was first visited by the U.S. Navy Alaska Coal Commission during Chickaloon's heyday period from 1920-1922. The Coal Commission conducted extensive trenching and exploration work during this time on the south side of Castle Mountain and along King's River. No mining was done at Castle Mountain, but a small mine did develop on King's River.

Initial activity at the present Castle Mountain Mine site occurred in 1952 when Haakon Edwardson applied for a coal prospecting permit on land previously used to supply mining timbers to the Evan Jones Coal Company Mine, north of Sutton. He was awarded a prospecting permit for 2,560 acres in 1953. In 1956, after some limited coal prospecting work from an underground drift, Mr. Edwardson subleased his permit to Rudolph Sterbenz and Paul Omlin. In 1957, a road from Drill Lake to the mine site was completed and a shop and wash plant was built. The road followed in most part the old trail that the Navy made to their exploration and

trenching sites of the early 1920's. In 1958, a Preference Rights Lease was assigned to 640 acres of the property for coal development.

At the Castle Mountain Mine, coal was originally mined in 1958 and 1960 from two north/south trending strip pits. These pits were aligned along the northwestern limb of a small northeast plunging synclinal structure. A total of 600 feet of coal along strike and 100 feet down dip were uncovered and mined along this limb. In the northern pit, a 6.5 foot coal bed was mined and in the southern pit, two seams, an upper 6.1 foot seam and a lower 8.7 foot seam, were mined. There is an average of 6.7 feet of clay and boney coal parting between the latter two coal seams. Average dip for the mined coal seams was 37 degrees to the southeast (Maloney, 1957).

During 1958 and 1960, a total of 20,000 tons of coal were mined from the newly named Castle Mountain Mine from State of Alaska coal lease ADL 33978. The coal was sold to the Evan Jones Coal Company to fulfill their Anchorage military contracts. The subsequent lack of coal contracts beginning in 1961 essentially closed down the operation. In 1961, Paul Omlin applied for and received a coal prospecting permit for what was then coal lease ADL 53509. Later in the same year, Haakon Edwardson died, and early in 1962 Paul Omlin received title on Edwardson's original lease. Omlin transferred his idle coal leases to Robert Gore in 1977. Mr. Gore died in 1986, with his wife Sara taking over leases ADL 33978 and 53509 that totaled 180 acres. In May 1988, those coal leases were transferred from Sara Gore to Hobbs Industries, Inc., who still holds them today. In 2010, the two coal leases were combined into one lease (MHT 9200442) by the Alaska Mental Health Trust Land Office, who presently hold subsurface mineral rights in the area.

The recent exploration activity at the Castle Mountain Mine by Hobbs Industries in 1989 consisted of fourteen boreholes to an average depth of 150 feet, along with some renewed trenching. The exploration effort corresponded with Slana Energy's (Hobbs Industries' power plant subsidiary) procurement of an Air Force contract to build a 10 MW coal-fired power plant at the Over-The-Horizon (OTH) Backscatter radar site near Gakona, Alaska. Hobbs Industries, which owned the coal leases, was chosen as the operator. In 1990, seven additional shallow fill-in boreholes and additional trenching was done to follow a newly discovered coal seam stratigraphically below the ones that were mined in the two older strip pits. The purpose of the two year exploration on coal lease ADL 33978 was to follow the two south pit coal seams along their strike to the south and then east, as well as to gather baseline information for a surface coal mining permit through the State of Alaska. The Mental Health Land Court Injunction of 1990 halted further exploration and development at the Castle Mountain Mine, and Hobbs Industries shifted their exploration focus to the Evan Jones Mine near Sutton. Neither the Castle Mountain Mine nor the Evan Jones (Jonesville) Mine has reopened to date.

4.0 COAL RESOURCES AND QUALITY

The early government explorers into the Matanuska Valley were the first to estimate coal resources of the Chickaloon area, as well as to sample and analyze the coals for quality. The earliest published mention of coal resources from the area was noted in “The Report of the Matanuska Coal Field in the Valley of the Matanuska River, Alaska”, by William Griffith on December 2, 1905. In his report, he estimated that the Kings River, Chickaloon, and Coal Creek field contained a total of 15,000,000 tons of mineable coal.

In 1908, Griffith modified his estimate of the coal resources. In his new estimate, he included some hypothetical assumptions such as: estimating average thicknesses of the coal beds in the different parts of the field, assuming a general lateral continuity of coal beds, mining by slopes or shafts one-half mile on the veins, and factoring in mining problems relating to faults and intrusions. His revised hypothetical, but potentially mineable coal resource for the Kings River-Chickaloon-Coal Creek area was 62,000,000 tons. This estimate would be the highest estimate ever given.

In 1913, in the “Preliminary Report of the Matanuska Coal Field of Alaska for the U.S. Navy” by George Watkin Evans, Evans estimated that the Chickaloon-Kings River area contained approximately 19,200,000 tons. He based his estimate on the average thickness of the two thickest coals over a distance of 4 miles and down to an underground mining depth of ½ mile on the pitch. Some of this area is included in the Chickaloon Coal Lease of RAL. Using the same reasoning, he estimated the Coal Creek area resource at 6,400,000 tons, and an area-wide total of approximately 25,000,000 tons. “The estimate of 25 million tons does not take into account the 56 square miles of Chickaloon Formation which occupies the area lying east of the Chickaloon River and between the mountains to the north of the Matanuska and those to the south” (Evans, 1913).

In 1922, a Navy Alaska Coal Commission report to the Secretary of the Navy by Captain W.P.T. Hill, U.S. Marine Corps, stated that coal “in sight” (or exposed by mining operations) was 404,000 tons, estimated coal available in the area (King River to Chickaloon) was between 12 and 15 million tons, and Coal Creek coal resource were about 750,000 tons. This was the last of the reports on the Chickaloon area coals before the mine closed.

In 1984 a compilation report on the Matanuska Coal Field by Roy D. Merritt and Michael A. Belowich from the Alaska Division of Geological and Geophysical Surveys in Fairbanks showed that there was a high assurance coal resource tonnage for the Chickaloon District of 20.5 million tons, with moderate and low assurance estimations for the same area to be 30 million and 40 million tons, respectively. This tonnage agrees with earlier estimates on coal resources in the area. Additional exploration in the area is needed to verify these estimations.

Finally, the 1989-1990 Castle Mountain exploration by Hobbs Industries resulted in a better definition of measured coal resource in the immediate vicinity of the Castle Mountain Mine. It was determined that measured coal resources for this area are 200,000 tons, with inferred resources to 800,000 tons. Some of this tonnage included a stratigraphically lower coal (named A Seam) from those previously mined. However, the quality of A Seam was suspect in a

number of holes and surface trenches. Most of the Hobbs Industries coal resource tonnage could only be recovered by underground mining methods.

The coal resources in the Chickaloon coal district, which includes the area from the Kings River to the Chickaloon River and across the Matanuska River near Coal Creek, have been determined by numerous authors to include high quality coking or metallurgical grade coal. This was noted in all the early reports from the coal field that stated that the Chickaloon coals “were of much higher grade than any developed coal field on the Pacific Coast, and approaching very nearly the better coals of the eastern part of the United States. We will note that the Chickaloon coals somewhat resemble the Pocahontas coals and the Cumberland coals in general quality, containing somewhat higher ash, a little more volatile matter, and a slightly less quantity of fixed carbon” (Griffith, 1905). Griffith went on to say that the Chickaloon coals would be “exceedingly useful throughout the Pacific Coast as a blacksmith’s fuel and that the coking qualities are particularly fine”.

Based on later reports discussing the coal in terms of rank, the Chickaloon coal district coals run from high volatile A bituminous to semi-anthracite, with the predominant ranks being medium and low volatile bituminous (Merritt, 1985). All of the coal at the Castle Mountain Mine site was determined to be low volatile to semi-anthracite in rank and is also of proven coking quality (Maloney, 1957; and Merritt, 1985).

In regards to actual coal quality data, much is available from the early samplings at the Chickaloon, Coal Creek and Kings River coal mines. Representative analyses from these three areas of coal study taken from U.S. Bureau of Mines Technical Paper 682 (Gates, 1946) are as follows:

	<u>Moisture</u>	<u>Ash</u>	<u>Volatile Matter</u>	<u>Fixed Carbon</u>	<u>Sulfur</u>	<u>BTU</u>
Chickaloon	2.14	11.56	17.65	68.65	0.60	13,600
Kings River	2.27	10.51	21.94	65.28	0.64	13,350
Coal Creek	2.00	15.60	20.17	62.41	0.46	12,700

In general, the sampled coals showed low moisture, variable ash, but generally less than those at Wishbone Hill, and high fixed carbon to volatile contents (fuel ratio) which is evidence of their elevated rank. In places, the coal is naturally coked when adjacent to igneous sills and dike swarms that are common to this part of the Matanuska Valley. Some of this coked coal exhibits prismatic fracturing perpendicular to the igneous body and normal bedding planes of the coal and accompanying sedimentary rock.

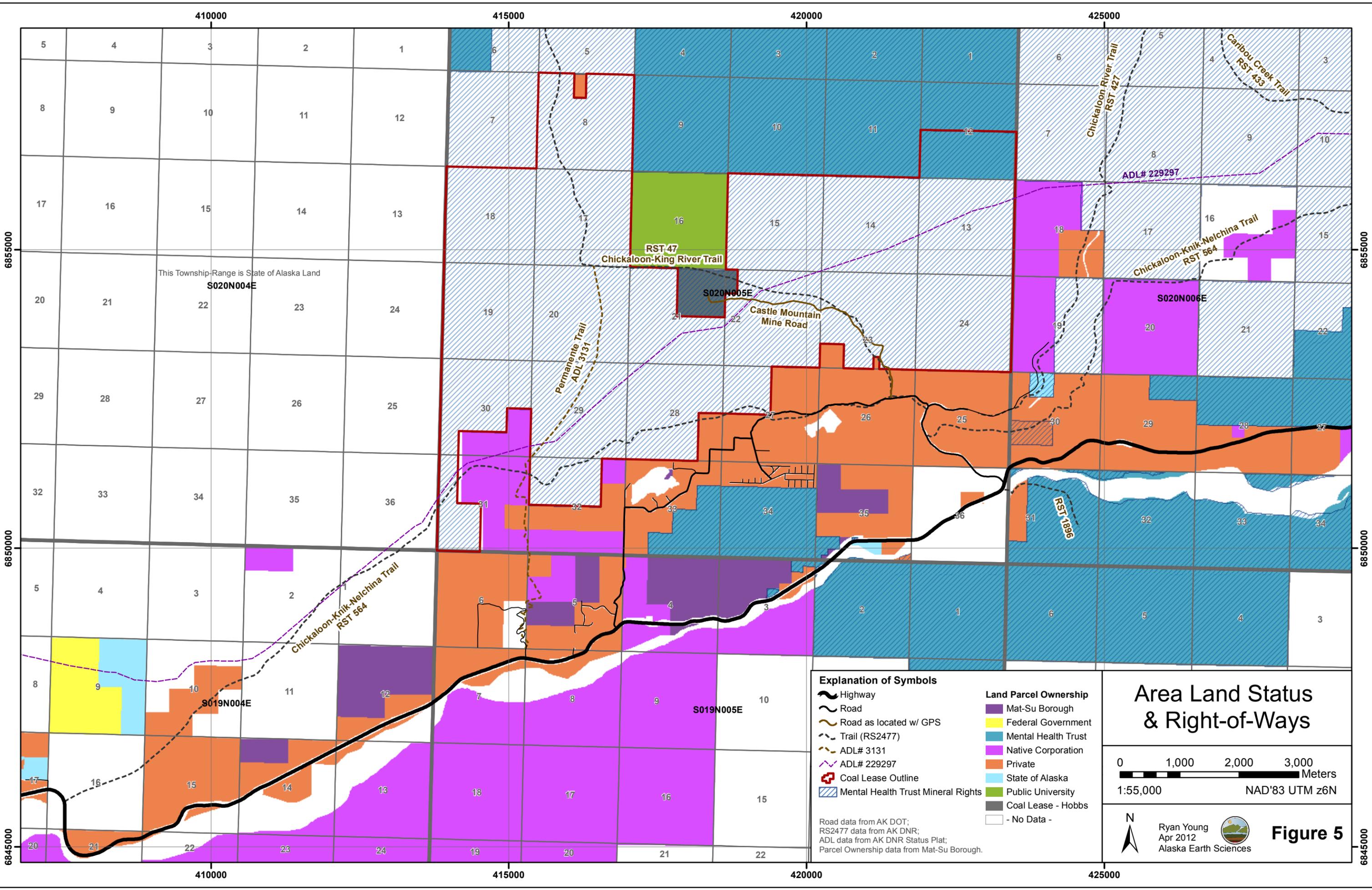
5.0 LAND USE

In October 2011, the Alaska Mental Health Trust Land Office, owner of the subsurface estate in the proposed Chickaloon coal lease area (surface estate is general state land) commenced a “Best Interest Decision” process in accordance with AS 38.05.801 and the implementing regulations governing Alaska Mental Health Trust land management (11 AAC 99). The findings of this process, which included the hearing of public comments and some local concern, were that “The highest and best use of the Subject Lands (i.e. the coal lease tender area), is the exploration and development of the subsurface resources, including coal, with the hopes of subsequent production. On this basis, the Alaska Mental Health Trust Authority through the Trust Land Office commenced the process to offer the Subject Lands for coal lease through a competitive bid process for which RAL was the successful applicant.

There are numerous and varied land owners in the Chickaloon area of the Matanuska Valley. These include private land owners located mainly along the Glenn Highway and secondary road system in the area, small businesses mostly along a short corridor near the Matanuska River, the Alaska Mental Health Trust, other state-owned lands, Mat-Su borough land, and native land selections (Figure 5). The area in and around the RAL coal lease is within the Susitna Management Plan, the Matanuska Valley Moose Range Area Plan and the Chickaloon Special Land Use District. All three plans recognize coal development as a primary use of the area.

In 1986, the Matanuska Valley Moose Range was set aside in a management plan for the Matanuska Valley “to maintain, improve and enhance moose populations and habitat and other wildlife resources of the area, and to perpetuate public multiple use of the area, including fishing, grazing, forest management, hunting, trapping, mineral and coal entry and development, and other forms of public use of public land not incompatible with the purposes stated”. The 1986 Moose Range plan recognized the existence of coal resources “with high commercial potential” within the plan area.

A Chickaloon Comprehensive Plan (CCP) was established in 1991, amended in 1995, and further revised in 2008. This plan notes that the land use within the planning area is predominantly residential, with some commercial use along the Glenn Highway. The plan states that the desire of most residents is to preserve the rural character of the community as shown by the development of parcels that mainly range from 2 to 20 acres in size. The Chickaloon Community Plan outlines the wishes of the local residents in regard to public safety, public school facilities, solid waste removal, parks and recreation, trails, roads-highway systems, and air transportation. In the 1991 and 1995 versions of the plan, the only references to coal development were notes in the Economy and Population section that state, “development of both the coal and limestone deposits in the area may result in a larger influx of people.” Under the Land Use Element portion of the plan, it is noted that “the plan’s (CCP) goals state a desire for a minimal amount of land use regulation within the planning area.” In the 2008 revision, it was agreed that commercial and/or industrial development can co-exist with residential and recreational land use as long as the development doesn’t disrupt neighborhoods. Such development was deemed incompatible if located adjacent to residential neighborhoods. The CCP also recognizes, however, that the larger land owners in the area, including the State of



This Township-Range is State of Alaska Land
S020N004E

S019N004E

S019N005E

Area Land Status & Right-of-Ways

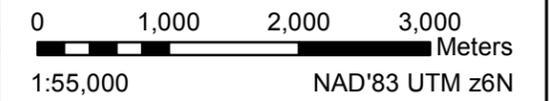
Explanation of Symbols

- Highway
- Road
- Road as located w/ GPS
- Trail (RS2477)
- ADL# 3131
- ADL# 229297
- Coal Lease Outline
- Mental Health Trust Mineral Rights

Land Parcel Ownership

- Mat-Su Borough
- Federal Government
- Mental Health Trust
- Native Corporation
- Private
- State of Alaska
- Public University
- Coal Lease - Hobbs
- No Data -

Road data from AK DOT;
 RS2477 data from AK DNR;
 ADL data from AK DNR Status Plat;
 Parcel Ownership data from Mat-Su Borough.



N
 Ryan Young
 Apr 2012
 Alaska Earth Sciences

Figure 5

Alaska and the Mental Health Trust Authority manage their lands according to priorities set by their governing body.

The area adjacent to the RAL coal lease is home to a small population of Dena'inas, an Athabascan Indians people whose residences in the area precedes all mining activities. With the onset of mining, workers and their families involved in the mining of coal and associated support industries began to settle the area. Over the years the area has evolved as a popular destination for outdoor recreation in south-central Alaska. This includes hunting, fishing, hiking, sightseeing, off-road ATV use and dirt-bike riding, and horseback riding. These activities frequently used paths and trails developed by and for the early coal and mineral explorers.

In the present area of the RAL coal lease, there are four separate recognized RS 2477 trails, a separate developed public right-of-way, a gas pipeline corridor, and several other non-official designated trails. One of the recognized RS 2477 trails is RST 564 or the Chickaloon-Knik-Nelchina Trail. This trail was initially established by the Dena'inas from Cook Inlet as a trade route with their Ahtna neighbors in the Copper River region. Then, in the early part of the 20th Century, early explorers used it to reach placer mining claims in the Nelchina District. Part of this trail today passes through the coal lease east of the Kings River. Another recognized RS 2477 trail is RST 427 or the Chickaloon River Trail. This trail originates near the old coal mine townsite of Chickaloon and travels north along the Chickaloon River for 35 miles. It was also developed early in the century and was used to access placer mining operations in the Nelchina-Susitna District. This trail passes just east of the coal lease.

Two other recognized RS 2477 trails in the area were originally developed to directly reach coal resource areas. These are RST 1896 and RST 47. The former is a short trail from Chickaloon to the old coal mine across the Matanuska River at Coal Creek. The latter, RST 47, is the route originally developed by the Navy to search for coking coal south and west of Castle Mountain. The eastern portion of the old trail was upgraded in the 1950's to develop the Castle Mountain Coal Mine and is now recognized as Castle Mountain Mine Road. The last of the primary trails in the Chickaloon Coal Lease area was developed by the Kaiser Cement & Gypsum Corp in the early 1960's to reach promising limestone deposits up the Kings River valley. This trail, now called the Permanente Trail has a trailhead on the Glenn Highway near Mile 72. A public right-of-way easement (ADL 3131) was established for this trail, which passes through four sections of leased coal land east of Kings River. Portions of this easement effectively became an Alaska Native Claims Settlement Act (ANCSA) 17(b) easement when lands in the vicinity of the Kings River limestone deposit were effectively transferred to Cook Inlet Region Corporation in 1978. Other 17(b) easements in the area follow portions of the streams and are sponsored by the Alaska Department of Fish and Game and Bureau of Land Management.

The aforementioned gas pipeline corridor (ADL 229297) was issued to the Alaska Natural Gas Development Authority of Anchorage on July 20, 2006 as the preferred corridor of a yet to be built gas pipeline that would run from Glennallen to Anchorage through the Matanuska Valley. The pipeline easement passes through the southern portion of RAL's coal lease between the Chickaloon River and Kings River.

With the exception of RST 47, the eastern part of which is now called the Castle Mountain Mine Road, all trails and easements in the vicinity of RAL’s coal lease should not be affected by exploration activity. Proposed exploration activity will use portions of RST 47 as a base of exploration operations since this is the only access road into the coal lease. Exploration activities will be planned that will not hinder or block access to this public right-of-way. Further discussions on the use of RST 47 are seen in Part C, Sections 2.0 and 3.0 of this permit application. The locations of the RS 2477 trails and other ADL corridors are seen on Figure 5.

It should also be noted that the 1986 Matanuska Moose Range Management Plan designated some sections and portions of sections that encompass the face of Castle Mountain as a valuable viewshed. Although portions of this viewshed are contained in the RAL coal lease, there are no coal-bearing rocks in this area to develop, thus keeping this viewshed intact for future generations.

6.0 CLIMATE

Five climatological zones have been identified for Alaska: maritime, maritime-continental, transition, continental, and arctic (Merritt, 1985). The Matanuska Valley, including the Chickaloon area, is considered to be in the transition zone between the maritime climate of coastal Alaska and the continental climate of interior Alaska. Summer temperatures average near 60⁰ F and winter temperatures average near 0⁰ F (Browser, 1988).

Precipitation within the region varies with topography. Yearly average precipitation in Palmer, about 30 miles west of the proposed exploration area, is about 15 inches, including 56 inches of snowfall. Precipitation in the mountainous area can be over 80 inches, including over 200 inches of snowfall. Recent climate data from Sutton shows an average precipitation of 19.04 inches, including 74.8 inches of snowfall (Western Region Climate Center, 2012). Below is a climate summary for the Sutton area between 1978 and November of 2011 from Western Regional Climate Center’s website.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	22.9	28.2	37.2	48.9	60.9	66.9	68.0	65.7	57.2	42.5	28.1	23.6	45.8
Average Min. Temperature (F)	9.1	11.5	17.3	25.0	32.4	40.7	46.3	44.1	35.9	25.9	14.8	10.0	26.1
Average Total Precipitation (in.)	1.08	1.04	0.83	0.54	0.86	1.47	2.48	2.95	3.04	1.66	1.54	1.54	19.04
Average Total SnowFall (in.)	12.3	11	8.7	3.5	1	0	0	0	0.2	6.4	14	17.8	74.8
Average Snow Depth (in.)	16	18	16	5	0	0	0	0	0	1	6	13	6

In the village of Chickaloon, old data from the 1920’s and 1930’s data shows an annual average precipitation of 14 inches, including 69 inches of snowfall (Browser, 1988). Average climatological data on Chickaloon, as compared to US averages, is seen in the following table from Sperling’s BestPlaces on Google.

Climate	Chickaloon, AK	United States	Climate	Chickaloon, AK	United States
Rainfall (in.)	18.8	36.5	Avg. July High	68	86.5
Snowfall (in.)	79.1	25	Avg. Jan. Low	9.4	20.5
Precipitation Days	115	100	Comfort Index (higher=better)	80	44
Sunny Days	130	205	UV Index	1.3	4.3
Elevation ft.	510	1,060			

Chickaloon, AK, gets 19 inches of rain per year. The US average is 37. Snowfall is 79 inches. The average US city gets 25 inches of snow per year. The number of days with any measurable precipitation is 115 (Sperling’s Best Places, 2012).

On average, there are 130 sunny days per year in Chickaloon, AK. The July high is around 68 degrees. The January low is 9. The comfort index, which is based on humidity during the hot months, is a 80 out of 100, where higher is more comfortable. The US average on the comfort index is 44 (Sperling’s Best Places, 2012).

Wind direction and velocity are also dependent on local topography. Local winds tend to be orientated roughly parallel to valleys and rivers. Strong northeast winds, often exceeding 60 mph, periodically blow down the Matanuska River Valley in the fall, winter and spring. These winds occur as often as 3 times per year but seldom in the summer (McKinley Mining Consultants, 1989). The topography also affects air mass movements. The Talkeetna Mountains serve as a barrier to cold interior air masses moving southward into the Valley, while the Chugach Mountains shelter the area from warm moist air moving northward from the Gulf of Alaska (Merritt, 1985).

Long-term temperature, precipitation, wind speed and wind direction data are available for the Matanuska Agricultural Experiment Station in Palmer, approximately 30 miles west southwest from the proposed exploration area. Little long-term climatological data, however, exists in the immediate vicinity of the coal exploration area. Short-term information from Sutton and Chickaloon suggests that there is much variability in precipitation and mean temperatures within the area, even at lower elevations. For example, Chickaloon receives significantly less precipitation but more snowfall than the other stations. Sutton seems to have the most precipitation, and both Palmer and Sutton have substantially warmer temperatures year round than Chickaloon.

Average summer temperatures in the Chickaloon area range from 40⁰F to 69⁰F. Average winter temperatures range from -3⁰F to 39⁰F. Annual maximum and minimum temperatures are 90⁰F and -42⁰F, respectively (Browser, 1988).

The Matanuska-Susitna Borough is classified by the Alaska Department of Environmental Conservation as a Class II PSD (Prevention of Significant Deterioration) area, which is considered to be clean air. Few significant sources of air pollution exist in the area. Naturally-occurring dust occurs as “Matanuska Winds” pick up glacial sediment from the

Matanuska River floodplain. Dust occurs most often in the spring and fall when high winds correspond with a lack of snow cover.

Past acquired data from an air quality monitoring station adjacent to the Wishbone Hill coal project of Idemitsu Kosan in the 1980's demonstrated that background pollutant concentrations (i.e., inhalable and suspended particulates) consistently fell below the National Ambient Air Quality Standards (NAAQS). During this study, only one measurement exceeded the standards and that was during a November high wind event. It is expected that similar air quality conditions exist at the proposed Chickaloon exploration area. A new weather station is proposed to be set up in the coal exploration area to obtain current climatological data as part of the environmental baseline studies starting in the summer of 2012.

7.0 HYDROLOGY – GENERAL

11 AAC 90.163 (a) (2) (A) surface water

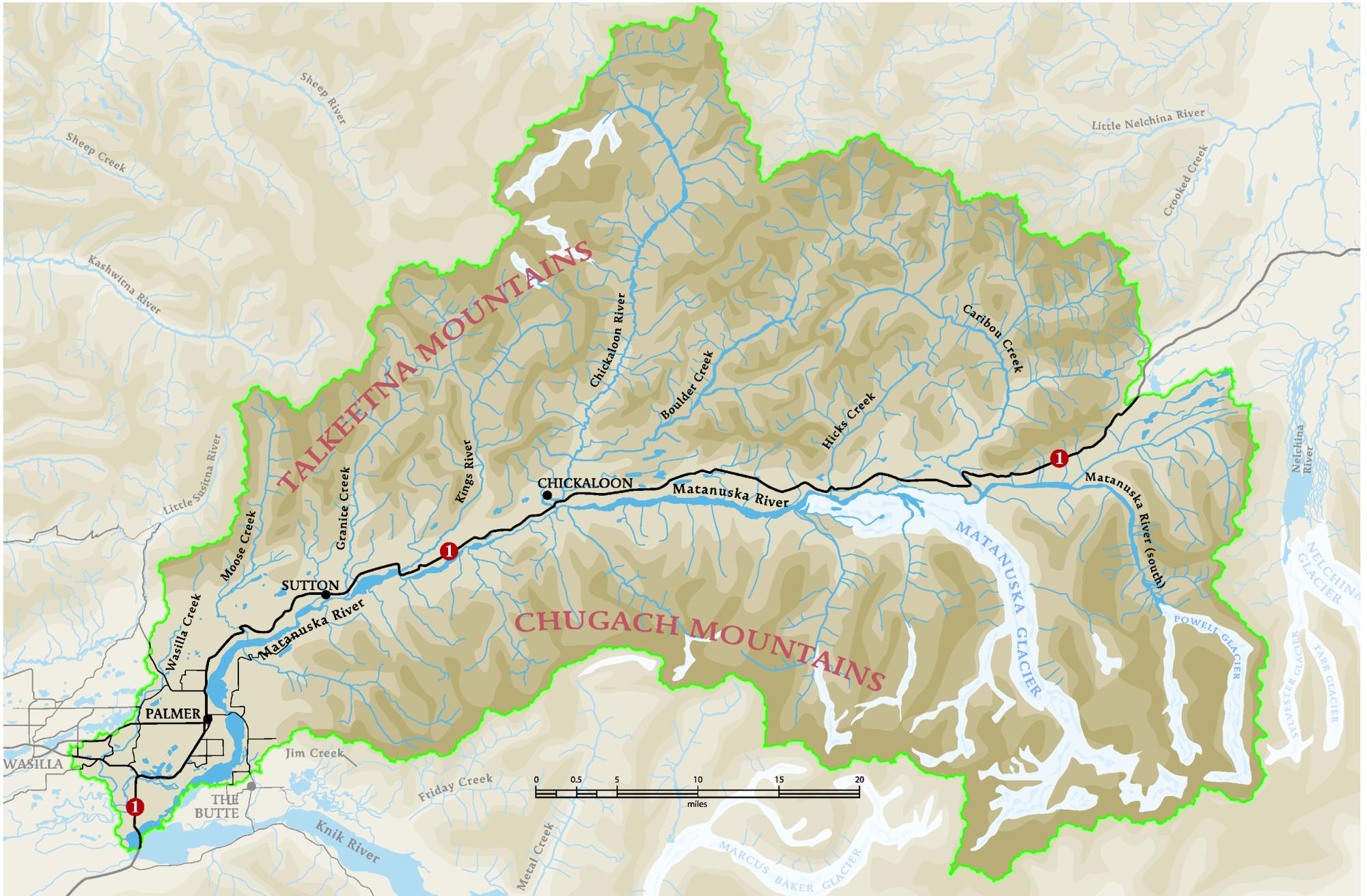
7.1 Surface Water

Discussions of the hydrology on and adjacent to RAL's Chickaloon Coal Lease must revolve around the Matanuska River Watershed, the primary watershed in the Matanuska Valley. The coal lease (Figure 6) lies completely within this watershed. The Matanuska River Watershed (2,070 square miles) is a major east-west trending basin that separates the Talkeetna Mountains to the north from the Chugach Mountains to the south. The watershed drains westerly into the northeastern arm (Knik Arm) of Cook Inlet. The major streams of the northern half of the watershed drain the Talkeetna Mountains and include Moose Creek, Granite Creek, Kings River, Chickaloon River, and Caribou Creek.

Glaciers dominate the headwaters of the southern basins, which drain from the Chugach Mountains and include the Matanuska and Powell glaciers. In addition, Wolverine, Coal and Gravel Creeks drain smaller, partially glaciated basins in the Chugach Mountains. Although glaciers cover only 12% of the area, the fluvial processes in the Matanuska River are dominated by glacier melt so that most of its annual discharge occurs during mid-summer when glacier ablation rates are high. For the smaller watersheds not associated with glaciers, stream hydrology also reflects the large seasonal climate changes typical of a subarctic environment, i.e., a large portion of a basin's annual runoff occurs during breakup in the spring and early summer. Stream discharges decrease during the winter because of cold temperatures and ice formation, so that the minimum discharge occurs during the late winter (ADNR, 1986).

Only 14% of the Matanuska River Watershed is forested. The watershed has a relatively high average mean elevation of about 4,000 feet. Generally, the basin receives about 35 inches per year of precipitation, with the average snowfall of 80 inches per year (Lamke, 1979). Most climate information has been gathered in the valley bottoms. Data for higher elevations is generally lacking.

There are numerous lakes within the Matanuska Valley, many of which are unnamed. Some of the larger lakes include Wishbone, Seventeenmile, Slipper, Ruby, Thirtymile (Ida), Fish, and Drill lakes. Almost all the lakes lie within three miles of the Matanuska River and probably owe their origin to glacial-related processes.



Matanuska River Watershed

From the Mat-Su Borough:
http://www.matsugov.us/component/docman/doc_details/1505-matanuska-river-watershed-map

Figure 6

Few of the major streams have stream flow or water quality records. A gauging station on the Matanuska River, near Palmer, has continuous flow records for several periods starting in 1949. It also has numerous sediment and chemical water quality data on a non-continuous basis starting at the same time. Generally, the Matanuska River has an average daily discharge of 4,000 cfs. Winter low flows typically range from 400-900 cfs, while typical summer daily flows range from 6,000-12,000 cfs (Lipscomb, 1989). Still and Cosby (1989) and ADNR (1986) report that miscellaneous water quality and flow measurements have been recorded on the Chickaloon and Kings Rivers and on Moose, Granite, and Eska creeks. Generally, the data is either unpublished or in various USGS Water Supply Papers and consists of non-continuous chemical water quality samples and flow measurements taken between 1948-1988. The water quality and streamflow data for these stations are summarized in Table 1.

There are three small watersheds noted in the 1990 Castle Mountain Mine permit application that occur in RAL's coal exploration area between the Chickaloon River and Kings River (Figure 7). The largest is the California Creek watershed (5.25 square miles). Another has been arbitrarily named Edwardson Gulch watershed (2.52 square miles) after the original prospector in the Castle Mountain Mine area. California Creek empties into the Chickaloon River and Edwardson Gulch empties into Fish Lake. The last is a small basin (0.57 square miles) which drains the western part of the area into Kings River.

A hydrological survey is proposed for RAL's 9,927-acre coal lease starting in the summer 2012. This program will entail new surface water quality sampling and discharge analysis.

7.2 Ground Water

Any coal exploration and development within the coal lease requires discussion of the hydrostratigraphy of the area in order to assess any potential impacts. This includes discussing how the different geologic formations (lithostratigraphic units) and structural elements affect the movement of precipitation (rain and snow) into the ground water systems of the area. In general, the RAL coal lease is underlain by the following lithostratigraphic units; Matanuska Formation, Chickaloon Formation, Wishbone Formation, late Tertiary hypabyssal igneous intrusions, glacial-derived gravels, fluvially derived sands and gravels, landslide debris, and eolian wind-blown deposits.

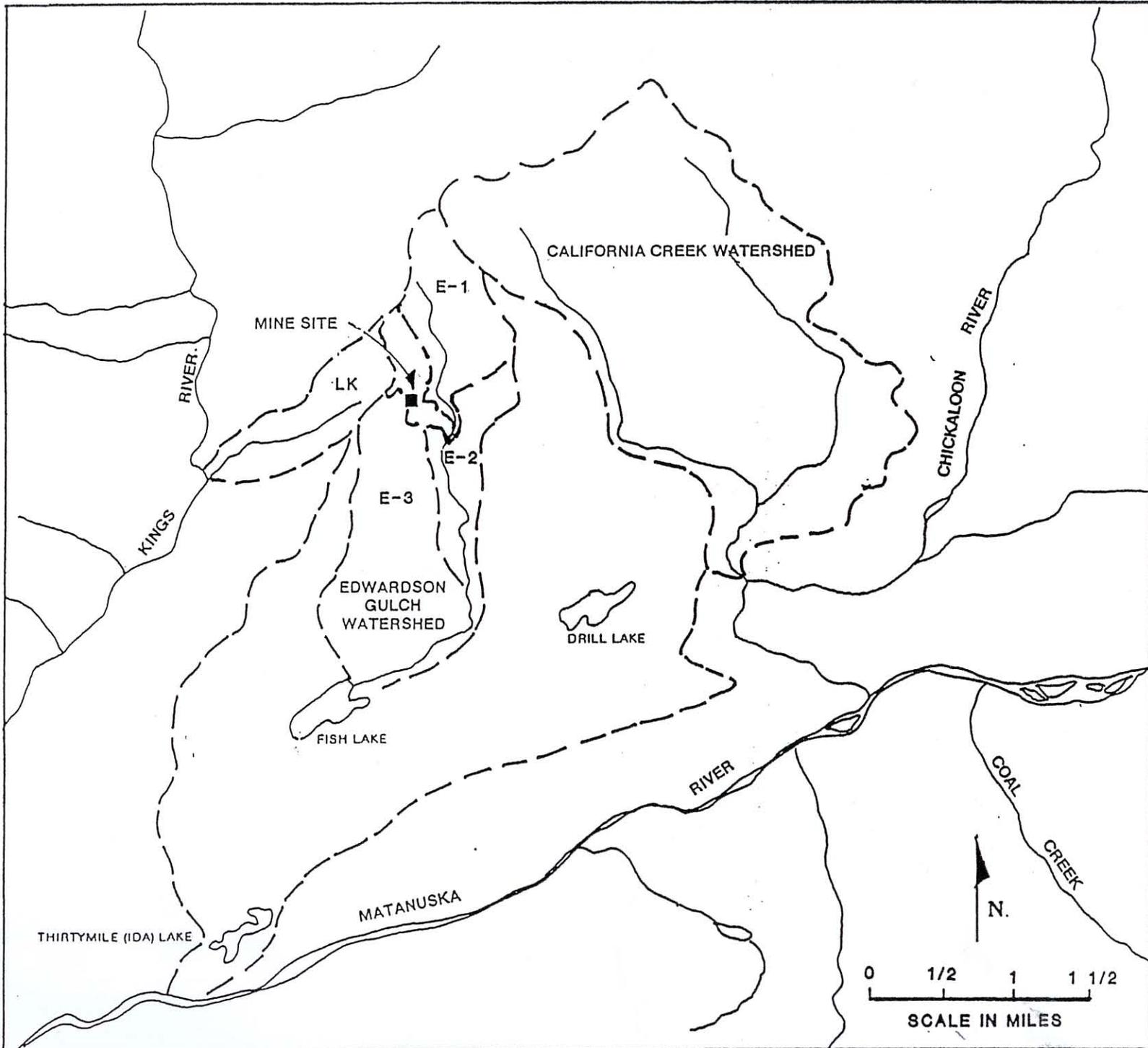
All of the above formations or sedimentary deposits have a different effect on the movement of groundwater. This is theoretically due to the formations or deposit's hydraulic conductivity and permeability. Information on the hydraulic conductivity and permeability of lithostratigraphic units found in the Matanuska Valley is shown in the Jonesville Underground Coal Mining Permit Application 2005, at the Public Coal Library, Alaska Department of Natural Resources, Division of Mining, Land and Water in Anchorage. Hydraulic conductivities are measured in feet per second and permeability is measured in square feet. For relatively undeformed Chickaloon Formation rock strata (fine-grained sandstones and shales), the hydraulic conductivity of the rock to transport water is low, ranging from 3.28×10^{-13} to 3.28×10^{-8} ft./sec., while permeability ranges from 1.08×10^{-19} to 1.08×10^{-14} ft², making for difficult groundwater movement. Fractures in the rocks from deformation can increase this hydraulic conductivity locally. For more porous, uncemented, coarser-grained deposits like surface gravels

Table 1

RANGES OF WATER QUALITY PARAMETERS FOR STREAMS IN
MATANUSKA VALLEY WATERSHED (FROM USGS ANCHORAGE)

	Eska	Granite	Caribou	Chickaloon	Moose	Kings	Matanuska
T	1.0-8.5	0.0-9.5	0.0-14.5	0.0-9.5	0.0-7.0	0.0-10.0	0.0-11.5
Cond	65-118	74-157	105-911	121-287	54-130	100-179	147-309
pH	7.2-7.6	6.9-7.4	6.9-8.2	6.7-7.9	6.5-7.9	6.0-7.9	6.6-8.3
Alk	21-54	24-39	46-218	48-91	23-53	39-58	49-90
Mg	1.1-2.9	1.3-2.8	1.9-21.0	1.4-6.2	1.3-3.0	1.3-3.6	1.2-12.0
Fe	0-30	10-20	0-1,200	0-80	10-120	0-100	0-3,400
TDS	32-70	59-102	67-623	70-175	41-76	60-113	87-185
TSS	NR	NR	30-13,220	NR	14,200	NR	10-9,250
Years of Records	1950-51 1955-57 1961-62	1948-49 1950-52	1948-49 1950-56 1958-69 1971-72 1975-76	1948-49 1950-55	1948-49 1950-52 1955-56 1970-71	1951-54 1955-56 1957-58	1948-56 1957-68 1971-73 1984-86

Note: T = temperature in degrees Celsius; Cond = specific conductance (umhos/cm); pH in standard units; Alk = alkalinity in mg/l as HCO₃; Mg = Magnesium, total dissolved (mg/l); Fe = iron, total dissolved (ug/l); TDS = total dissolved solids (mg/l); TSS = total suspended solids (mg/l).



and glacial deposits, the same two processes are much higher and movement of water is more easily achieved. In this case, average hydraulic conductivity ranges from 3.22×10^{-5} to 3.22 ft/sec. with permeability ranging from 1.08×10^{-10} to 1.08×10^{-6} ft².

As noted previously, in the geologic formations and deposits around Chickaloon, the primary sedimentary formations observed are the Wishbone Formation, Chickaloon Formation and Matanuska Formation, as well as intrusive hypabyssal igneous sills and dikes. All included rocks from these formations or intrusives are moderately to well indurated. As a result, these rocks have low to very low hydraulic conductivities and permeabilities which means it is difficult for groundwater to move easily through these rocks. The presence of folding and faulting as well as closely spaced jointing can locally increase permeability and hydraulic conductivity. This increase is mainly seen in relatively incompetent rock strata, although it is not uncommon in the higher indurated rocks. As noted in the Geology Section of this permit application, increase in deformation from mountain building processes to the north and south of the Valley and heating from the intrusions of igneous intrusives farther east in the Valley, hardens the sedimentary rock packages and increases the rank of coal. This in turn lowers its hydraulic conductivity and permeability.

The less consolidated deposits that are seen in the Chickaloon area (i.e., glacial-derived gravels, fluviially derived sands and gravels, landslide debris, and eolian wind-blown deposits) have higher hydraulic conductivities and permeability because they are less indurated, have more and larger interstitial pore space, and have minimal cementation. It is these deposits where most groundwater is found. Therefore, it is also in these deposits where most successful water wells are found, as the increase in permeability and hydraulic conductivity allows intersected groundwater to easily move toward the well bore.

A review of documented water wells in the Chickaloon area through the State of Alaska WELTS database was undertaken to see if there was any correlation in flow rates reported during the drilling with the type of sediments or bedrock encountered. Ground water wells in the area were equally distributed between those intersecting water bearing horizons in loose gravelly sediments and those in bedrock. It was very clear from the available flow data in the database that ground water flow was much higher in looser sediments compared to those in bedrock, by a factor of 10. This difference in flow rates can be attributed to the differences in hydraulic conductivity and permeability.

A hydrological survey is proposed to be conducted on the 9,927-acre coal lease starting in the summer 2012. This latter program will entail new groundwater water quality sampling and analysis.

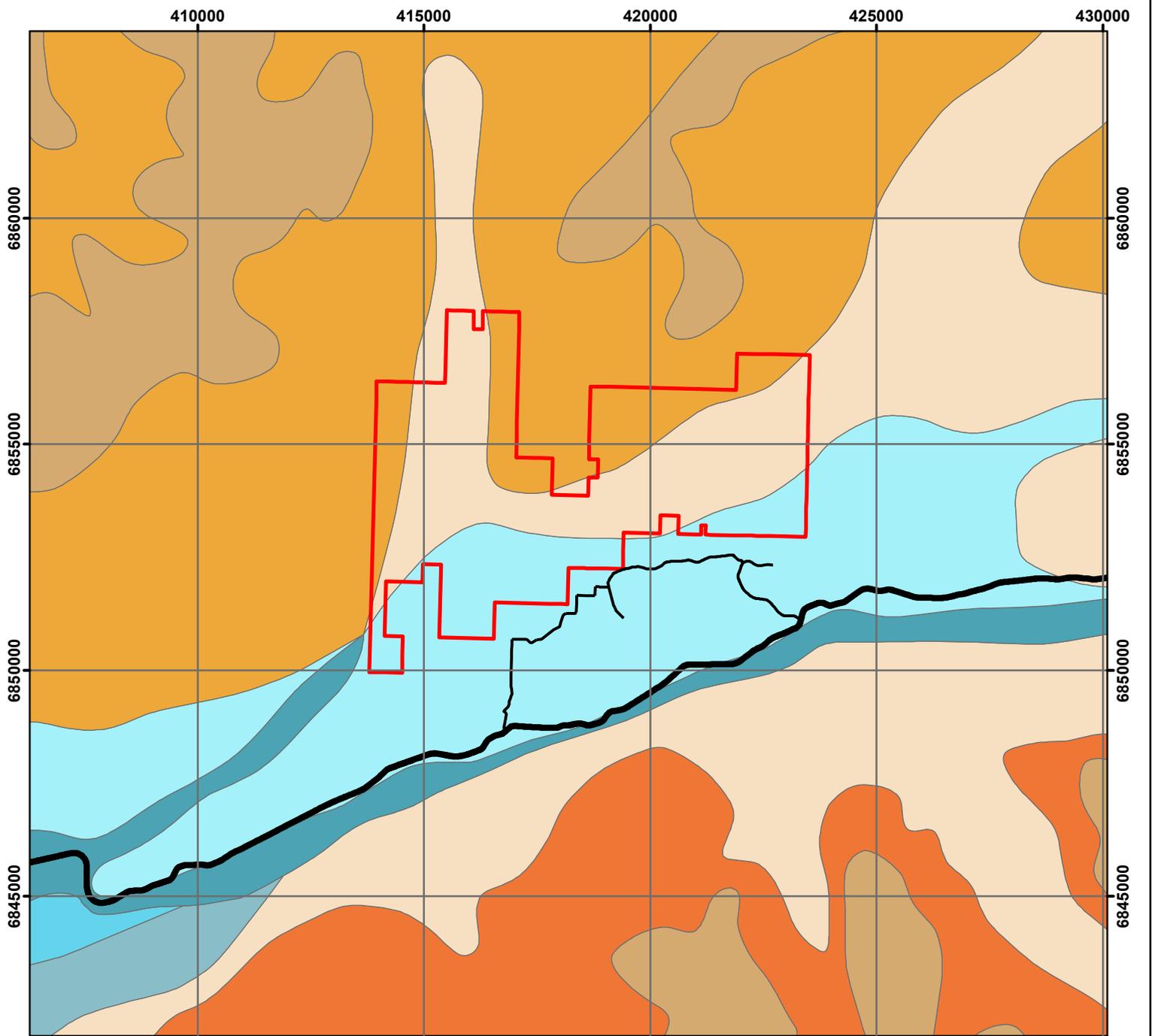
8.0 SOILS

11 AAC 90.163 (a) (2) (A) other physical features;

A study of available data on soil resources in the area found two soil surveys. The first and more detailed was a soil survey done in 1992 that contained portions of RAL's coal lease. This soil survey, which was part of a larger Matanuska-Susitna Valley Soil Survey, was made cooperatively by the Natural Resources Conservation Service (NRCS), the University of Alaska Fairbanks Agricultural and Forestry Experiment Station, and the State of Alaska Department of Natural Resources. Soil names and descriptions contained in the survey were officially approved in 1995 and a final report/was published in 1998. The primary area of mapping, in relation to the coal lease, occurred west of the Chickaloon River and north of the Matanuska River to the base of Castle Mountain. This soil survey, however, did not cover northern portions of the RAL coal lease along the Kings River and east northeast of the Hobbs Industries' small 180-acre coal lease. Some additional focused soil work, including a few test pits, was done within the Castle Mountain Mine in 1989 and 1990. The second soil survey, was a generalized one performed jointly between the United States Department of Agriculture (USDA) and the NRCS in 2006. This survey includes generalized soils and covers those areas of the RAL coal lease not described in the 1992 survey.

The soil studies in the Chickaloon area showed approximately eight different and major soil types plus an additional non-documented mine spoil unit from previous coal mining operations in the area. Mark Clark (2006, personal communication) of the NRCS, was a part of the 1992 Matanuska-Susitna soil survey and also performed the digging of test pits at Castle Mountain in 1989 and 1990. He stated that the eight primary soil types seen west of the Chickaloon River are common throughout the area and would also be seen east of the Chickaloon River and south of the Matanuska River. Figure 8 shows a total of 19 different soil types observed in the Chickaloon area, including the 10 primary RAL coal lease area soil types from the 1992 soil survey along with their corresponding reference number in the Matanuska-Susitna Soil Survey are: 116 – Cryaquepts; 117 – Cryods, (35-90 percent slopes); 120 – Cryods – low elevation; 121 - Cryods- shallow (35-90 percent slopes); 130 – Eska-Jim complex; 141 – Histosols; 154 - Kichatna silt loam, undulating; 159 – Kidazqeni, cool and Niklason, cool soil, 4 to 12 percent slopes; 183 – Rock Outcrop-Cryumbrepts Association, Extremely Steep; and 214 – Yensus silt loam, undulating. In Figure 9, the more recent and generalized survey shows two major soil groups in the unmapped sections of the RAL coal lease. These are the Boreal Upland and Lowland Valley soils and the Boreal Subalpine and Alpine-Mountains, Acid soils.

The primary soil types, minus the mine spoils, can be lumped into a few dominant groups. The Cryaquepts and the Histosols pertain to soils that are representative of lands exhibiting either a high water table or dominated by marshes and bogs. Some of these soils were observed between the Kings River and Chickaloon River, but are not that common, mostly due to the higher slope of land in this area. Both types of Cryods and the Eska Jim complex comprise soils on hills and ridges and generally steeper slope areas. This is the most common soil type seen in the survey. These soils are generally well-drained and have a water table below 5 feet. They often occur as thin soil horizons over bedrock. The Kidazqeni and Niklason cool soils are seen in just one area of the survey, along the lower reaches of California Creek and represent



Generalized Soils

Explanation of Symbols

- Lease Block Outline
- Highway
- Road

Cook Inlet Mountains - MLRA 223

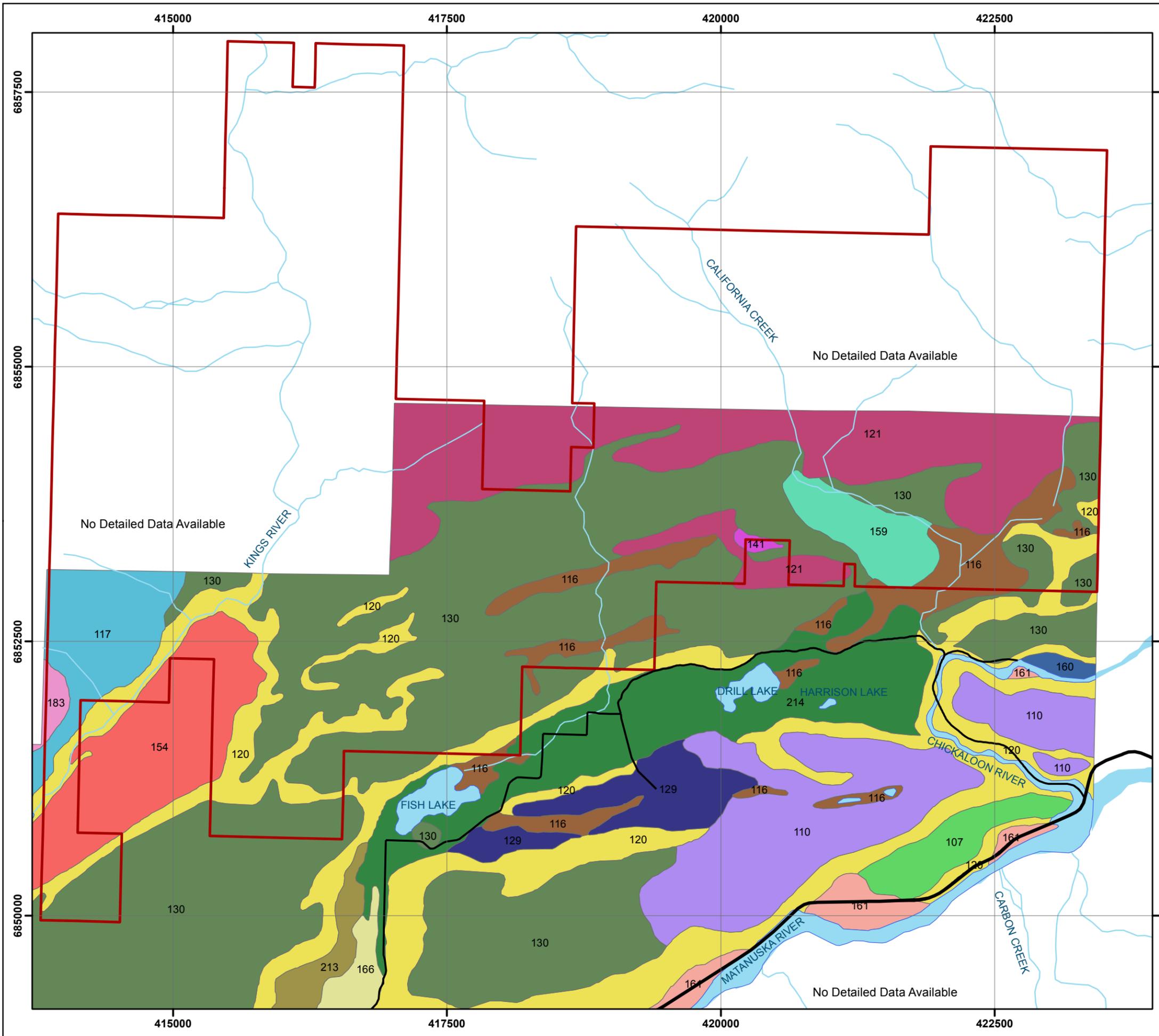
- Boreal Alpine-Barren Mountains
- Boreal Alpine-Mountains
- Boreal Subalpine and Alpine-Mountains, Acid
- Boreal Upland and Lowland-Valleys

Cook Inlet Lowlands - MLRA 224

- Boreal Lowland-Flood Plains and Terraces
- Boreal Upland-Glaciated Plains and Hills
- Boreal Upland-Loess Plains and Hills
- Boreal Upland-Till Plains

Major Land Resource Areas (MLRA) of the Chickaloon Area from the USDA NRCS: Handbook 296 (2006); and General Soil Map of Alaska (STATSGO Data) from the Soil Survey Staff, NRCS, USDA. Accessed Apr 2012.





Explanation of Symbols

- Coal Lease Outline
- Highway
- Road
- Creek / River
- WATER

Soils

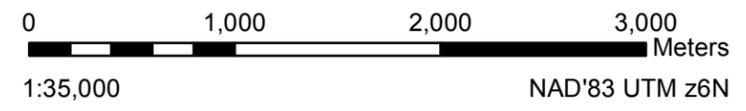
- 107 Bodenburg Silt Loam, Steep & Sloping
- 110 Bodenburg Silt Loam, Silty Substratum, Sloping & Moderately Steep
- 116 Cryaquepts, Depressional, 0-7 % Slopes
- 117 Cryods, 35-90 % Slopes
- 120 Cryods, Low Elevation & Cryochrepts, 30-70 % Slopes
- 121 Cryods, Shallow, 35-90 % SLOPES
- 129 Eska Silt Loam, Sloping & Moderately Steep
- 130 Eska-Jim Complex, Sloping & Moderately Steep
- 141 Histosols
- 154 Kichatna Silt Loam, Undulating
- 159 Kidazqeni, Cool & Niklason, Cool Soils, 4-12 % Slopes
- 160 Kidazqeni Silt Loam, Rarely Flooded, 0-2 % Slopes
- 161 Kidazqeni Soils, 0-2 % Slopes
- 162 Kidazqeni-Niklason Complex, 0-2 % Slopes
- 166 Knik Silt Loam, Sloping & Steep
- 183 Rock Outcrop-Cryumbrepts Association, Extremely Steep
- 191 Talkeetna, Warm & Talkeetna, Thick Surface Soils, 15-45 % Slopes
- 213 Yensus Silt Loam, Sloping & Moderately Steep
- 214 Yensus Silt Loam, Undulating

Blank Areas Have No Detailed Data Available

- Indicates Soil Type in Lease Area

Road data from AK DOT; Hydrologic data from AK DNR;
Soil Data from USDA NRSC Mat-Su Soil Survey;
digital version from Mat-Su Borough, IT Dept, GIS Div.

Detailed Soils Map



Ryan Young
Apr 2012
Alaska Earth Sciences

Figure 9

well-drained alluvial fan complexes. These areas, according to Clark, are fine for exploration, but building structures on them could be perilous due to occasional flooding. Finally, Yensus and Kichatna undulating silt loams are comprised of outwash deposits, with the former being glacially derived and the latter being fluviially derived. These soils, common in the populated areas of Chickaloon between Drill and Fish Lakes and along the east bank of Kings River in the far southwestern portion of the coal lease, overlie thicker gravel deposits and are well drained. These areas will not be targeted by coal exploration, as they are populated and generally not part of the coal lease.

In the 1989 and 1990 soil pits near the Castle Mountain Mine, only three soil types were present. These were Cryods and Mine Spoils which comprised the greater part of the acreage around the old mine and two small areas of Cryaquepts that paralled a couple of drainages, one being Edwardson's Gulch. The Cryaquepts show a mottled appearance from a high (less than 5 feet deep) water table. The Cryods in the area appeared to be a silt loam loess (windblown deposit) mantle ranging from 10 to 20 inches thick, over fractured bedrock of sandstone, siltstone, and shale.

Much of the lease area lies within areas previously surveyed by the NRCS; however, additional surveys may be conducted if the exploration moves towards development. These surveys would be conducted for the area of proposed development if these areas were not previously surveyed as part of the NRCS survey. It is not anticipated that soil surveys will be conducted in 2012; however, shallow soil pits will be dug and characterized as part of the preliminary wetland reconnaissance in Summer 2012. Soil surveys are not planned for the entire lease area.

9.0 VEGETATION

11 AAC 90.163 (a) (2) (A) vegetation cover and plants, including any endangered or threatened species listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 – 1543);

The only vegetation survey known in the area of the Chickaloon Coal Lease was done in October of 1989 and June of 1990. It was conducted at the old Castle Mountain Mine site by the Anchorage-based environmental consulting firm Dames and Moore. This study was performed in conjunction with their baseline environmental work for Hobbs Industries in advance of latter's submittal of a mine permit application to the State of Alaska Division of Mining, Land and Water. The mine permit was never issued, but is available for public view at the State of Alaska's Division of Mining, Land and Water Library in Anchorage. The baseline survey contains vegetation information specific to the Castle Mountain Mine area but can be interpolated by similarity to describe the general vegetative makeup of the entire Chickaloon Coal Lease area. This similarity was noted in a vegetation survey of the Wishbone Hill mining project area by Dot Helm, also in 1989, and cited by Dames and Moore as evidence of similar plant communities in the areas between the two projects.

In the Dames and Moore vegetation survey, vegetation compilation methods included 200 meter transects and meter square quadrats described at 50 meter intervals along these transects. In the test areas, number of plant stems per quadrat was measured for density, while

basal cover and diversity were measured along transects, as well as tree diameters. Zigzag transects and a simple and rapid forest land inventory system was used for determinations of average tree diameter, number of trees per acre, and species composition.

Three mapped communities within the Castle Mountain Mine area were noted in the Dames and Moore study. Those communities seen at Castle Mountain can be interpolated to exist throughout the Chickaloon Coal Lease area and is based on previous Dames and Moore vegetation studies conducted in the Matanuska Valley. The three communities include Open Mixed Forest, Tall Shrub, and Young Deciduous Forest.

Open Mixed Forest provides most of the vegetation cover seen in the test area at Castle Mountain and also is projected to comprise the greater part of the Chickaloon Coal Lease area. Cottonwood (Populus balsamifera) and white spruce (Picea glauca) dominate the tree layer, with willow (Salix sp.), and paper birch (Betula papyrifera) sparsely scattered throughout the community. Highbush cranberry (Viburnum edule) and prickly rose (Rosa acicularis) dominate the shrub layer. Herbaceous species from this community type are blue joint grass (Calamagrostis canadensis), bunchberry (Cornus canadensis), and fireweed (Epilobium angustifolium).

Tall Shrub communities are dominated by mountain alder (Alnus crispa), with willow and highbush cranberry as minor components. Blue joint, cow parsnip (Heracleum lanatum), geranium (Geranium erianthum), and fireweed provide sparse to moderate understory cover. The two areas of high water table, including a small marsh, included vegetation from this community.

Finally, Young Deciduous Forest has developed on much of the area disturbed by previous mining activities. The same communities are common around Wishbone Hill and most likely occur in the Chickaloon, Coal Creek and Kings River mining areas. Dense stands of young cottonwood and Sitka alder dominate the overstory. Understory vegetation is typically sparse and contains few species in these young stands.

It was noted by Dames and Moore in their study at Castle Mountain that productivity of the area appears to be high. Re-growth on old mined areas where topsoil was available shows strong development of cottonwood and mountain alder. The same could be assumed for areas affected by coal exploration work. There were no threatened or endangered plant species found in or adjacent to the Castle Mountain project. All plant species occurring in the Hobbs coal lease area are common in the region and no unique or critical wildlife habitats were identified (Dames & Moore, 1989).

Additional vegetation surveys are not planned in 2012; however, surveys may begin in the summer of 2013. Locations of these survey areas will be driven by project needs. Wetland reconnaissance studies will begin in 2012 and will include collection of vegetation data which will be incorporated into vegetation surveys as appropriate. This new ground truthing by HDR, starting in 2012, will take the place of the area-wide interpolation of vegetation types suggested by Dames and Moore (1989).

10.0 BIRDS AND OTHER TERRESTRIAL WILDLIFE

Bald and Golden Eagle Protection Act of 1940 as amended (16 U.S.C. §§ 668-68d)

Migratory Bird Treaty Act of 1918 (16 U.S.C. §§ 703-12)

11 AAC 90.163 (a) (2) (A) fish and wildlife, including any endangered or threatened species listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 – 1543);

RAL's Chickaloon Coal Lease is located within the legislatively designated Matanuska Valley Moose Range. This legislatively designated management plan area identifies moose as the priority species and states that moose populations are to be maintained or enhanced within the boundaries of the moose range. Other species of mammals and birds have been identified by the cooperating regulatory agencies as being of secondary interest (ADNR, 1986). A small localized study of the terrestrial wildlife species inhabiting or known to pass through the 180-acre coal lease of Hobbs Industries, as identified by Dames and Moore in their 1989 baseline wildlife study, is identified in this section. Again, this study was conducted on only 180 acres and is therefore very limited in scope.

The Dames and Moore Castle Mountain wildlife study was comprised of three survey transects, two across the undisturbed portions of habitat adjacent to the old Castle Mountain Mine and one across the area that was mined in 1958 and 1960. Of the transects crossing undisturbed habitat areas, one went across an area of high water table shrub habitat and the other went across an open mixed forest habitat. A bird survey was accomplished at this time, counting all species observed within 25 meters of each transect. A mammal survey was also conducted, noting signs of mammal presence, including tracks, signs and the animals themselves along these transects. Additional information on moose populations and other large and small mammals was obtained from Alaska Department of Fish and Game records in Palmer, Alaska.

10.1 Birds

Results of a bird survey conducted by Dames and Moore showed documentation of ten migratory species along the transects. These included the American robin, varied thrush, yellow-rumped warbler, dark-eyed junco, pine grosbeak, gray jay, black-billed magpie, raven, black-capped chickadee and boreal chickadee. Ptarmigan and spruce grouse have also been observed by local residents in the area and there are reports of raptor (eagle, falcon and hawk) nesting and flyways along the steep face of Castle Mountain. A complete listing of birds that are likely to occur in at least the Castle Mountain area, but most likely the entire Chickaloon Coal Lease area, including the face of Castle Mountain, is documented in the Castle Mountain Mine Permit application at the offices of the State of Alaska Division of Mining, Land and Water in Anchorage.

To avoid disturbing nesting bald eagles, the U.S. Fish and Wildlife Service (USFWS) recommends (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities to nest sites. Ideally,

buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees. The USFWS recommends a primary 330-foot buffer zone around eagle nests to provide protection of the juvenile eagles in the nest tree and to buffer the tree from human activities during the nesting season (March through August). A 660-foot buffer is recommended to protect the nest from noise and disruptive activities and to protect nesting habitat. The secondary zone extends from the primary zone to a distance of 660 feet from the nesting tree. When topography or vegetation does not adequately protect the nest from human disturbance, the buffer zone may be increased by ¼ to ½ mile. However, the actual size of the buffer zone could vary depending on the eagle's tolerance for human disturbance¹. Existing information regarding the location and status of bald eagle nests in southcentral Alaska is maintained by the USFWS, Anchorage Field Office.

Although there is no regulation requiring bird nest surveys, the Migratory Bird Treaty Act (MBTA) prohibits the “take” of any migratory bird, nest, or egg. The term “take” includes any intentional or unintentional act that wounds or kills a migratory bird². Construction activities such as clearing vegetation can result in a take if a nest is abandoned or if birds are injured during the clearing activities. Therefore, vegetation clearing can result in a violation of the MBTA. To prevent impacts to migratory birds, and to assist developers with legal intent of the MBTA, the U.S Fish and Wildlife Service has published a schedule of nesting periods for Southcentral Alaska bird species based on the habitat type impacted by the project³. For bald eagles and other raptors covered under the MBTA, clearing should be avoided between April 10 and August 10 if activity is within 660’ of an active nest. For all other migratory birds, avoid clearing between May 1 and July 15th.

The USFWS guidance recommends that vegetation removal occur during the non-breeding season to avoid impacts to migratory birds, the breeding season is as identified above for raptors and other migratory birds respectively. For the proposed Chickaloon Coal Lease area, RAL will attempt to plan clearing activities to the extent practicable outside of identified migratory bird windows; however, postponing clearing activities may result in a delay to the exploration program and project permitting.

A raptor survey of the Chickaloon Coal Lease area is planned in Spring of 2012 prior to the start of ground disturbing activities. Before conducting the aerial raptor survey, a review of the USFWS Alaska Bald Eagle Nest Atlas database will be conducted and preliminary mapping of the lease area will be done to identify areas of exploration and areas planned for baseline studies in 2012. If clearing activities fall within the May 1st to July 15th window, RAL will coordinate with the USFWS to ensure appropriate measures are employed to protect migratory birds in accordance with the MBTA.

¹ U.S. Fish and Wildlife Service (USFWS). 2007. National Bald Eagle Management Guidelines.

² http://alaska.fws.gov/ambcc/ambcc/treaty_act.htm accessed April 2012

³ <http://kenai.fws.gov/wildlands/KenaiPeninsulaVegClearingFactSheet.pdf> accessed April 2012

10.2 Terrestrial Wildlife

Moose are the most important large mammal present in the coal lease area. During the transects by Dames and Moore in 1989, they noted browsing activity on many shrub species present in the area with the exception of white spruce and buffaloberry (soapberry). The browsed species included willow, cottonwood, birch, alder, prickly rose, highbush cranberry, and mountain ash. Moose hunting is very popular in the area below the base of Castle Mountain due to the ready access to the area from the old Castle Mountain Mine Road and the Permanente Trail. This area is in Game management Unit 14A.

During the same discussions with the Department of Fish and Game, Dames and Moore stated that moose throughout the year utilized the small Castle Mountain Mine coal lease area, with perhaps the greatest concentration occurring in the winter. In the much larger area between Kings River and the Chickaloon River, ADF&G personnel stated that moose could be found wintering down to the 1,000 foot contour, i.e., the Fish Lake/Drill Lake residential area. In early May, ADF&G noted a migration to higher elevations. It is also understood from prior testimony in 2007 that moose calving and rutting activity is in fact prevalent in the larger RAL coal lease area between the Chickaloon and Kings Rivers and south of Castle Mountain to the Matanuska River. There is also note of a mineral lick in Section 21 southwest of the Hobbs coal lease. Earlier transect surveys on the Hobbs Industries coal lease by Dames and Moore did not see this extensive moose activity, but their sample size was extremely small. It is assumed that the same migrations to low altitudes in the winter and high altitudes in the summer would also apply to the much larger Chickaloon Coal Lease area.

In a recent visit to the ADF&G Palmer office, wildlife biologist Tim Peltier stated that Game Management Unit (GMU) 14A covered a pretty large area and it was not possible to separate the number of moose counted in the area the size of Riversdale's coal lease, nor estimate the number of moose harvested in the same area. GMU 14A was further broken down to specific permit harvest areas with the one encompassing the coal lease being in Drawing Moose Permit Hunt DM407. Unfortunately, this permit hunt area also encompassed lands from Palmer to Chickaloon, north of the Matanuska River to the upper reaches of the south draining streams in the Talkeetna Mountains. In the last year of published data, 2008-09, there were 3337 permit applicants with only 60 permits issued. There was a 30% unsuccessful rate with 5% deciding not to hunt. The harvest for this still large area was one bull and 38 cow moose. Again, the data does not specify the number of moose taken between the Kings and Chickaloon Rivers in the area of the coal lease.

Data on other large mammal species that were harvested was available for years up to 2008 (ADF&G, 2009). This data showed brown bear harvest in GMU 14 for 2007 was 26 with 70% of those taken in September and the rest mainly in April and May. No data was available on black bears in GMU 14. In the last pre-trapping season wolf census, it was estimated that 145-160 wolves reside in GMU 14 in about 19 to 20 separate packs. In the last harvest report of 2007-08, 22 wolves were harvested in Unit 14A, of which 12 were females. The method of take was evenly divided between being shot, snared or trapped. Dall sheep harvest information is given for the Talkeetna Mountains-Chulitna-Watana Hills area that encompasses GMU's 13A, 13E, 14A, and 14B. In this large region, a total of 42 rams were taken in 2006-07, the last year of

published ADF&G data. There was a 13% success rate by the hunters. Mountain goats showed an aerial population count of 154 in GMU 14A during 2006-07, the last year of published count data. Mountain goat harvest data between 2007 and 2009 showed a total of 21 animals taken. It could not be determined what percentage of these occurred on or near Castle Mountain.

There is also harvest data on smaller furbearer harvests in GMU 14, with the latest year of data being 2008-09. In the ADF&G report, the following furbearing animals were harvested by various methods, but primarily via traps: beaver (121), land otter (21), lynx (9), wolverine (13), and marten, (431).

A raptor survey is planned for early spring 2012. Large mammal surveys are not planned for the 2012 field season, however, scientists conducting other studies in the project area will note signs of wildlife and wildlife activities.

11.0 AQUATIC WILDLIFE

11 AAC 90.163 (a) (2) (A) fish and wildlife, including any endangered or threatened species listed under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 – 1543);

In 1989, a study of the aquatic wildlife resources in and adjacent to the 180-acre Castle Mountain Mine area was conducted by Dames and Moore. Their studies included cursory observations made during their baseline mammal survey of the same area. Additional aquatic species data and information was obtained in 2005 and 2012 from the Alaska Department of Fish and Game office in Palmer. The latter Fish and Game information included data from a Fish Distribution Database, a Statewide Harvest Survey, and an ADF&G Enhancement website.

Three lakes in the vicinity of the Chickaloon Coal Lease were part of the aquatic wildlife resources study. These were Thirtymile (Ida), Fish Lake and Drill Lake. These three freshwater lakes lie in a residential area between the coal lease and the Matanuska River. Nine freshwater streams were also part of the aquatic wildlife resources study. The streams are the Matanuska River, Chickaloon River, Kings River, Carbon Creek, Coal Creek, Boulder Creek, Sawmill Creek, Riley Creek, and California Creek.

In obtaining information about the freshwater lakes from the Department of Fish and Game in Palmer, it was noted that only one of these lakes, Ida or Thirtymile, received annual fish stockings of grayling and rainbow trout. In 2005, 1,000 grayling and 6,588 rainbows were stocked. According to Fish and Game, Ida Lake also supported a “natural” rainbow trout and kokanee “landlocked” salmon population at the time of the first State stocking in 1987. Ida Lake has an inlet stream from Fish Lake that also supported these same “natural” populations of rainbow trout and Kokanee landlocked salmon. Other species noted in Fish Lake are three spine sticklebacks and cottids (slimy sculpins). Regular stockings of fish into Fish Lake stopped in the 1960’s according to the Alaska Department of Fish and Game in Palmer. The last lake in the area with any known fish populations is Drill Lake, named for the 1929 Navy Alaska Coal Commission exploratory oil well that came up dry. This small lake is located about 1.5 miles east of Fish Lake. Drill Lake has in the past shown small populations of rainbow trout and slimy

sculpins. It was also last stocked in the 1960's, according to the Alaska Department of Fish and Game in Palmer.

Of all the freshwater streams noted above that occur in the vicinity of the Chickaloon Coal Lease, only two, California Creek and Riley Creek, show no indications of fisheries resources according to the Alaska Department of Fish and Game in Palmer. These streams, however, have had no formal surveys conducted on them. All the other streams, support anadromous species of salmon.

As for anadromous streams found flowing in the vicinity of RAL's coal lease, the most prolific is the Matanuska River. This major drainage that empties into Cook Inlet supports all five species of Pacific salmon, Chinook (king salmon), coho (silver salmon), sockeye (red salmon), chum (dog salmon) and pink salmon. It is not known if red and pink salmon make it as far upstream as Chickaloon. The Matanuska River also hosts wintering populations of non-anadromous rainbow trout, Dolly Varden char, and Arctic grayling. Of the major tributaries to the Matanuska River in the vicinity of Chickaloon, anadromous species are found in south-flowing tributaries such as the Chickaloon River and Kings River, as well as north-flowing tributaries Coal Creek and Carbon Creek. Coho salmon have been caught in the Chickaloon River according to Statewide Harvest surveys conducted between 1977 and 2004. The Chickaloon River is also noted by Fish and Game as being a chum salmon spawning area and coho salmon rearing area. State Harvest surveys also state that non-anadromous species of rainbow trout, Dolly Varden char, and Arctic grayling are present in the Chickaloon River.

There is continuing speculation on anadromous species populations in the Chickaloon River, both historically and in present day. With the river being glacier-fed and having no recognized presence of anadromous species in feeder tributaries upstream with the exception of a few coho salmon in Riley Creek, a fish biologist in the Palmer ADF&G office, suspects that the Chickaloon River has never supported significant numbers of anadromous species (Sam Ivey, 2012, personal communication).

Kings River's anadromous salmon species, according to Fish and Game, include data that reflect chum salmon spawning, coho salmon spawning and rearing, and Chinook salmon spawning activity. There are also reports that the Kings River hosts a non-anadromous species population of Dolly Varden char. The other two freshwater streams that data show to contain anadromous fish species are Coal and Carbon Creek with the species present being coho salmon. Cohos were found to be spawning in the lower reaches of the stream. According to Fish and Game, it is not known if they are also reared there or if they are found farther up the drainage. No data on non-anadromous fish species are available for Coal and Carbon Creeks.

Finally, the 1989 Dames and Moore baseline research project at Castle Mountain Mine reported no fisheries resources in Edwardson Gulch Creek, which is part of a small watershed on the south side of Castle Mountain that ultimately flows into Drill Lake. According to Dames and Moore, any fish that would likely want to swim up this small stream into the coal lease area would be met with numerous impediments to fish movement, such as perched culverts, long cascading intervals and a waterfall with a seven-foot drop. It is also surmised that the same type of impediments result in the lack of fish in aforementioned California and Riley Creeks.

In 2012, The Palmer office of the Department of Fish & Game was revisited for any additional information on aquatic wildlife in the area of the RAL coal lease. Fisheries surveys are not planned for the 2012; however, scientists conducting other field studies will be noting stream characteristics and noting fish presence as practicable to aid in planning for future fisheries field studies.

12.0 CULTURAL AND HISTORICAL RESOURCES

11 AAC 90.163(a)(2)(B) a description of known cultural or historic resources listed or eligible for listing on the National Register of Historic Places and known archaeological features within the proposed exploration area. The commission will, in the commissioner's discretion, require additional information regarding known or unknown historic or archaeological resources if these resources are likely to be affected by activities under this section;

Human occupation in the Upper Cook Inlet during early prehistory (10,000 - 3,000 BC), has been documented in several areas, most notably at Beluga Point on Turnagain Arm and Long Lake in the upper Matanuska Valley. Past studies suggest that the arrival and growth of the Athabaskan tradition in Upper Cook Inlet occurred within the last 1,000 years. Sites throughout the Susitna Valley and one at Fish Creek have substantiated this.

Prehistoric cultural resources in the Chickaloon vicinity are not well known. Previous archeological research has been largely associated with development of the Glenn Highway (Dixon and Johnson, 1973; Holmes, 1973, 1989; Gibson and Sterling, 1981). Thirteen prehistoric sites are known within the middle Matanuska Valley, the majority of which are clustered in the Long Lake vicinity, about eight miles east of Chickaloon. Materials recovered from these sites suggest the potential for an early Holocene (starting 12,000 years ago) occupation of the region (Bacon, 1975; Holmes, 1989).

Climate and ecological conditions starting during the late prehistoric times were similar to that of today with modern forest vegetation predominating. This vegetation induced the subsistence patterns oriented toward seasonal use of river and marine resources. Prior to this, extensive grasslands accommodated mainly hunting lifestyles, usually for caribou.

The Wishbone Hill and Chickaloon areas of the Matanuska Valley are incorporated in the larger Upper Cook Inlet Region cultural resource area. The Dena'inas, an Athabaskan Indian people, controlled this area at the time of European contact (Early History). These people mainly fished the rich Upper Cook Inlet waters as their primary subsistence source. Regional bands of the Dena'ina populated the area around Knik Arm and the Matanuska River drainage. These bands, called the K'enaht'ana were both hunters and fishermen and maintained a close association, through trade, with the Ahtna people, a regional group of native people from the Copper River Region of Alaska.

No previously unknown prehistoric or historic cultural resource sites from the Dena'ina, K'enaht'ana or Ahtna peoples are known within the Chickaloon Coal Lease area. Archeological surveys completed for the Wishbone Hill coal project, the Jonesville coal project, and the Castle Mountain coal project in the late 1980's and early 1990's noted that there was little doubt that

these areas and its resources were important to the native peoples living or passing through these areas. However, it appears that historic occupation and development of these areas is primarily associated with the exploration and mining of coal. Discussions of coal mining history of the area are better explained in Part 3.0 of this exploration permit application.

The only archeological survey inside the Chickaloon Coal Lease that has occurred in recent years is a reconnaissance survey accomplished at the Castle Mountain Mine project in 1989. During this survey, past mining debris and effects were noted as would be expected from a recent mining adventure. Similar materials and observations would be expected at the other previously mined areas associated with the Chickaloon, Coal Creek, and Kings River coal mines. However, attributes of setting, location, and resource availability observed during the Castle Mountain reconnaissance survey suggests that the potential for locating prehistoric cultural resource sites in the vicinity is very low. Native peoples undoubtedly used the Chickaloon Coal Lease area during travel and hunting expeditions, but the expected types of sites resulting from such usage would be small, difficult to locate and highly subject to alteration and destruction by natural and man-made processes.

Based upon information compiled and reviewed for prior mining activities in the vicinity of the Chickaloon Coal Lease area, it is unlikely that coal exploration within the area will significantly affect cultural resources. The last desktop review and associated report on existing information was conducted by Alaska Earth Sciences (AES), under contract to Full Metal Minerals (FMM) on November 28, 2006. AES visited the State of Alaska Division of Parks and Outdoor Recreation's Office of History and Archeology in Anchorage; this visit was organized to do a detailed paper search of any potential sites of prehistoric and historical significance in the area of FMM's Chickaloon Coal Leases. The SHPO office denotes sites of historic and prehistoric significance with a number designation that is placed in an Alaska Heritage Resources Survey (AHRS) publication. To qualify for publication in this publication, a site must be at least 50 years old. Over 30,000 sites had been reported within Alaska by 2007. At the time of the desktop review in 2006 the AHRS had identified two historic sites directly on RAL's Chickaloon Coal Lease acreage.

As the last desktop review and survey work was conducted in 2006, a desktop review of cultural resources in the Chickaloon Coal Lease area is being conducted in April 2012 concurrent with this application. Following the desktop review, a cultural resources survey will be conducted for the area proposed for exploration prior to drilling, trenching or other ground disturbing activities.

PART C – EXPLORATION AND RECLAMATION PLAN

11 AAC 90.167(a) Coal explorations that substantially disturbs the land surface and associated reclamation operations must be conducted to minimize, to the extent practical, environmental damage. The operations must comply with this section; however, the commissioner will, in his or her discretion, waive certain requirements of this section upon a written finding that the requirement will be superseded by subsequent permitted operations. The commissioner will, in his or her discretion, impose additional performance standards to minimize environmental damage if the particular type of exploration activity requires them.

This section does not require specific information from the application. However, this application does not request waiver of any of the performance standards of this section.

11 AAC 90.163(a) (4) a map of the 1:63:360 scale series enlarged at least 2.5 times showing, based on available information, the area to be disturbed by the proposed exploration and reclamation activities, including existing roads, structures, pipelines, and the proposed location of trenches, roads, rights-of-way and other access routes, land excavations to be conducted, water or coal exploratory holes and wells to be drilled or altered, earth or debris disposal areas, bodies of water, historic, archeological and cultural features, topographic and drainages features, and the habitats of endangered or threatened species identified in (2)(a) of this section; and

Figures 2 and 10 relate the proposed exploration and reclamation activities and meet the 11 AAC 90.163(a) (4) scale requirements. All other figures are regional maps, schematics or pictures that are not required to meet those requirements.

11 AAC 90.163 (b) Extraction of more than 250 tons of coal under an exploration permit is allowed only with the commissioner's prior written approval. 11 AAC 90.163 (c) The demonstration required in (b) of this section must also include (1) the location where the coal will be tested etc.

Not applicable for this proposed exploration as less than 250 tons will be extracted.

11 AAC 90.163(a) (5) a statement as to whether coal exploration is proposed for an area designated unsuitable for mining under AS 27.21.260.

The Chickaloon coal lease is not in an area designated as unsuitable for mining under AS 27.21.260.

11 AAC 90.163(d) (2) an explanation of why other means of exploration are not adequate to determine the quality of the coal or the feasibility of developing a surface coal mining operation.

The method of retrieving the coal — by standard HQ and NQ size drill core for coal seam identification for coal quality sampling and rotary drilling and limiting trenching is the only way to explore for a coal resource which is structurally complex and has limited surface exposure. A summer 2012 exploration program will take place on or very near an

old established and mostly unimproved gravel road, known locally as Castle Mountain Mine Road. A more extensive lease-wide drilling program will take place after a sufficient snowpack to handle vehicles traverses has accumulated in the late fall of 2012 or late winter 2013. No short or long-term impacts are expected.

1.0 INTRODUCTION

11 AAC 90.163 (a) (2) (D) an estimated timetable for each phase of exploration and reclamation

Exploration activities on Riversdale Alaska LLC's (RAC) recently acquired Chickaloon Coal Lease are planned to commence in the summer of 2012 and last up to two years, the length of the exploration permit term. This exploration is presently intended to be conducted in three separate phases. The initial phase will take place during the summer of 2012. The focus of the latter two phases is dependent on what is found during the Phase 1 exploration. As such, details on the latter two Phases are not addressed in this exploration permit application.

The purpose of this initial Phase 1 exploration is twofold. First, it is necessary to map and understand structural and stratigraphic geologic trends within the lease to evaluate the potential of economic coal resources on the coal lease. The geologic determinations would then be used to plan continued exploration during the Phase 2 and 3 exploration programs. To obtain this information, both core and rotary drill rigs will be used, along with some limited trenching. Coal quality and environmental baseline data will start being collected during this Phase 1 program. Coal quality information will be used to send to potential end-users to determine market interest in the Chickaloon area coals. The environmental baseline data will include information on coal and overburden quality, area hydrology, and other environmental baseline data required to complete a State of Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA) mine permit application. Since most of this information can only be gathered when the ground is not frozen, it will be incorporated into the summer 2012 exploration program.

The Phase 1 summer 2012 exploration drilling program will focus its effort along the Castle Mountain Mine Road to get a better understanding of the coal geology and subsurface structure in the center portion of the coal lease. From this initial round of drilling, samples will also be taken and the extent of the coal-bearing portion of the Chickaloon Formation along this road will be identified.

Phase 2 and Phase 3 exploratory drilling programs are necessary to adequately map and identify the coal resource and geology over the entire lease area. The scope and extent of the later phase exploration program cannot be fully determined until the results of Phase 1 drilling have been analyzed. It can be anticipated that 10 to 15 boreholes will be completed in each future exploration phase. One thought is to drill wildcat holes in each section in the Phase 2 drill program and do infill drilling within the sections during a Phase 3 and later exploration program.

At present, there are no estimations of the depth of any future Phase 2 or Phase 3 boreholes or their locations. This information will depend on the interpretation of the subsurface geologic structure, the projected location of the coal-bearing portion of the Chickaloon

Formation within the coal lease, and potential environmental factors. This is the primary object of the Phase 1 and Phase 2 drill programs.

Future in-fill drilling programs beyond a Phase 3, if accomplished, will most likely occur under an extension of the RAL coal exploration permit. In-fill drilling means that boreholes every 1,000 feet or even every 500 feet could be drilled, possibly with multiple drill rigs. This type of exploration drilling is primarily accomplished to outline a mineable deposit for mine planning purposes.

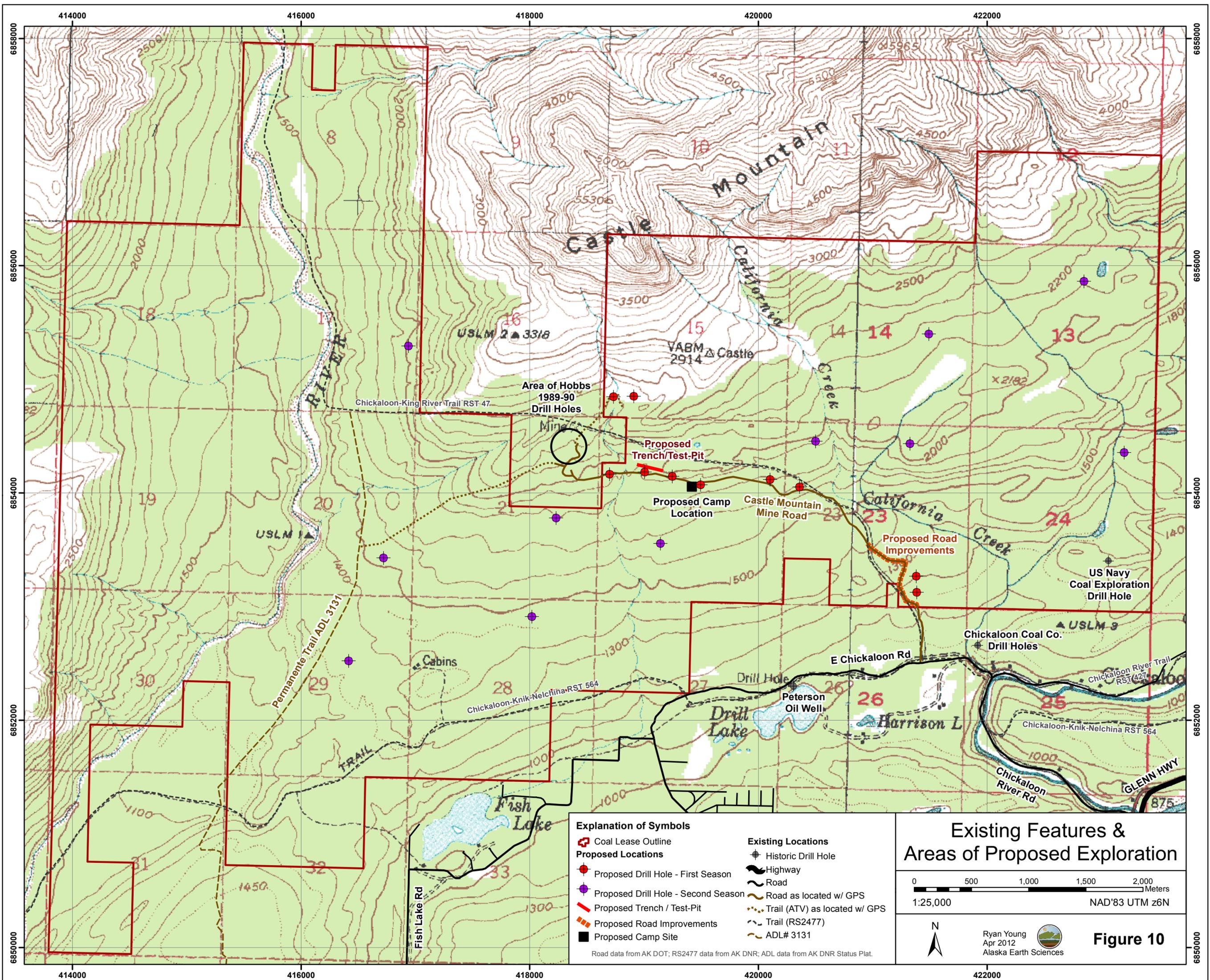
Drilling equipment and methods will stay the same for all exploration phases and access to later phase exploration sites will either be by helicopter or tracked and/or large-tired (low ground pressure) vehicles, depending on the time of year. Some trenching may also occur. Later exploration phases will be conducted similarly. There are no plans to utilize blasting during any of the Chickaloon coal exploration phases. In all cases, a primary responsibility of the exploration is to minimize disturbance to the natural environment. If helicopters are used to transport the drilling rig and other equipment to the drill site, wooden drill platforms may be constructed over sloping or frozen ground with an emphasis on limited ground clearing. Finally, the projected location of all Phase 2 and Phase 3 boreholes will be sent to the Division of Mining, Land and Water for approval at least 30 days prior to the anticipated start-up of exploration. In addition, during the summer of 2013, additional environmental baseline studies will be conducted.

2.0 2012 SURFACE DRILLING PROGRAM

11 AAC 90.163 (a) (2) (C) a description of the methods to be used to conduct coal exploration and reclamation including, types and uses of equipment, drilling, blasting, road or other transportation facility construction, and earth and debris disposal areas;

Ten core holes are proposed for the Phase 1 exploration drilling program. Figure 10 shows the general location of these coreholes. The ten coreholes is an approximation of what may be needed to identify the coal resource location, obtain a basic understanding of the geologic structure, and gather other pertinent information. Borehole location will be based on what is currently known about the deposit and locations will be adjusted throughout the program as new data is acquired. The exploration programs purpose is to maximize the understanding of the complex geology within the Chickaloon Coal field. All of the core holes will be drilled along or directly adjacent to the old Castle Mountain Mine Road and along an old Castle Mountain Mine road emanating from it that has devolved to the state of a trail (but has no name associated).

The unnamed trail presently considered to be used to access drilling areas is both an old mine road and a trail. The old mine road starts on Hobbs Industries 180-acre coal lease and skirts the west side of the reclaimed facility area, passes south of the south strip pit and angles to the north skirting the west side of the northern strip pit. Past the strip pit, the old road ends and becomes a trail. This trail continues to the northeast about 1/4th mile and then descends into a gulch created by the upper reaches of Edwardson Gulch Creek. After crossing this small drainage (gravel covered bed with water channel two feet wide and two inches deep), the trail



Explanation of Symbols

Coal Lease Outline	Existing Locations
Proposed Drill Hole - First Season	Historic Drill Hole
Proposed Drill Hole - Second Season	Highway
Proposed Trench / Test-Pit	Road
Proposed Road Improvements	Road as located w/ GPS
Proposed Camp Site	Trail (ATV) as located w/ GPS
	Trail (RS2477)
	ADL# 3131

Road data from AK DOT; RS2477 data from AK DNR; ADL data from AK DNR Status Plat.

Existing Features & Areas of Proposed Exploration

0 500 1,000 1,500 2,000 Meters

1:25,000 NAD'83 UTM z6N

N

Ryan Young
Apr 2012
Alaska Earth Sciences

Figure 10

turns to the southeast and then east. One corehole is planned west of this crossing and one is planned east of this crossing. The drilling will take place more than 100 feet from the small drainage. See Figure 10 for the location of this unnamed trail.

In addition to the 10 proposed Phase 1 coreholes projected for the 2012 RAL coal exploration program, up to 15 shallow air rotary drilled boreholes will be drilled, also on or near the old mine road and connecting unnamed trail. All exploration boreholes which pass through surface gravels prior to intersecting the coal-bearing formation will be cased through the gravels. The casing will have an outside diameter of 4.5 inches to a maximum of 6 inches. The corresponding inside diameter of this casing would be 4.0 inches and 5.5 inches, respectively. If the larger casing is used, the annular space between it and the 4.5" (OD) threaded surface casing will be cemented. Each of the thicker conductor casing sections will be welded at their connections. The location of these separate air rotary boreholes is not known. Their location is dependent on the field data received from the core drilling. As such, map locations for them are premature.

Part A of this permit application notes that RAL's Chickaloon Coal Lease covers 9,927.60 acres of potential coal-bearing land. Previous Chickaloon area coal exploration drilling, noted in Part B, Section 3.1 and 3.2 of this permit application, covered less than a hundred acres. This means that about one percent of RAL's coal lease has actually been explored. It is presently envisioned to have only one daytime operating shift of 10 to 12 hours. Any decision to extend the drilling around-the-clock will depend of progress of drilling and formation conditions.



Figure 11. Tuggster Rotary Drill Carrier.

Equipment for the Phase 1 exploration will be mobilized from their home base and transported to the exploration area via private carrier. The company selected to complete the shallow drill holes will use either a nodwell carrier or an oversized rubber-tired Tuggster truck (Figure 11) to carry an air rotary drill. Nodwell or Tuggster carriers with on board drill rigs have lower overall weight and corresponding lower ground pressure compared with normal tired or treaded off-road drill rigs. The Tuggster carrier has an overall dimension of 9.6 feet wide by 20 feet long with the Nodwell being slightly shorter. A small air compressor (6 by 7 feet) will be pulled behind the drilling rig.

The rotary boreholes will be 4.5-inch diameter holes with average depths ranging from 50 to 250 feet. Some may be deeper. Most of these shallow boreholes will be used to follow trends of intersected coalbeds identified in the core holes. Rotary boreholes may also be used to determine substrate conditions for possible facility placement or some may be made directly into

water monitoring wells. For the rotary boreholes that will become coreholes, threaded surface casing will be top driven through the surface gravels and into the upper few feet of the coal-bearing formation.

Rotary drill rigs are equipped with various cuttings samplers. A sampling diverter system from Wasilla's Winger Drilling's B-61 air rotary rig (Figure 12) is one such system designed for better control and sampling of drill cuttings, placing them directly into super sacks. Another system has sample recovery cyclones with a mini-cyclone attachment that directs cuttings into sausage type bags. For the purposes of this program, the surficial overburden drill cuttings and upper formational cuttings will be directed to a selected site in back of the drill rig. Using this method, the cuttings will accumulate from the surface drill hole in a



Figure 12. Sampling Diverter System

10 foot by 10 foot area. One of the sampling systems could be used if a coal seam is intersected. Upon completion of the hole, a portion of the piled-up cuttings will be returned to the borehole, while the remainder will be spread around the drill site to cover any areas of surface damage from the drilling process.

The air rotary drill rig and air compressor will be placed side-by-side at the drilling site along with the drillers' work truck. Given room for maneuvering, it is anticipated that an area approximately 30-foot square will be affected during the drilling process. The drill will be set up at a specified location and leveled. The only physical disturbance at the site will be at the well bore and below the sample cuttings diverter (see description below). There will also be some disturbance at the location of the equipment levelers. The root mass of native plants will be left in place during the exploratory drilling to help maximize native species regrowth after cuttings have been redistributed over the site. Any damage to the tundra from the Tuggster and worker truck traffic will be reclaimed and revegetated. Reclamation and revegetation procedures are discussed in Part C, Sections 6.0 and 7.0.

Upon completion of each rotary drill hole, the rotary rig will move to the next drill hole where the set-up process will be repeated. Also, upon completion, the hole will either be backfilled with cuttings and other materials described in Part C, Section 7.0, or completed as a groundwater monitoring well by lining it with a 4 inches perforated PVC pipe. The tentative locations of these water monitoring wells will depend on regional topography, but in general they will be placed adjacent to surface drainages. No exploratory drill holes will be placed within 100 feet of streams.

The core drilling company will be used to provide a continuous wireline coring operation for the proposed Phase 1 drilling program. The rig will be a LF-70 (or equivalent) typically used for mineral exploration in Alaska. Figure 13 shows a typical LF-70 core rig courtesy of Boart Longyear Drilling Company. This core drilling rig and the air compressor unit accompanying it will be mounted on a tracked Nodwell for easier access to the drill locations. The core rig will start the hole with HQ core which has a core diameter of 2.5 inches, 3.895 inch bit and 3.5 inch-OD drill rods. The hole will be downsized to NQ core, diameter 1.875 inches, when drilling HQ is no longer feasible. The smaller string NQ rods will be used to complete the hole. NQ drill bits are 3.032 inches with rod OD of 2.75 inches. A sample core hole schematic is illustrated in Figure 14. An open-hole geophysical logging suite will then be run down the borehole. Particulars on this open-hole logging suite are discussed in Part C, Section 4.0. After all cores have been retrieved and logs run, the hole will be permanently abandoned by approved methods.



Figure 13. LF-70 Core Rig on Location

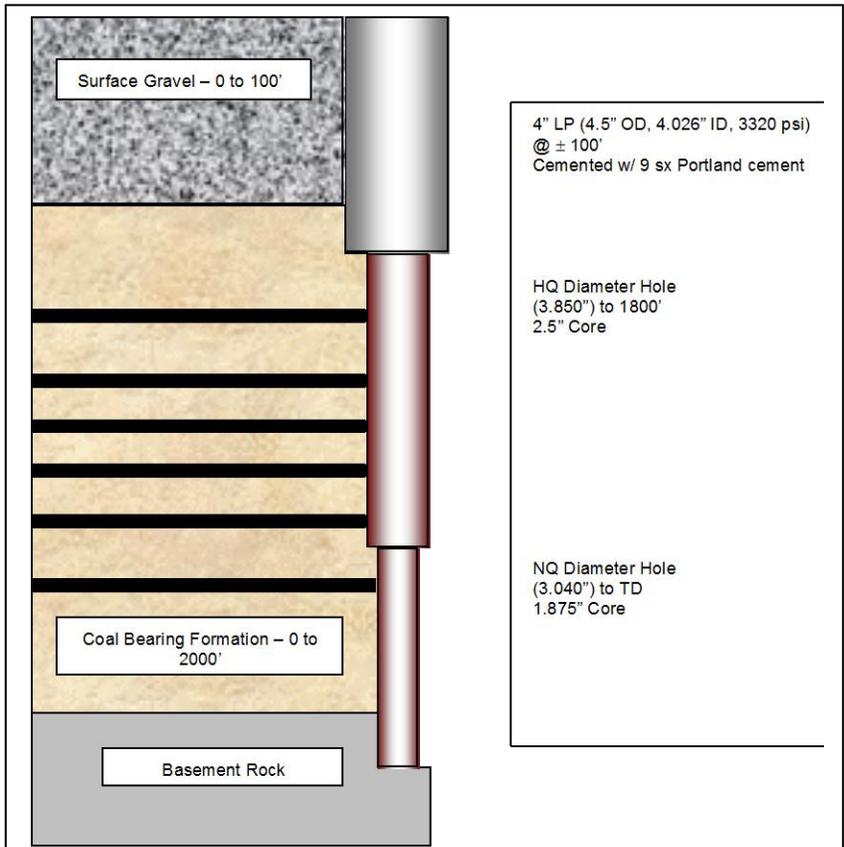


Figure 14. Core Hole Schematic

The core drilling rig, associated compressor and associated support equipment will occupy a larger area (45 feet by 60 feet) when compared with surface drilling rig (Figure 15). Since core will be cut from the formation, brought to the surface, and taken away for study, only minor amounts of drill cuttings will collect on the surface. These cuttings will accumulate around the drill collar behind the drill rig. Upon reaching TD, the core rig will move on to the next corehole location to repeat the process. Any leftover cuttings will either be used to backfill the hole or to repair any damaged areas as will be done at the rotary borehole sites.

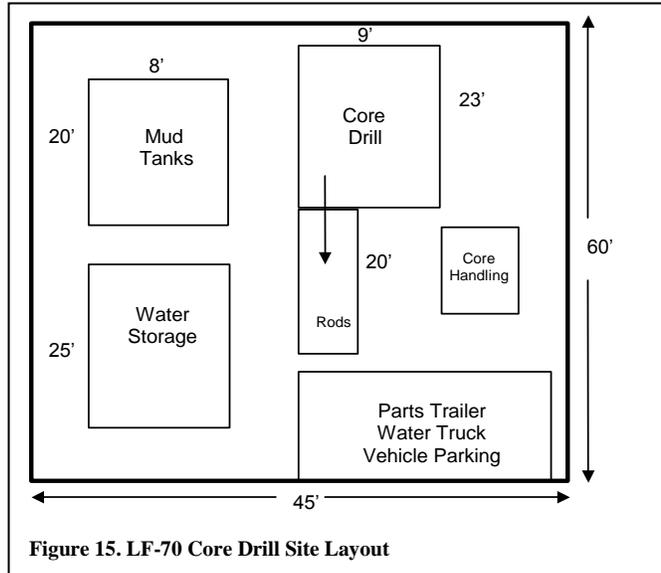


Figure 15. LF-70 Core Drill Site Layout

There will be no caustic materials used in the drilling process. In regard to drilling muds that may be used during the coring process, the relevant MSDS Sheets for drilling fluids that may be used at the site are attached at the end of this permit application. The products names are: Dextrid, EZ Mud Plus, FEB Hyseal No. 1, Drispac Polymer, Quick Seal, and Bentonite Pellets.

The Tuggster mounted auger/downhole hammer drill rig will use air to drill, with minimal water for lubrication, as necessary. In addition, only normal motor oils, hydraulic oils, and assorted greases will be used. These will be stored on the Tuggster carrier or workers truck above plastic liners or absorbent cloth. Some cement (stored in bags on the Tuggster or workers truck) will be used for topping off holes during the borehole plugging and reclamation process.

RAL has submitted a Temporary Water Use Permit application to the Water Resources Division of the ADMLW. In that application RAL proposes Edwardson Gulch Creek, Unnamed Pond and California Creek as primary water sources. Edwardson Gulch Creek is located just east of the small Castle Mountain Mine lease of Hobbs Industries. This water source location is dependent on the annual flow in this small drainage. The Unnamed Pond site is a small pond in the northern half of Section 22, north of the Castle Mountain Mine road. It will be checked this summer to see if it is a viable water supply point. California Creek is in the vicinity of the old Castle Mountain Mine washplant. California Creek is a last resort at this time due to its present use as a drinking water source by the local populace. If a water well of sufficient flow capacity is developed in the exploration area, it will also be considered for a water source. The location of a water well for this purpose will be examined during the summer drilling program.

The Temporary Water Use Permit application also lists the Chickaloon volunteer fire department tanker as a secondary/alternative water source. Chickaloon volunteer fire department pulls their water from Drill Lake. The tanker would transfer water to tanks mounted in the back of personnel transport vehicles. Water from the pickup tank will then be transferred to the water tank on the back of the compressor rig for the coring operation and a separate pickup accompanying the rotary drill rig. No onsite water truck is envisioned.

Fuel, (diesel and unleaded regular) used during the exploration will be purchased in Palmer or Sutton and brought to the coal lease area as needed in a 150 gallon tank at the back of a pickup truck. This will alleviate the need for on-site fuel storage. Regular runs from a local distributor's fuel truck are also being considered but are not the first choice for the small program envisioned. It would be preferable to obtain fuel locally in Chickaloon, but the town does not have a fuel distributor at this time. Drilling and support equipment will be refueled from the service tank on the back of the pickup on an as-needed basis. The drilling operators and other heavy equipment operators will have absorbent materials and containment equipment (duck ponds etc.) readily available. They will place these materials and containment devices under the equipment in those areas where leakages or spills may occur. A Spill Prevention, Control, and Countermeasure Plan will be in place.

A temporary camp site/staging area is proposed for at least the Phase 1 exploration program. This camp will be located on a flat area directly south of Castle Mountain Road on an area that appears to have been previously disturbed (Figure 10). Only minimal grading will be necessary to improve the site. Fueling of exploration equipment during the initial Phase 1 exploration program will be done either at the camp site/equipment staging area or on location at the site of the drilling. No fueling will be done within 100 feet of any creek or any other permanent water body. No fuel will be stored on site. Oils and greases used during the program will be stored on the equipment in designated containment areas or on top of absorbent cloth. Empty containers that held these substances as well as other non-coal waste will be collected and hauled off site to the nearest approved recycling or disposal facilities in either Sutton or the main Mat-Su Borough landfill off the Palmer-Wasilla Highway west of Palmer. The camp site/staging area as well as the drill sites will be kept clean. All employees will be required to keep their work areas clean and safe.

During the Phase 1 exploration, all drill sites will be accessed from the Castle Mountain Mine road and many will be located on or directly adjacent to this road on surfaces previously disturbed during initial road building or subsequent maintenance work. On those off-road boreholes, minimal surface disturbance should be realized due the use of low-pressured large tired vehicles or tracked Nodwell carriers. Open areas with meadows or vegetated areas with fast growing willow/alder stands will be used to access off-road borehole sites. The trees and brush that are cut will be cut at the ground surface to allow equipment transport over them. This will minimize disturbance to the vegetative surface mat and leave the roots intact to control erosion and facilitate rapid regrowth. Higher elevation drill sites will be prioritized to be drilled earlier in the summer/fall program to minimize activity in these more productive hunting areas during the hunting season.

To facilitate the Phase 1 exploration program, some grading, road widening and culvert work will be necessary along the old Castle Mountain Mine access road from the Alpine Development parcel near the beginning of the road to the old coal mine site. Gravel cover will be placed on portions of the road that need it, mostly at lower elevations. Alder and willow brush that has overgrown portions of the road surface since the old mine closed in 1960 will be cut back or removed to provide unhindered travel. Recreational traffic will be allowed to traverse the Castle Mountain Mine road during the exploration to maximum extent practicable, but will be restricted around the drilling sites and the camp/staging area for safety reasons. Appropriate

safety protocols will be implemented to protect project personnel and the public. This may include signage, road bumps, safety barriers and occasional temporary road closure during heavy equipment movement. Signage will be installed as necessary within the lease area to inform the public of activity and warn of potential temporary roadway obstructions. Notices will be posted at the community center and other public venues to keep the public informed of activities taking place within the lease area.

The Phase 1 camp/staging area will have one large tent and one portable chemical toilet during the exploration, besides drilling supplies and personal vehicles. The tent structure will be used as a temporary office and core logging facility during the exploration. The location of the camp is shown on Figure 10. Only minimal grading will be necessary to improve the site. Only personal vehicles will access the camp site during the course of the exploration after all the drilling equipment and associated supplies have been brought to the camp at the start of the project. Camp activities and facilities will be structured to minimize disturbance and prevent the transport of potentially harmful substances into any stream. Although no living quarters are planned during the exploration program, a person will be on site overnight during the exploration to provide security.

Two or three portable chemical toilets will be used during the exploration and will be maintained by a local rental toilet company. As noted above, one of the toilets will be placed at the camp/staging site. Another will accompany the drilling rig. Should both drilling rigs be used simultaneously, one toilet will be at each drilling site.

3.0 TRENCHING AND TEST PITS

11 AAC 90.167(h) Excavations, artificial flat areas, or embankments created during exploration must be returned to the approximate original contour when no longer needed.

11 AAC 90.167(i) Topsoil must be removed, stored, and redistributed on disturbed areas as necessary to assure successful revegetation

11 AAC 90.167(o) Known acid-forming or toxic forming materials must be handled and disposed of in compliance with 11 AAC 90.335 and 11 AAC 90.445 or other measures required by the commissioner.

No acid-forming or toxic materials will be handled or disposed of during the excavation of surface trenches and test pits. None of the soil, overburden or coal is acid-forming or toxic. The coal cores will be transported off-site.

In all coal exploration projects, it is important to procure fresh and unweathered samples in quantities greater than what can be collected by cuttings or core. These larger bulk coal and overburden samples are used mostly for coal characterization and overburden characterization studies, respectively. The bulk coal samples are also sometimes used for combustion testing. In order to obtain these bulk samples, some test pits will need to be excavated. RAL will dig the minimum number and size of trenches and test pits necessary for adequate testing.

Excavation of trenches/test pits must be done in unfrozen ground. The Phase 1 exploration program is proposed for the summer of 2012, so it will incorporate excavating trenches and test pits. Besides collecting coal from these test pits, soil and overburden information will also be collected, all for environmental baseline purposes. Before any test pits are dug, officials at the Division of Mining, Land and Water will be notified of their location and an appropriate reclamation bond will be calculated and submitted.

The location of one test pit is shown on Figure 10. This test pit will be along the north edge of the Castle Mountain Mine road east of the small Hobbs Industries Coal Lease and about 750 feet east of the road's intersection with Edwardson Gulch Creek. This particular test pit is projected to be about 100 feet long, 5 to 10 feet deep and about 5 feet wide. A small hydraulic excavator (see Equipment Types and Uses in Part C, Section 5.0) will be used to excavate this test pit since it creates less surface disturbance than a bulldozer. It is suspected that at least one other long test pit might be needed during the exploration for coking test samples. Less than a ton of coal in about 2-3 covered 55-gallon drums will be required for these tests. The location of this second test pit is yet to be determined. A calculation of the reclamation bond for these surface disturbances is seen in Part C, Section 11.0.

In addition to the above mentioned test pits, it will be necessary to occasionally trench along the trend of shallow lying coal seam on the coal lease. The same small hydraulic excavator will be used for these excavations. These trenches will have the approximate dimensions of 15 feet long, 3 feet wide, and no more than 10 feet deep. Reclamation bonding for five of these anticipated trenches has also been calculated and included in the bonding shown in Part C, Section 11.0 of this permit application. Again, officials at the Division of Mining, Land and Water will be notified of the trench locations, prior to actual commencement of the trenching work.

The information gathered during the Phase 1 coal exploration on the property will dictate if any other test pits are needed and where they will be located. As such, no reclamation bonding for these potential test pits is calculated, but will be added when known.

In the case of the already proposed test pit immediately north of the Castle Mountain Mine road, all excavated material will be segregated into separate coal and overburden piles and placed immediately south of this road. Operations will be done to maintain recreational access along the RS-2477 trail (old Castle Mountain Mine road).

Proper topsoil and overburden storage procedures, through segregation, will be followed in connection with the trenching and test pit operations. This means that any available topsoil will be removed first and placed separately from the overburden that will be removed next. After observing the excavated section and removing the necessary coal for testing, the trench/test pit will be backfilled in reverse order and the area graded and revegetated according to regulations. Care will be used during the movement of equipment to impact as little of the native vegetation as possible.

4.0 GEOPHYSICAL EXPLORATION METHODS

It is not known what or when geophysical exploration methods might occur at RAL's Chickaloon Coal Lease. However, some possible geophysical methods envisioned for the coal lease area include: Gradient Array Resistivity, seismic and ground penetrating radar (GPR).

Gradient array resistivity is a new method for tracing low resistivity stratigraphic horizons such as coal seams. This method is becoming more popular as a lower-cost method of developing a three dimensional structural and stratigraphic subsurface picture over a large area. Depending on the size of the survey, anywhere from 50 to 200 meter dipole spacing in a dipole-dipole array is envisioned, likely with 100 meter to 200 meter line spacing. Figure 16 is an example of a gradient array resistivity survey from QGX's coal property in Mongolia.

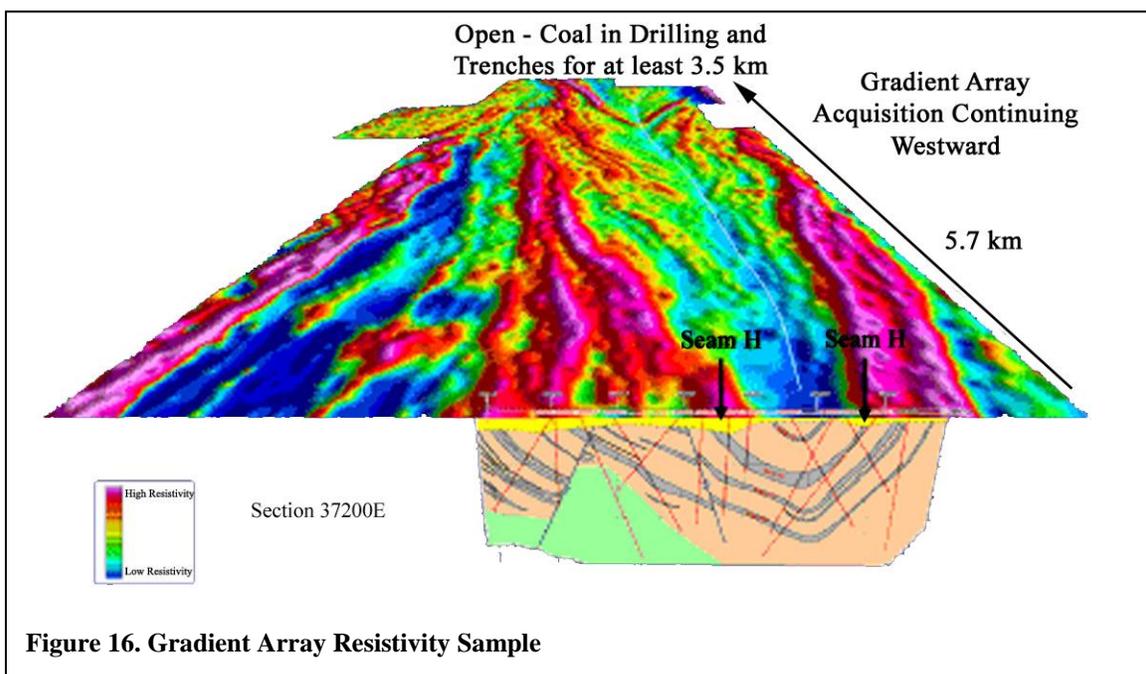


Figure 16. Gradient Array Resistivity Sample

A seismic survey would involve placing geophones at 10 to 100 meter spacing, and using a small charge such as a shotgun shell, or even impact from a sledge hammer to give reflection and refraction profiles of the subsurface. Ground penetrating radar typically has resolution to 10 meters or less, and is useful for profiling depth to bedrock, often being used in archeological surveys. Although the timing of using geophysical exploration methods is still undetermined, it is quite possible that they will be considered during the summer of 2012.

At the completion of drilling and before the core holes are abandoned, each core hole will be geophysically logged, by an experienced contractor. The logging suite will consist of gamma ray, caliper, compensated neutron density, array induction, and sonic porosity. A memory style quad-combo logging suite will be run from intermediate total depth (TD) to surface casing. After the drill rods are removed, the tools will be lowered through the casing into the open hole below and set in place using the same principles and equipment as the retrievable core barrel. The depth of the logging should not exceed 1,800 feet in the deepest boreholes.

5.0 EQUIPMENT TYPES/USES

11 AAC 90.163 (a) (2) (C) a description of the methods to be used to conduct coal exploration and reclamation including, types and uses of equipment,

11 AAC 90.167(m) all facilities and equipment must be removed when no longer needed, unless the commissioner approves retention for a specified period to (1) provide additional environmental quality data; (2) reduce or control the on- and off-site effects of the activities; (3) facilitate future operations under an approved permit or exploration approval.

All equipment and facilities will be removed from the exploration site at the conclusion of the 2012 summer Phase 1 exploration with the exception of piezometers to monitor environmental data. If specific equipment is required for immediate deployment for Phase 2 activity, it will remain on site.

Discussions above have outlined an exploration drilling program to determine if sufficient mineable coal reserves are present within the Chickaloon Coal Lease, to collect coal samples for quality determination and to better understand the geology of the area. The shallow rotary drilling and wire-line coring portions of this exploration will be conducted by yet unnamed drilling contractors. It is also possible that both shallow rotary and deeper wire-line coring may be performed by the same contractor with the same drilling rig. Deep drilling plans and equipment will occur later in the project after determining the structural geology of the deposit and the projection of mineable coal seams. Tenders are currently being called for a suitable drilling contractor. It is expected that the following equipment or equivalent equipment may be used to initiate drilling for the Phase 1 program. The suitability of this equipment for subsequent Phases of drilling will be assessed once drilling commences.

<u>Equipment</u>	<u>Use</u>
One (1) Mobile B61 air rotary drill (or equivalent)	Drill shallow test holes and monitoring wells drill (on Tuggster or Nodwell carrier)
One (1) LF-70 (or equivalent) core drilling rig (on Nodwell carrier)	Drill core holes and deeper water monitoring wells
One (1) Service Nodwell with air	Provide air for core-drilling and store drill rods and supplies
One (1) small Air Compressor	Provide air for air rotary drilling rig
300 gallon water tank (on Pickup)	Provide water for drilling, as needed
150 gallon fuel tank (on Pickup)	Provide fuel for drilling, as needed
1,000 feet of drill rods and drill bits on Nodwell and rod trailer	Used for core drilling

300 feet of drill rods and drill bits on Tuggster carrier	Used for shallow gravel drilling
One (1) Cat 320, (or equivalent) hydraulic excavator	Trenching and bulk sampling
One (1) 14H (or equivalent) motor grader	Regrade Castle Mountain Mine Road
One (1) D5H bulldozer (or equivalent)	For CMM road upgrading and other as needed uses
Three (3) Kenworth 12-14 yd End dump trucks	Transport pit run gravel from Chickaloon gravel site to Castle Mountain Mine Road for upgrade purposes
One (1) Fecon Track unit Brushing machine	Grind up encroaching vegetation along Castle Mountain Mine Road
One (1) Service Pickup	Transportation of workers and water
Three (3) ATV four-wheelers	Personnel transportation on site
One (1) office trailer or tent	Office, core-logging, storage, meetings
Portable Generators	Power office trailer, if present
Three (1) Portable Toilets	Shamrock Septic or Rent-A-Can Toilet Co.

6.0 ENVIRONMENTAL BASELINE DATA GATHERING

11 AAC 90.167 (a) Coal exploration that substantially disturbs the natural land surface and associated reclamation operations must be conducted to minimize, to the extent practical, environmental damage.

The proposed Chickaloon coal exploration, besides searching for coal resources that could support a future mining operation, is being proactive by initiating in Phase 1 numerous environmental baseline studies on the Riversdale Coal Lease. These studies include surface and groundwater hydrology, climatological information, vegetation, soil resources, wetland delineation, fish and wildlife resources and cultural and historical resources.

11 AAC 90.167(c) The applicant must utilize impact control measures, management techniques and monitoring methods to protect endangered or threatened species listed under the Endangered Species Act of 1973 (16 U.S.C. Sec 1531 et Seq.), and their critical habitats; species such as eagles, migratory birds or other animals protected by state or federal law, and their habitats; and habitats of unusually high value for fish and wildlife.

A helicopter nest survey is part of the environmental baseline work proposed to see if any endangered or threatened species are located on the Riversdale Coal lease.

The primary purpose of the State of Alaska's coal exploration permit is to obtain data and information on a particular coal resource area. This data can be collected through various methods, the most common being drilling, trenching, geological mapping, geophysical examination, sampling and analysis. The data collected is then used to decide if there are sufficient good quality coal resources present to suggest that an economic mine development could take place at that location.

A secondary purpose, but no less important aspect of the exploration, is to collect environmental baseline data in the exploration area. This environmental data is collected in the coal resource area to provide a baseline dataset on each environmental parameter that must be addressed in a permit application to then mine the coal. These environmental parameters include surface and groundwater hydrology, climatological information, air quality, vegetation, soil resources, wetland delineation, fish and wildlife resources and finally cultural and historical resources. Socioeconomic and transportation studies are also an important aspect of determining the economic viability of a project.

As part of the exploration program proposed on RAL's Chickaloon Coal Lease, environmental baseline data gathering will occur starting in the summer of 2012. Prior to conducting the initial baseline studies an evaluation of existing data and prioritization of studies based upon project and program needs is being conducted. Current baseline studies planned for 2012 include the following:

1. A raptor survey will be conducted prior to the start of the 2012 exploration program targeting areas planned for disturbance, field studies or other activities that could impact raptors. A 660' buffer will be applied to all proposed areas of disturbance in accordance with the Bald and Golden Eagle Protection Act.
2. A cultural resources survey will be conducted for all areas planned for drilling, trenching and access improvements. This survey work will be conducted once the ground is thawed and prior to disturbance. An initial desktop review of existing information and study plan will be developed prior to conducting surveys.
3. A subsistence evaluation is being conducted of the lease area to better define traditional and subsistence usage. This will be a desktop review based upon existing knowledge and interviews conducted with the residents in the vicinity Chickaloon.
4. Reconnaissance level wetlands work will be conducted in 2012, targeting areas of proposed disturbance and other wetlands areas adjacent to the Castle Mountain Mine road. Associated soils and vegetation data will be collected as part of the wetlands data collection; however, soils and vegetation surveys are not planned in 2012.
5. Surface water quality and hydrology data collection is planned for 2012. The 2012 program includes collection of surface water quality and hydrology data from 8 locations twice during the 2012 field season. Three continuous stream gages will be installed and maintained during the ice-free season beginning 2012.
6. A groundwater quality and hydrology program will also be developed beginning in 2012 and will be coordinated with the surface water program to ensure they are complimentary and sufficiently address data needs to assess the hydrologic balance.
7. A meteorological station will be installed in 2012 and continuous data will be collected for a minimum of one year. Installation is planned for late spring or early summer 2012 depending on weather conditions.

Baseline noise studies and collection of air quality data are planned to begin in the 2012 field season as well. Additional studies planned for 2013 and beyond may include fisheries, wildlife, soils and vegetation surveys.

7.0 BOREHOLE PLUGGING AND RECLAMATION

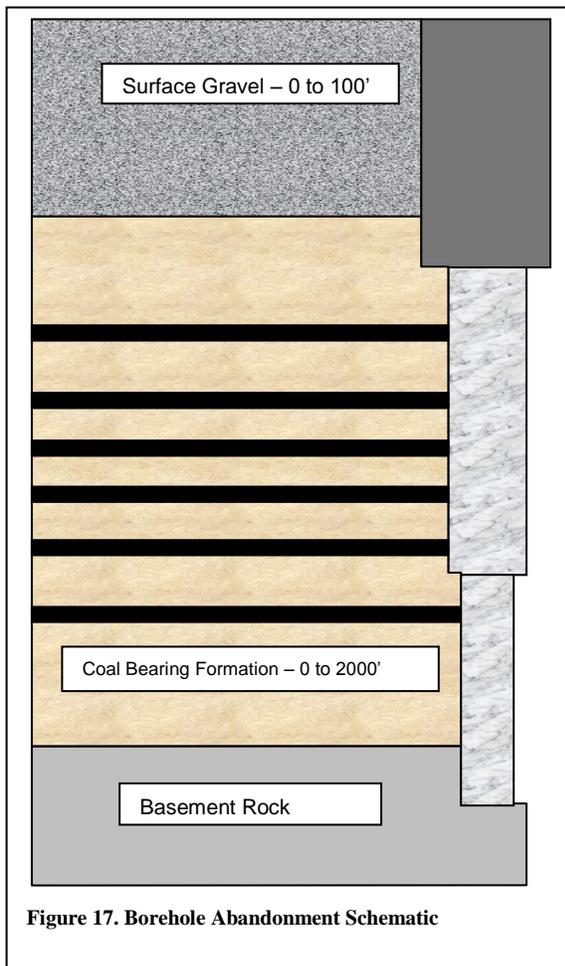
11 AAC 90.167(l) each exploration hole, borehole, well, or other exposed underground opening must comply with 11 AAC 90.303 – 11 AAC90.305.

11 AAC 90.303. Each exploration hole, other drill or borehole, shaft, drift, adit, tunnel, entryway, well, or other exposed underground opening must be capped, cased, sealed, backfilled or otherwise managed, as approved by the commissioner, consistent with 30 CFR 75.1711. Closure measures must be designed to prevent acid or other toxic drainage from entering ground or surface water, to minimize disturbance to the prevailing hydrologic balance, and to ensure the safety of people, livestock, fish and wildlife, and machinery. After these openings are uncovered or exposed by mining activities they must be permanently closed, unless approved under 11 AAC 90.305, or otherwise managed in a manner approved by the commissioner. Use of a drilled hole, borehole, or monitoring well as a water well must meet the provisions of 11 AAC 90.347. This section does not apply to holes drilled and used solely for blasting.

11 AAC 90.305. Each temporary inactive mine entry, exploration hole, other drill or borehole, well, and other exposed underground opening which has been identified in the approved permit application for return of underground development waste, hazardous coal processing waste, or water to underground workings, or to be used to monitor ground water conditions, must be sealed when not in use and protected during use by protective devices approved by the commissioner. The operator shall periodically inspect and maintain these devices in good operating condition.

RAL will abide by all State of Alaska rules and regulations during the course of their exploration activities on their Chickaloon Coal Lease. One of the most important regulations that involve exploration drill holes is 11 AAC 90.303. This regulation requires each exploration borehole to be sealed at the conclusion of its drilling, with the exception of those used for water monitoring purposes. Prior to borehole abandonment, all coreholes will be geophysically logged as described in Part C, Section 4.0. If the hole is not geophysically logged at the end of drilling, it will be sealed immediately. This is to prevent surface drainage from the drill sites from entering ground or surface waters, to minimize disturbance to the prevailing hydrologic balance, and to ensure the safety of people, wildlife, and machinery in the permit area.

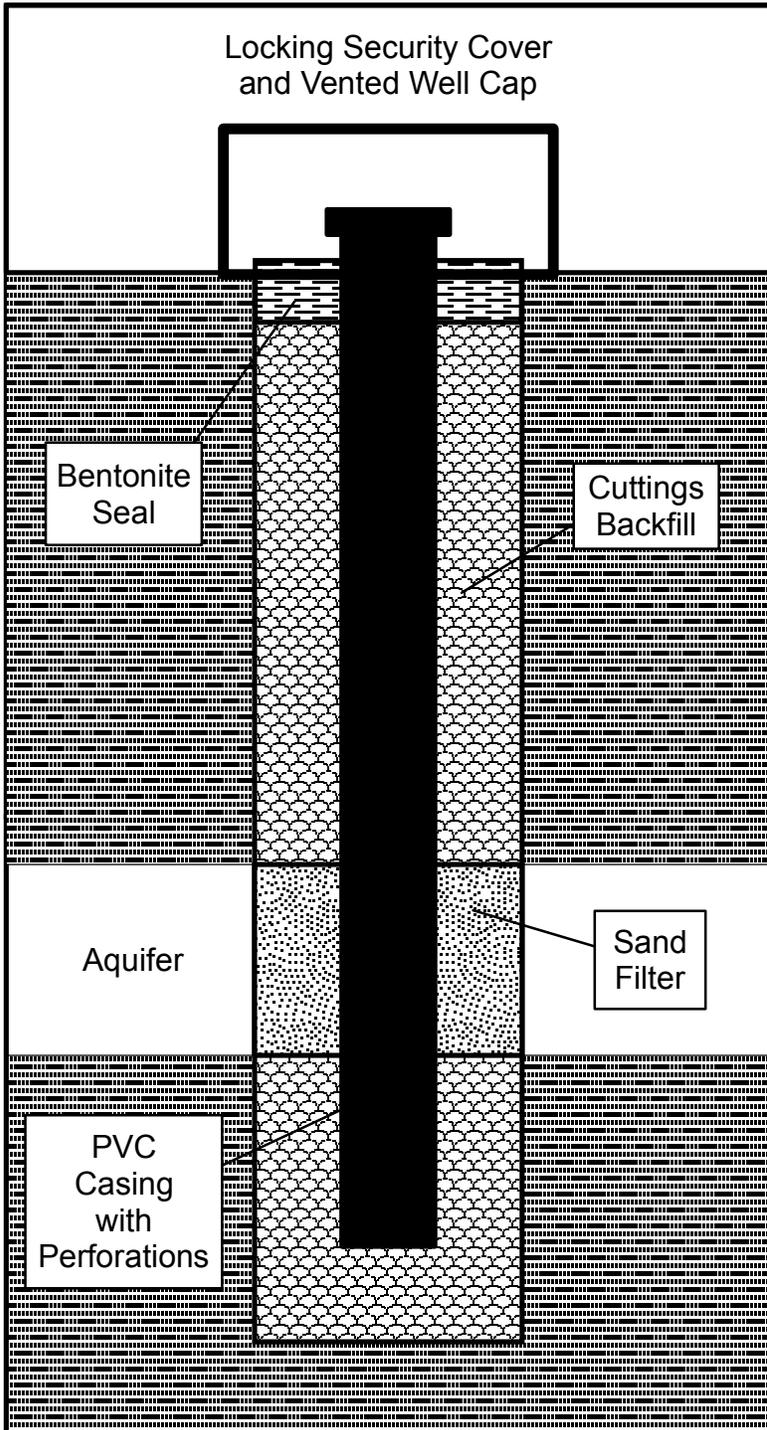
All abandoned drill holes will be backfilled with overburden cuttings, bentonite and cement to within 12 feet of the surface using approved DEC methods. Unless otherwise modified by DNR, the downhole coal-bearing unit (Chickaloon Formation) will be sealed with a bentonite slurry: 30% bentonite, 30% cement, and 40% cuttings. In the event that there are inadequate drill cuttings, the project will use a 50-50 percent mixture of bentonite and cement. See Figure 17 for a borehole abandonment schematic.



When the backfilling reaches the overlying surface gravel, backfill material will change to a mixture of cuttings and bentonite to within 12 feet of the surface. A 10-foot cement-bentonite plug will then be used to cap the drill holes to within two feet of the surface. Cuttings, overburden or available topsoil will then fill the last 2 feet to the ground surface. A 4 inch by 4 inch wooden post will be sunk into the ground the last 2 feet of the drill hole and will stick up out of the ground no more than 6 inches. On this marker post will be the borehole number and depth of hole and any other pertinent information that may be needed. The location of the drill hole will be preliminarily located with a Global Position System (GPS) unit and then surveyed in at the conclusion of a Phase drilling project by a professional surveyor. The reclaimed drill hole will then be revegetated with grass seed compatible to the local growing conditions in south-central Alaska. This grass seed will be approved by Alaska Department of Natural Resources. Areas of the drill site where root mats were left in place will be fertilized to promote natural regrowth.

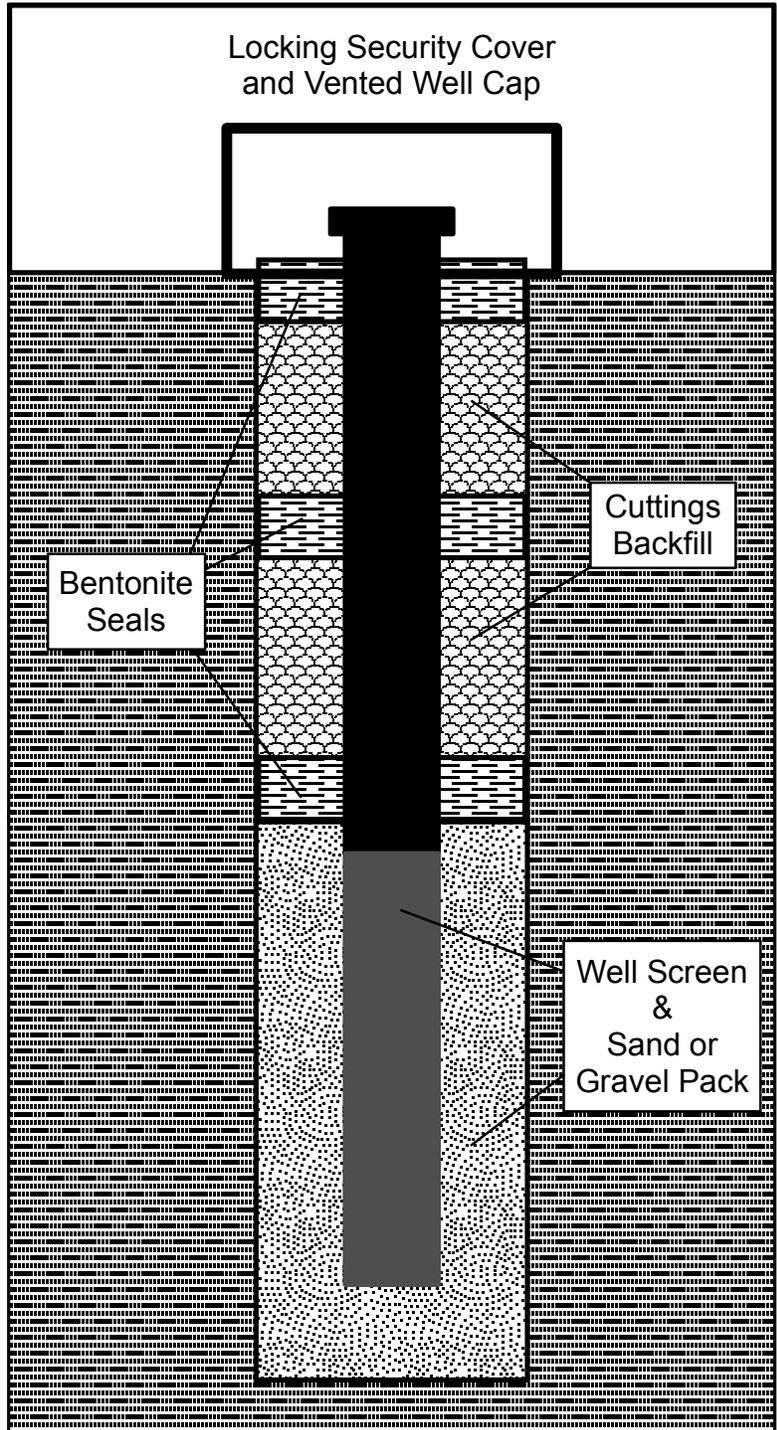
Where holes are to be used for monitoring wells or piezometers, threaded PVC with well screen will be placed in the hole. The well construction will generally include a sand filter placed between the well screen and the borehole wall within the aquifer to be tested. A monitoring well schematic is seen in Figure 18. A three foot bentonite plug will be placed on top of the well screen filter. The remainder of the borehole will be backfilled with the driest available drill cuttings. The top plug will be constructed with the same methods used for abandon boreholes. The surface will include a minimum 2 feet of PVC “stick-up” above the existing ground surface. This PVC “stick-up” will be set inside an above surface casing extension that will also be a minimum of 2 feet stick-up above the ground surface. A locking cap will be placed on top of the casing extension to protect the well or piezometers from contamination by runoff and vandalism.

It may be determined during the exploration drilling that a borehole exhibiting a decent influx of groundwater flow could be utilized as a water source for the drill project. This well should not exceed 200 feet in depth. Water wells are usually 6 inches in diameter, meaning the exploration borehole would need to be reamed out to this larger diameter. It may also be decided that it is cheaper and faster to just redrill a larger diameter borehole next to the exploration hole that then would be backfilled per the above procedures. Figure 19 is supplied to show a cross sectional view of a 6-inch water well.



Monitor Well Schematic

Figure 18



Water Well Schematic

Figure 19

Once the monitoring or water well is in place, the areas around them will be graded and reclaimed, similar to that done for the non-monitoring wells, again with compatible seed grasses. If exploration- drilling results in the coal project not going forward to development, all casing and PVC liners will be pulled from the monitoring and water wells and the area reclaimed. This removal of monitoring and water well materials and reclamation will occur during the summer months immediately following the decision to abandon the project.

Drill site reclamation will be accomplished by removing all foreign materials from each drill site and by spreading the remaining drill cuttings (not used for borehole backfilling) out over the site. Drill cuttings are inert and will return to soil. MSDS sheets are provided for three hole-plugging mixes at the end of this exploration permit application. Each drill site will be cleaned and left as close to original condition as possible. There should be minimal runoff from the small disturbed areas associated with the drilling process. However, to prevent runoff impacts on the disturbed areas during breakup and during precipitation events prior to summer revegetation measures, the regraded areas will be scarified with rakes with ridges set perpendicular to the slope of the land.

Finally, for those areas traveled over with tracked or large rubber-tired exploration equipment, this may result in a matting down of vegetation. During the winter, there should be little effect to vegetation cover given a mantling snow cover and frozen ground. During summer exploration, as long as the surface vegetative mat is not broken and topsoil exposed, there should be no harm done and the plants should recover. Should the vegetative mat be broken and soils or bedrock become exposed, these areas will be regraded and revegetated with native vegetation. If need be, new topsoil will be brought in to fill in damaged ground. All efforts will be made to ensure the success of the revegetation effort including frequent monitoring.

8.0 REVEGETATION PROCEDURES

11 AAC 90.167(j) All disturbed areas must be reseeded or planted to the same seasonal characteristics of growth as the original vegetation. The vegetative cover must be capable of stabilizing the soil against erosion. Revegetation must be carried out in a manner that encourages prompt vegetative cover and recovery of productivity levels compatible with the approved post exploration land use. If both the pre-exploration and post-exploration land use is intensive agriculture, planting of crops normally grown will meet the requirements of this section

Upon the completion of exploration activities, disturbed grounds, whether from drilling or test pit activities, will be reclaimed and revegetated. Revegetation will only occur during the summer months. Soon after the completion of a drill hole or a test pit, backfilling and grading of the overburden and topsoil that was removed during the exploration will be done. Once the topsoil has been redistributed over the disturbed areas, the area will be scarified perpendicular to the slope of the land to minimize erosion and the formation of rills and gullies. Seeding and fertilizing will then occur on the disturbed sites, again in the summer. The fertilizer will be at least the equivalent of N20-P20-K10. Approximately 400 pounds per acre or 9 lbs per 1,000 square feet of fertilizer will be utilized.

Seed and seedling requirements for proper revegetation of the disturbed Chickaloon Coal Lease exploration areas will be dictated partially by the native species that inhabit the region. Those vegetation types that are prevalent at the lease site should dominate percentages of seed and seedlings. As noted in Part B of this permit application, the most prominent vegetation types are cottonwood, paper birch, alder, willow, high bush cranberry, prickly rose, blue joint grass, bunchberry and fireweed.

Replanting rooted cuttings of moose browse vegetation, although in line with revegetation guidelines established within the Matanuska Valley Moose Range Management Plan, is not practical to establish a groundcover as rapidly as possible on disturbed ground, as these cuttings grow too slowly to prevent erosion. Therefore, in order to establish groundcover as fast as possible, it is suggested that a grass seed mixture be used at least initially. One possible mixture consists of “Arctared” red fescue (*Festuca rubra*), “Norcoast” tufted hairgrass (*Deschampsia beringensis*), and “Gruening” alpine bluegrass (*Poa alpina*). This grass seed mixture has been used with success on disturbed coal land areas within the Matanuska Valley at Wishbone Hill. These grasses are proven in Alaska and generate quickly, holding the soil and minimizing erosion. A proposed grass-seeding rate in pounds per acre for the above mix is “Arctured” – 32 lbs., “Norcoast” – 4 lbs., and “Gruening” – 4 lbs. for a total of 40 lbs. per acre.

To determine the exact seeding mix appropriate for lands disturbed during the RAL’s Chickaloon Coal Lease exploration, horticulturists at the University of Alaska agricultural experimental station in Palmer, who are familiar with reclaiming and revegetating disturbed coal mining lands and Division of Agriculture, Plant Materials Center in Palmer will be contacted for suggestions. These horticulturists use soil types, moisture conditions and the location within Alaska, to determine the correct seed mix for use on the Chickaloon Coal Lease.

Due to the ease of vegetation recolonization of coal-mining-related disturbed grounds, it is proposed to only seed with the aforementioned grass communities on those areas disturbed by small imprint drilling, trenching, and test pit activities. Each of these areas will be less than a couple hundred square feet of area and with the exception of the post marking the drill hole, most likely unrecognizable within a couple years time through recolonizing vegetation species. The reclaimed areas will monitored and managed until such a time that they are established and self-supporting.

9.0 HYDROLOGIC BALANCE CONTROL MEASURES

11 AAC 90.167(n) Exploration and reclamation must minimize disturbance to the prevailing hydrologic balancing, including , if necessary, sedimentation control measures that comply with 11 AAC 90.329 and 11 AAC 90.331 or other measures required by the commissioner.

Neither the exploration camp/staging area nor the drill sites will be near streams. Transportation is on existing roads and trails or on frozen ground with low-ground pressure vehicles. These activities will not affect the prevailing hydrologic balance nor disturb areas such that any sediment control is necessary.

11 AAC 90.167(k) Except for small and temporary diversions of overland flow of water around new roads, runways, marine facilities, drill pads, and support facilities, no ephemeral, intermittent or perennial stream may be diverted. Overland flow must be diverted in a manner that prevents erosion and complies with all other applicable federal and state laws and regulations.

No ephemeral, intermittent or perennial stream will be diverted during the proposed exploration.

Some of this environmental data that will be collected during the environmental baseline studies includes hydrological information sufficient to fulfill requirements of a State of Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA) mine permit application. A significant amount of this hydrological baseline data involves the gathering of groundwater and surface water information within and directly adjacent to the coal lease. This information will help define the hydrology of the coal lease's watershed and will be used to help minimize disturbance of the hydrologic balance in this area. Until the above two objectives are met that establish a mineable coal deposit, some activities accomplished during the coal exploration will be done with hydrological information gathering in mind. One of these is ensuring the placement of all boreholes, trench/test pits, facilities and access ways do not impact natural surface drainages. Another is placing slotted PVC tubing in some boreholes to make them into water monitoring wells.

In Part C, Sections 2.0 and 7.0 of this permit application, it was stated that a number of monitoring wells will be established on RAL's coal lease. The exact location and number of the monitoring wells will not be known until the exploration borehole is drilled and groundwater is encountered. Drilling experience in Chickaloon Formation coal-bearing rocks at other Matanuska Valley locales have revealed generally minimal groundwater influx. This is due to the formation's low permeability and hydraulic conductivity as discussed in Part B, Section 3.2 of this application. It was also stated in this same section that natural fractures and faulting can locally improve this permeability and hydraulic conductivity.

Other important hydrologic balance considerations when installing monitoring wells is the location of the aquifers in relation to the intersected coal measures within a certain borehole. If the water aquifer is below the mineable coals or if intersected coals are too thin to be mined, that borehole will likely not become a monitoring well. However, if the aquifer is discovered above the lowest potentially mineable coal bed, that borehole has a good chance to become a monitoring well. For more discussions of water monitoring wells, see Part C, Sections 2.0 and 7.0 and well as Figure 19 of this application.

All drill holes converted into monitoring wells will be bonded and DNR will be given a location of all such wells. Although it is not known at present where the monitoring wells will be located prior to Phase 1 drilling, it is anticipated that at least a couple will be developed. Therefore, bonding calculations for two monitoring wells to 150 feet are included in the Reclamation Bonding Section discussed in Part B, Section 11.0.

RAL understands that the hydrologic balance on its Chickaloon Coal Lease must be protected during its upcoming coal exploration. To ensure this, Phase 1 and future coal exploration activities, which include boreholes, trenches and test pits, will be set a minimum of 100 feet from any surface water bodies, including small flowing surface drainages. This same buffer will be used during the excavation of small surface trenches and test pits.

It is also proposed that excavated trenches and test pits be constructed in such a way as to impede surface runoff water from entering them. They will be opened only a short time to get necessary information or samples and then immediately backfilled, re-graded and revegetated. No diversion of any stream is anticipated during the project. Surface runoff from any disturbed area will be minimized by making the surface of the disturbance area rough through scarification with ridges formed perpendicular to the slope of the land to minimize erosion. Revegetation during the summer with grasses will also help control erosion and surface runoff.

10.0 TRANSPORTATION AND FACILITIES

11 AAC 90.167(e) Construction of new roads, aircraft runways, and marine facilities must be limited to the minimum necessary for the approved exploration and reclamation activities. Travel must be confined to existing roads, trails, runways, and marine facilities when excessive damage to vegetation or rutting of the land surface could result.

No aircraft runways or marine facilities will be constructed. There are existing trails and an unimproved gravel and dirt road within the exploration area. New roads/trails will not be necessary, though some brush clearing of overgrown vegetation may be required along the unimproved road and trails to widen the cleared area for the width of the equipment. Brush clearing will be the minimum necessary for the task. Once within the lease area, travel will be mostly on existing road and trail surfaces. Some limited off road (less than a few hundred feet) travel with tracked or large rubber-tired low ground pressure vehicles might be necessary. No long term damage or rutting is expected.

11 AAC 90.167(f) Existing roads, trails, runways, and marine facilities may be used under the following conditions: (1) All applicable federal, state, and local requirements must be met. (2) If the road, trail, runway or marine facility is significantly altered or its use contributes additional suspended solids to streamflow or runoff; (j) of this section applies to those portions of the activity. (3) After exploration and reclamation activities are completed, the road, trail, runway, or marine facility must be restored to a condition equal to or better than the pre-exploration condition.

All applicable federal, state, and local requirements are met by this application. The application does not propose to significantly alter any of the roads/trails. Only one ephemeral surface drainage will be crossed and this drainage is encapsulated in an existing culvert beneath the existing gravel/dirt road surface. This crossing on an existing road surface will not contribute additional suspended solids to the stream.

11 AAC 90.167(g) Roads, trails, runways, and marine facilities constructed or significantly altered for the exploration and reclamation activities must comply with 11 AAC 90.491 for

design, construction, maintenance and removal. The commissioner will, in his or her discretion, require the use of rolligons and air-cushioned vehicles or winter roads when necessary to minimize environmental impacts.

No roads will be constructed or significantly altered. In addition, the application proposes use of low-ground-pressure vehicles to minimize environmental impacts as mentioned in the regulation.

From discussions in Part B, Section 1.0, Fish Lake Road and the Chickaloon River Road that intersect the Glenn Highway at Mile 73 and Mile 78, respectively, will be used to access the RAL coal lease. Castle Mountain Mine Road, along which exploration will take place, intersects the locally maintained East Chickaloon Road about ½ mile west of its intersection with Chickaloon River Road. Access and road usage research is being conducted by RAL to ensure legal access and usage at all identified access points and planned road improvements. RAL will ensure legal access and usage has been established before mobilizing equipment or accessing the lease area from identified access points.

Due to the narrowness, minimal sight distance and steepness of the section of East Chickaloon Road just north and west of its intersection with Chickaloon River Road, all exploration equipment and associated accessory trucks will access the Castle Mountain Mine road via Fish Lake Road and the western section of East Chickaloon Road. Should future phase exploration take place, it is expected that similar access for vehicle movements will occur. Personal vehicles of workers getting to the job site and visitors should access the Castle Mountain Mine road via the eastern section of East Chickaloon Road and the Chickaloon River Road.

For the Phase 1 coal exploration effort starting in the summer of 2012, key road improvements on the Castle Mountain Mine road are envisioned to enhance safety for public users and heavy equipment operators. Most of these improvements will occur on a 0.5 mile section of this road, starting at the section line boundary between Sections 23 and 26, and going northwestward. At this location, the primarily dirt road, which appears to be composed primarily with clay-rich soil and deeply rutted will be upgraded with a new gravel cover and widened to safely accommodate heavy vehicles. Gravel is needed as this section of road is nearly impassible during and directly after precipitation events. Gravel will be procured from a local source for this improvement and amount to about 2,000 total cubic yards. The second quarter of a mile of this road will require the most gravel, approximately 2 feet, over a geotextile cloth. The first quarter mile of the road will only need about a foot of gravel and no geotextile cloth. The road will be upgraded to 14 feet wide. A Construction General Permit from the Alaska Department of Environmental Conservation will be procured prior to initiating any road upgrade work. The rest of the Castle Mountain Road should require minimal upgrade with some new 18" diameter culvert placement (approximately three), grading and brushing. In addition, to meet RAL's safety protocols it is proposed to look at methods to maintain a safe travel speed for all vehicles (e.g. speed humps at regular intervals).

Much of the areas on both sides of Fish Lake Road and East Chickaloon Road as well as unmaintained portions of Chickaloon River Road are residential property. As such, during the proposed exploration operations in the summer months, it will be mandated by the operator (RAL) that travel speeds of trucks and personal vehicles along all gravel roads in the Chickaloon area be kept to a minimum (i.e., less than 30 mph) to minimize the generation of dust and for safety reasons.

At the proposed camp site east of the Hobbs Industry coal lease along Castle Mountain Road, the only upgrades envisioned at this point besides some grading will be the temporary placement of a small rented office trailer or tent, a sanitary chemical toilet and an area suitable for staging of drilling supplies with the temporary facilities surrounded by a temporary fencing, lighting and security system. All support facilities will be removed upon the completion of the exploration effort. Personal vehicle parking there will only take place during the days as the drilling will only occur during the daytime. No personal or equipment parking will be allowed on the Castle Mountain Mine Road to allow visitors, the other coal leaseholder and recreational traffic to pass unimpeded. A night security watchman will be hired to keep an eye on the surface facilities and off-site drilling/support equipment during night time and non-exploration hours.

11.0 RECLAMATION BOND

11 AAC 90.167(b) the commissioner will, in his or her discretion, require a performance bond. In determining the amount and conditions of the bond and the criteria for bond release, the commissioner will consider the relevant provisions of 11 AAC 90.201 – 11 AAC 90.213 and will specify the bond amount, conditions, and release criteria in the decision under 11 AAC 90.165(e).

During the Phase 1 program, RAL will focus its exploration efforts and subsequent reclamation actions along the Castle Mountain Mine road and connecting trails within its 9,927.60-acre Chickaloon Coal Lease. In its planning for the Chickaloon exploration, RAL has broken down exploring this large acreage position into phases. The first phase will concentrate efforts along the old Castle Mountain Mine Road (CMMR). Phase 2 exploration will place exploration boreholes within most sections of the coal lease to expand this geological and structural data compilation. Phase 3 exploration will infill boreholes within the most promising sections of the property uncovered during the first two phases.

This exploration permit application only estimates that number of boreholes and other surface disturbances that may occur during the initial Phase 1 exploration program. Surficial impacts of exploration that may occur in future phases is too speculative to consider at this time. Therefore, it is proposed that reclamation costs for Phases 2 or 3 not be considered under this Section. These costs can be added at a later date, if exploration continues.

Exploration activities within RAL's Chickaloon Coal Lease that will require reclamation bonding under the Alaska Surface Coal Mining Program are the following Phase 1 exploration activities that include 15 rotary boreholes, 10 core holes, one long test pit and five small surface trenches. Another long test pit is planned, but its location hasn't yet been determined. The rehabilitation of the Castle Mountain Mine Road (mostly in the lower ½ mile) is also included in

the bond calculations. The major cost of this rehabilitation is the cost of gravel and moving it to the CMM road site. If sufficient gravel is discovered in the roadbed itself during the rehabilitation, this will substantially reduce the reclamation bond. It will also greatly reduce dump truck traffic along the eastern portion of Fish Creek Road and East Chickaloon Road from the gravel pit sites being considered.

The reclamation bond will primarily constitute the costs to plug and cap all drill holes and revegetate the drill pads. It will also include the cost to backfill, grade and revegetate the proposed test pit and five shallow trenches. Only one test pit or shallow trench will be open at any one time. Each test pit and trench will be reclaimed at the completion of the excavation or upon obtaining the information for which it was opened. In the case of trenches and test pits, the root mass and topsoil will be segregated from the overburden and replaced back on the backfilled test pits in reverse order of their removal as noted in Part C, Sections 2.0, 3.0 and 7.0

Areas between the drill sites, trenches, and test pit areas will not be physically disturbed during the proposed exploration activities. Should some limited disturbance of the ground occur by the transiting equipment, the disturbed areas will be reclaimed and seeded with fast germinating grasses. For more discussion on surface disturbance and revegetation matters, refer to Part C, Sections 6.0 and 7.0 of this application.

The following is a breakdown of the individual cost items involved with the borehole plugging, reclamation of the drill sites, trenches and test pits:

General Reclamation Parameters

General Labor (Davis-Bacon wages):		\$49.22 per hour
Equipment Labor (Davis-Bacon wages):		\$54.64 per hour
Drill site cuttings		(1.1 cubic yds./150' hole)
Test pits	(two)	(100'x5'x10' or 185 yds ³ or 500 ft ² /pit)
Trenches	(five)	(15'x 3'x10' or 17 yds ³ or 45 ft ² /trench)
Fertilizer	@ \$33.52 per 50 lbs.:	\$268.16 per acre
	(400 pounds per acre or 9 lbs per thousand sq. ft.)	
Seed (\$6.20 per lb.)	@ 40 lbs. per acre:	\$247.80 per acre
Marker Posts (4"x4"x4')		\$5.98 each
Cement	@ \$13.00/50 lb. bag	6.97 bags/100'
	HQ – 3.895" diameter boreholes = 14.35 feet per bag	
Bentonite	@ \$18.00/50 lb. bag	14.3 bags/100'
	HQ – 3.895" diameter boreholes = 6.99 feet per bag	

Reclamation Activities (Drilling and Trenching)

<u>Activity Description</u>	<u>Unit Cost</u>	<u>Cost</u>
Corehole backfill with 10% cuttings, 45% cement, 45% bentonite (550'/hole average formation depth, 50'/hole gravel depth)	\$1,034/hole	\$10,340.00
Borehole backfilling with 50% cuttings, 50% bentonite (100'/hole formation depth, 100'/hole gravel depth)	\$304/hole	\$4,560.00
* Costs to reclaim water monitoring wells are included in borehole backfilling costs		
Trenches/Test pit backfilling and grading (includes operator) (8 hours with excavator @ \$185/hour)	\$1,480/day	\$1,480.00
(8 hours with Cat D3 or D5 @\$135/hour)	\$1,080/day	\$1,080.00
Borehole/Trenching Reclamation Direct Cost		\$17,460.00

Castle Mountain Mine Road Upgrade

1,370 cubic yards of gravel delivered to site at \$13.25 per cubic yard (Quantity based on 1/4 th mile x 14' wide x 2' lift (upper 1/4 mile))		\$18,152.50
685 cubic yards of gravel delivered to site at \$13.25 per cubic yard (Quantity based on 1/4 th mile x 14' wide x 1' lift (lower 1/4 mile))		\$9,076.25
18" Culvert installed x \$30.50/linear foot x three culverts		\$1,647.00
Filter Cloth – 4 rolls estimated x \$530/roll		\$2,120.00
Dozer for muck removal and gravel placement – 32 hours x \$135/hour		\$4,320.00
Brushing – 2.5 mile CMM road – 16 hours x \$200 per hour		\$3,200.00
Mobilization and Demobilization - \$4,800 (lump sum)		\$4,800.00
Total CMM Road Upgrade		\$43,315.25

* Gravel costs and filter cloth may be reduced if gravel is located in roadbed

Revegetation Costs

Marker Posts X 20	\$5.98 each	\$119.60
Seeding of borehole areas (30,000 sq. ft. area)	\$247.80/acre	\$170.66
Seeding of trenches/test pits/camp (16,050 sq. ft. area)	\$247.80/acre	\$91.31
Fertilizer (46,050 sq. ft. area)	\$268.16/acre	\$283.50
Labor for Seeding and Fertilizing (one day-one laborer)	\$49.22 x 10 hours	\$490.22
Total Revegetation Costs		\$1,155.29

TOTAL DIRECT RECLAMATION COST: \$61,930.54

INDIRECT COSTS

Mobilization/Demobilization @ 10%	\$6,193.06
Contingency @ 10%	\$6,193.06
Contractor Profit/Overhead @ 15%	\$9,289.58
Project Management Fee @ 4%	\$2,477.23
<u>Engineering Redesign Fee @ 5%</u>	<u>\$3,096.53</u>
TOTAL INDIRECT COSTS	\$27,249.46

TOTAL CHICKALOON EXPLORATION RECLAMATION BOND **\$89,180.00**

In a previous section, it was noted that gravelling a 0.4 mile section of the Castle Mountain Road is planned soon after permit issuance to improve access and safety near the beginning of the Castle Mountain Mine Road. Since this road is also used by local residents for recreational pursuits such as ATV off-road riding, camping, hiking, hunting, and fossil hunting, as well as providing the main access to the other coal lease holder (Hobbs Industries), we propose to leave the road as-is after completion of the coal exploration. It is not the intention of RAL to prevent public use of this road, although some restrictions may be imposed during equipment movement into and out of the exploration area. Since the proposed camp facility and equipment staging area is temporary and will be removed upon the completion of the exploration, there will be no reclamation costs beyond the demobilization costs.

12.0 TIME TABLE

11 AAC 90.163 (a) (2)(D) an estimated timetable for each phase of exploration and reclamation;

The following is an estimated time table to conduct coal exploration work on RAL's coal lease starting in the summer of 2012. It should be noted that these are estimates and may change slightly depending on required permit issuance, equipment availability and scheduling conflicts.

2012 EXPLORATION PERIOD	J	F	M	A	M	J	J	A	S	O	N	D
Exploration Permit Work	x	x	x	x								
Exploration Permit Corrections			x	x								
Public Comment Period				x	x							
Environmental Baseline Studies					x	x	x	x	x			
Exploration Drilling						x	x	x	x	x	x	
Geophysical Surveys						x	x	x				
Trenches/Test Pits						x	x	x	x	x		
Castle Mountain Mine Road restoration						x	x					
Revegetation of Disturbed Sites								x	x			

13.0 REFERENCES

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MATERIAL SAFETY DATA SHEET

Product Trade Name: **DEXTRID®**

Revision Date: 02-Jun-2007

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DEXTRID®
Synonyms: None
Chemical Family: Modified Starch
Application: Fluid Loss Additive
Not for use in the United States

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Paraformaldehyde	30525-89-4	1 - 5%	Not applicable	Not applicable
Complex carbohydrate		60 - 100%	10 mg/m ³	15 mg/m ³

3. HAZARDS IDENTIFICATION

Hazard Overview: May cause eye, skin, and respiratory irritation. May cause allergic skin and respiratory reaction. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin: In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention.

Eyes: In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion: Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician: Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential. Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMS Ratings: Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Avoid dust accumulations.

Storage Information Store away from oxidizers. Store in a dry location. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Dust/mist respirator. (95%)

Hand Protection Impervious rubber gloves.

Skin Protection Normal work coveralls.

Eye Protection Dust proof goggles.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Powder

Color: Off white

Odor: Pungent

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.5
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30-44
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong acids. Strong alkalis. Amines.
Hazardous Decomposition Products	Formaldehyde. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Causes severe respiratory irritation. May cause allergic respiratory reaction.
Skin Contact	May cause a rash and itching of the skin. May cause severe skin irritation. This product contains ingredients which may produce an allergic skin reaction. It should be treated as a skin sensitizer.
Eye Contact	May cause severe eye irritation.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders. Eye ailments. Lung disorders.
Chronic Effects/Carcinogenicity	Paraformaldehyde may release formaldehyde monomer, a probable human carcinogen. Chronic exposures may cause cancer of the lung and nasal passages. Formaldehyde and possibly paraformaldehyde may react with hydrochloric acid to form bis-chloromethyl ether, a known human carcinogen.
Other Information	None known.
Toxicity Tests	

Oral Toxicity:	LD50: 800 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: 360 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	TLM96: 538,900 ppm (Mysidopsis bahia) SPP @ 10 ppb
Acute Algae Toxicity:	Not determined

Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 25000 Pounds based on Paraformaldehyde (CAS: 30525-89-4).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.
Canadian Regulations	
Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD® PLUS**

Revision Date: 03-Jan-2008

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD® PLUS
Synonyms: None
Chemical Family: Blend
Application: Additive

Manufacturer/Supplier: Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By: Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	200 mg/m ³	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated shoes and discard.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Min: > 200
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Min: > 93
Autoignition Temperature (C):	PMCC
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMS Ratings: Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor respirator with a dust/mist filter.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White to gray
Odor:	Mild hydrocarbon

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.0
Density @ 20 C (lbs./gallon):	8.3
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	347
Boiling Point/Range (C):	175
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	70
Evaporation Rate (Butyl Acetate=1):	< 1
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Lung disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.

Other Information None known.

Toxicity Tests

Oral Toxicity: Not determined
Dermal Toxicity: Not determined
Inhalation Toxicity: Not determined
Primary Irritation Effect: Not determined
Carcinogenicity Not determined
Genotoxicity: Not determined
**Reproductive /
Developmental Toxicity:** Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined
Persistence/Degradability Not determined
Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM48: 98 mg/l (Acartia tonsa)
Acute Algae Toxicity: EC50: 16.70 mg/l (Skeletonema costatum)

Chemical Fate Information Not determined
Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA Not restricted

Sea Transportation

IMDG Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****



The Chemical Company

SAFETY DATA SHEET
FEB Hyseal No.1

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME FEB Hyseal No.1
 PRODUCT NO. 118338
 SUPPLIER BASF Construction Chemicals UK
 Limited
 Albany House
 Swinton Hall Road
 Swinton
 Manchester
 M274DT
 +44(0)161 794 7411
 CONTACT PERSON EHSQ Officer
 EMERGENCY TELEPHONE Telephone: 0161 794 7411. If outside normal working hours, please listen to answer machine message for emergency contact numbers.

2 COMPOSITION/INFORMATION ON INGREDIENTS

Name	EC No.	CAS-No.	Content	Classification
Portland Cement	266-043-4	65997-15-1	30-60%	Xi;R38,R41.

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS

Modified sand - cement mixture

3 HAZARDS IDENTIFICATION

Irritating to skin. Risk of serious damage to eyes.

CLASSIFICATION Xi;R38, R41.

4 FIRST-AID MEASURES

GENERAL INFORMATION

This product contains cement. Cement produces an alkaline reaction with moisture or gauging water and therefore splashes of mortar, slurry or gauging water may cause skin irritation and/or caustic burns to mucous membranes (e. g. eyes). Avoid contact with eyes and prolonged skin contact.

INHALATION

Fresh air. Get medical attention if any discomfort continues.

INGESTION

Rinse mouth thoroughly. Drink plenty of water. Get medical attention if any discomfort continues.

SKIN CONTACT

Wash the skin immediately with soap and water.

EYE CONTACT

Important! Immediately rinse with water for at least 15 minutes. Get medical attention promptly if symptoms occur after washing.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA

The product is non-combustible.

PROTECTIVE MEASURES IN FIRE

No special measures required.

6 ACCIDENTAL RELEASE MEASURES

FEB Hyseal No.1**PERSONAL PRECAUTIONS**

Avoid inhalation of dust.

ENVIRONMENTAL PRECAUTIONS

No special measures required.

SPILL CLEAN UP METHODS

Remove spillage with vacuum cleaner. If not possible, collect spillage with shovel, broom or the like.

7 HANDLING AND STORAGE**USAGE PRECAUTIONS**

Avoid spread of dust.

STORAGE PRECAUTIONS

No specific storage precautions noted.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION**INGREDIENT COMMENTS**

MAK: Lower toxic limit for cement 5 mg/m³. OES-LTEL: 4 R / 10 l mg/m³. Otherwise the product contains no relevant quantities of substances with workplace-related limit values.

ENGINEERING MEASURES

Not relevant.

RESPIRATORY EQUIPMENT

Wear respirator if there is dust formation.

HAND PROTECTION

Nitrile impregnated cotton-gloves. The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

EYE PROTECTION

Wear goggles/face shield.

OTHER PROTECTION

The usual precautionary measures when handling chemicals should be adhered to. The product contains < 2 ppm Cr VI.

HYGIENE MEASURES

When using do not eat, drink or smoke. Wash hands after handling. Use appropriate skin cream to prevent drying of skin.

SKIN PROTECTION

Protection suit must be worn.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	Powder, dust		
COLOUR	Grey		
ODOUR	Almost odourless		
SOLUBILITY	Miscible with water.		
BOILING POINT (°C)	not applicable	MELTING POINT (°C)	not determined
pH-VALUE, DILUTED SOLUTION	12 - 13	FLASH POINT (°C)	not applicable
SOLUBILITY VALUE (g/100g H ₂ O@20°C)	< 0,2		

10 STABILITY AND REACTIVITY**STABILITY**

Stable when stored in a dry place.

HAZARDOUS DECOMPOSITION PRODUCTS

No hazardous decomposition products.

11 TOXICOLOGICAL INFORMATION**TOXICOLOGICAL INFORMATION**

The product shows the following dangers according to the calculation method of the General EC Classification Guidelines for Preparations as issued in the latest version: Irritant

FEB Hyseal No.1

GENERAL INFORMATION

When used and handled according to specifications, the product does not have any harmful effects in our experience and according to the information provided to us. The product does not contain asbestos or any other mineral fibres or inhalable fine quartz dust hazardous to health and causing silicosis. The product is chlorine-free and contains no formaldehyde.

SKIN CONTACT

Irritating to skin.

EYE CONTACT

Risk of serious damage to eyes.

HEALTH WARNINGS

The product is reduced in chromate (contains < 2 ppm Cr VI). Within the indicated storage time sensitization is not expected.

12 ECOLOGICAL INFORMATION

ECOTOXICITY

Do not allow product to reach ground water, water bodies or sewage system. No ecological studies are available. Harmful effects on man and environment are unknown and are not to be expected when application is in accordance with the instructions and the advice in this Safety Data Sheet. When handled properly and used as intended the product has no ecotoxic effects on the basis of our significant experience in ready-to-use cement mortars and chemical building materials and the information available to us.

WATER HAZARD CLASSIFICATION

WGK 1

13 DISPOSAL CONSIDERATIONS

GENERAL INFORMATION

Waste is classified as special waste. Disposal to licensed waste disposal site in accordance with the local Waste Disposal Authority. Smaller quantities can be disposed of with household waste.

DISPOSAL METHODS

Dispose of waste and residues in accordance with local authority requirements.

WASTE CLASS

EWC: 01 04 07 wastes containing dangerous substances from physical and chemical processing of non-metalliferous minerals.

14 TRANSPORT INFORMATION

GENERAL

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING



Irritant

CONTAINS

Portland Cement

RISK PHRASES

R38	Irritating to skin.
R41	Risk of serious damage to eyes.

SAFETY PHRASES

S2	Keep out of the reach of children
S24/25	Avoid contact with skin and eyes.
S26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S27/28	After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of water and soap.
S37/39	Wear suitable gloves and eye/face protection.
S46	If swallowed, seek medical advice immediately and show this container or label.

EU DIRECTIVES

System of specific information relating to Dangerous Preparations. 2001/58/EEC.

16 OTHER INFORMATION

GENERAL INFORMATION

This data is based on our present knowledge. However, it shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

REVISION DATE 22/09/06

RISK PHRASES IN FULL

R38 Irritating to skin.

R41 Risk of serious damage to eyes.



FRANCIS DRILLING FLUIDS, LTD.

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Trade Name(s): Drispac Polymer (Regular, XT and Superlo)

Generic Name(s):

Chemical Name(s): Proprietary (Chemical family Cellulosic Polymer)

Francis Drilling Fluids, LTD.
P.O. Box 1694
Crowley, LA 70527-1694

Emergency/Telephone No.: 800-960-6610
337-783-8685
Hazardous Materials No.: 800-255-3924
Poison Control Center No.: 800-256-9822

II. HAZARDOUS INGREDIENTS

Ingredient	CAS No.	%	Hazard
This product does not meet the definition of a hazardous chemical given in 29 CFR Part 1910-1200 (OSHA). Information on this form is furnished as a customer service.			

III. NFPA/HMIS HAZARD IDENTIFICATION SYSTEM

0=LEAST 1=SLIGHT 2=MODERATE 3=HIGH 4 =EXTREME

Health: 0

Fire: 1

Reactivity: 0

IV. PHYSICAL DATA

Boiling Point (°F): NA	Specific Gravity (H ₂ O=1): 1.6
Vapor Pressure (mm. Hg): NA	Melting Point: ND
Vapor Density (Air = 1): NA	Evaporation Rate: NA
Solubility in Water: Complete	pH: (1%)
Density (at 20° C): ND	Odor: Odorless
Appearance: Light colored powder	Freezing Point: NA

V. FIRE AND EXPLOSION DATA

Flash Point: ND	Flammable Limits: LEL: ND UEL: ND
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Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Use NIOSH/MSHA approved self-contained breathing apparatus (SCBA) and other protective equipment, if conditions warrant. Water fog or spray may be used to cool

DRISPAC POLYMER (REGULAR, XT AND SUPERLO)

exposed containers and equipment.

Unusual Fire and Explosion Hazards: Carbon oxides and various hydrocarbons formed when burned. If in a finely divided and suspended state, treat as a flammable dust.

Extinguishing Media: Dry chemical, foam or carbon dioxide, water spray or fog.

VI. REACTIVITY

Stability: Stable

Hazardous Polymerization: Will Not Occur

Incompatibility: ND

Hazardous Decomposition: ND

VII. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:

Skin: May produce slight irritation with prolonged contact with moistened product.

Eyes: Dust may produce mechanical irritation.

Inhalation: Non-irritating to mucous membranes, however, breathing high concentrations of the dust may cause mechanical irritation of the nose, throat, and upper respiratory tract.

Ingestion: Passes through relatively inert. May cause some gastrointestinal upset.

Permissible Exposure Limits: (for air contaminants)

OSHA PEL (8hr. TWA): Respirable - 5 mg/m³; Total dust - 15 mg/m³

ACGIH TLV: Respirable - ND; Total dust - 10 mg/m³

Carcinogenicity:

Listed By NTP: ND

Listed By: IARC: ND

Listed By OSHA: ND

Acute Oral LD50: >25 g/Kg (rats)

Acute Dermal LD50:

Aquatic Toxicology LC50:

Emergency and First Aid Procedures:

Skin: Wash skin with soap and water. If irritation or adverse symptoms develop, seek medical attention.

Eyes: Flush eyes with running water. If irritation or adverse symptoms develop, seek medical attention.

Ingestion: If illness or adverse symptoms develop, seek medical attention.

Inhalation: Remove from exposure. If illness or adverse symptoms develop, seek medical attention.

Additional Health Hazard Information: Subchronic and Chronic Effects of Overexposure - No adverse effects have been noted in chronic feeding studies using laboratory animals and humans. Sarcomas were exhibited at injection sites of animals receiving repeated massive subcutaneous injections of aqueous solutions of the material. The effects may have been the result of trauma.

Long term exposure to high dust concentrations may cause non-debilitating lung changes.

VIII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Evacuate area if all unnecessary personnel. Contain spill. Sweep up spill and place in disposal container. If wet, material becomes very slippery. Wear protective equipment and or garments if

exposure conditions warrant. Keep out of water sources and sewers.

Waste Disposal Methods: (Insure Conformity with all Applicable Disposal Regulations): Manage in a permitted waste management facility. Prior to disposal, consult your environmental contact to determine if TCLP (Toxicity characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

Handling and Storage Precautions: Avoid contact with eyes, skin or clothing. Avoid breathing vapors, mist, fume or dust. Wear equipment and/or garments if exposure conditions warrant. Launder contaminated clothing before reuse. Wash thoroughly after handling Use with adequate ventilation.

Store in a well-ventilated area. Store in closed containers.

IX. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Use adequate ventilation to control concentration below recommended exposure limits.

Respirator: Not generally required unless needed to prevent respiratory irritation. For concentrations exceeding the recommended exposure limit, use NIOSH/MSHA approved air purifying respirator.

Eye Protection: Use safety glasses with side shields

Gloves: Cotton gloves.

Other Protective Clothing or Equipment: Avoid unnecessary skin contamination with material. Personal protection information shown above is based on general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

X. SPECIAL PRECAUTIONS

Contact immediate supervisor for specific instruction before work is initiated. Wear protective equipment and/or garments if exposure conditions warrant.

XI. ENVIRONMENTAL/SAFETY REGULATION

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Environmental Toxicity

The 96-hour LC50 for Drispac Regular Polymer for freshwater trout was >32,000 ppm; for saltwater stickleback it was >56,000 ppm. The 96-hour LC50 for Drispac Superlo Polymer for freshwater trout was >21,000 ppm; for saltwater stickleback it was >56,000 ppm.

Environmental effects testing has been conducted using Drispac Polymer (both Regular and Superlo) in generic mud. The tests were conducted following the Environmental Protection Agency's (EPA), Region II drilling mud bioassay procedures.

The results of these tests classify Drispac Regular Polymer and Drispac Superlo Polymer as non-toxic drilling mud additives.

DEPARTMENT OF TRANSPORTATION

Shipping Name: NA

Hazard Class: NA

Hazardous Substance: NA

Cautionary Labeling: NA

NA=Not Applicable; ND=Not Determined or No Data

Date Prepared: June 14, 1995

File Name: drispac

DRISPAC POLYMER (REGULAR, XT AND SUPERLO)

The data presented is true and correct to the best of our knowledge and belief; however, neither seller nor preparer make any warranties, express or implied, concerning the information presented. The user is cautioned to perform his own hazard evaluation and to rely upon his own determinations.

PRO-CHEM, INC.

1475 BLUEGRASS LAKES PKWY.
ALPHARETTA, GA 30004
EMERGENCY/INFO # (800) 241-8180
ADDITIONAL EMERGENCY # INFO TRAC 1-800-535-5053

MATERIAL SAFETY DATA SHEET**QUICK SEAL / 3350****APRIL 2006****PAGE 1**

HEALTH	1
FIRE	0
REACTIVITY	0
P.P.E.	B

Complies With USDL Safety and Health Regulations, (29 CFR 1910.200)

SECTION 1 – Chemical and Company Identification**CHEMICAL FAMILY:** Clay**SECTION 2 – Composition on Ingredients**

CHEMICAL NAME	CAS #	OSHA PEL	ACGIH TLV	WT %
Bentonite Clay	1302-78-9	5 mg/m ³ respirable dust	5 mg/m ³ respirable dust	100
Crystalline Quartz	14808-60-7	0.1 mg/m ³	0.1 mg/m ³	<2

Contains no chemicals subject to the reporting requirements of SARA Title III Section 313.

SECTION 3 – Hazards Information**ROUTES OF EXPOSURE:** Inhalation**HEALTH HAZARDS (ACUTE):** Inhalation of dust may cause irritation of the nose, throat, and respiratory passages.**HEALTH HAZARDS (CHRONIC):** Inhalation of dust may cause delayed respiratory disease over a prolonged period of time. Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling and sometimes fatal disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** Respiratory diseases including asthma and bronchitis. Eye irritation.

IARC has determined that crystalline silica inhaled in the form quartz from occupational sources in carcinogenic to humans. NTP classifies respirable crystalline silica as reasonably anticipated to be a carcinogen.

SECTION 4 – First Aid Measures**EMERGENCY AND FIRST AID PROCEDURES:****IF INHALED:** Remove person to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, administer artificial respiration. Seek prompt medical attention.**SKIN CONTACT:** No first aid is required since this product does not affect the skin. Wash with soap and water to remove accumulated material from skin.**EYE CONTACT:** Flush eyes immediately with large amounts of water while holding eyelids open. If irritation persists or material is imbedded, seek immediate medical attention.**IF INGESTED:** DO NOT INDUCE VOMITING. If large quantities are swallowed, get immediate medical attention.**SECTION 5 – Fire Fighting Measures****FLASH POINT:** N.A. **FLAMMABILITY LIMITS:** N.A.**AUTOIGNITION TEMPERATURE:** N.A.**EXTINGUISHING MEDIA:** N.A., Does not burn**SPECIAL FIREFIGHTING INSTRUCTIONS:** Inorganic mineral/Non-flammable**UNUSUAL FIRE AND EXPLOSION HAZARDS:** None**SECTION 6 – Accidental Release Measures****STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED:** Vacuum if possible to avoid generating airborne dust. Avoid breathing dust. Wear an approved respirator. Avoid adding water as material becomes slippery when wet.**SECTION 7 – Handling and Storage****PRECAUTIONS FOR STORAGE AND HANDLING:** Do not breathe dust. Avoid creation of respirable dust. Use good housekeeping procedures to prevent accumulation of dust in work areas. Use with adequate ventilation and dust collection. Launder clothing that has become contaminated before it is reused.**SECTION 8 – Exposure Controls/Personal Protection****RESPIRATORY PROTECTION:** FOR OUTDOOR USE ONLY. Use appropriate respiratory protection for particulates based upon airborne workplace concentration and duration from intended use. Refer to the most recent standards of ANSI (Z88.2), OSHA (29 CFR 1910.134), MSHA (30 CFR Parts 56 and 57), and NIOSH Respirator Decision Logic.**VENTILATION:** FOR OUTDOOR USE ONLY. Use local exhaust as required to maintain exposure below occupational exposure limits.**EYE PROTECTION:** Wear safety glasses or goggles**PROTECTIVE GLOVES:** Recommended**PROTECTIVE CLOTHING:** As appropriate for the work environment.**SECTION 9 – Physical and Chemical Properties**

BOILING POINT (°F):	N.A.	MELTING POINT:	N.A.
SPECIFIC GRAVITY:	2.5	EVAPORATION RATE (BUAC=1):	N.A.
VAPOR PRESSURE:	N.A.	VAPOR DENSITY:	N.A.
% VOLATILE BY VOL:	0	SOLUBILITY, WATER:	Insoluble
pH:	N.A.	APPEARANCE/ODOR:	Pale gray to buff powder or granules, no odor

SECTION 10 – Stability and Reactivity**STABILITY:** Stable**CONDITIONS TO AVOID:** None known.**INCOMPATIBILITY:** None known.**HAZARDOUS DECOMPOSITION BYPRODUCTS:** None known.**HAZARDOUS POLYMERIZATION:** Will not occur.**SECTION 11 – Toxicological Information**

No Data Available

SECTION 12 – Ecological Information

No Data Available

SECTION 13 – Disposal Consideration**WASTE DISPOSAL:** Dispose of material in accordance with applicable Federal, State and local regulations for disposal of solid waste.**SECTION 14 – Transport Information****DOT PROPER SHIPPING NAME:** Not regulated

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BENTONITE PELLETS 3/8 Inch**
Revision Date: **06-Jan-2005**

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BENTONITE PELLETS 3/8 Inch **Synonyms:** None **Chemical Family:** Mineral
Application: Weight Additive

Manufacturer/Supplier **Baroid Drilling Fluids a Product Service Line of Halliburton Energy Services, Inc.**
P.O. Box 1675 Houston, TX 77251 Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By **Chemical Compliance Telephone:**
1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Crystalline silica, cristobalite	14464-46-1	0 - 1%	0.05 mg/m ³	1/2 x 10 mg/m ³ %SiO ₂ + 2
Crystalline silica, tridymite	15468-32-3	0 - 1%	0.05 mg/m ³	1/2 x 10 mg/m ³ %SiO ₂ + 2
Crystalline silica, quartz	14808-60-7	< 3	0.05 mg/m ³	10 mg/m ³ %SiO ₂ + 2
Bentonite	1302-78-9	60 - 100%	Not applicable	Not applicable

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep

exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media All standard firefighting media.

Special Exposure Hazards Not applicable.

Special Protective Equipment for Not applicable.

Fire-Fighters NFPA Ratings: Health 0, Flammability 0, Reactivity 0 **HMIS Ratings:** Flammability 0, Reactivity 0, Health 0*

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product.

Hand Protection Normal work gloves. **Skin Protection** Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when

removing or laundering clothing. **Eye Protection** Wear safety glasses or goggles to protect against exposure. **Other Precautions** None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Solid **Color:** Various **Odor:** Odorless **pH:** 8-10 **Specific Gravity @ 20 C (Water=1):** 2.55 **Density @ 20 C (lbs./gallon):** 62 **Bulk Density @ 20 C (lbs/ft3):** 71 **Boiling Point/Range (F):** Not Determined **Boiling Point/Range (C):** Not Determined **Freezing Point/Range (F):** Not Determined **Freezing Point/Range (C):** Not Determined **Vapor Pressure @ 20 C (mmHg):** Not Determined **Vapor**

Density (Air=1): Not Determined **Percent Volatiles:** Not Determined **Evaporation Rate (Butyl Acetate=1):** Not Determined **Solubility in Water (g/100ml):** Insoluble **Solubility in Solvents (g/100ml):** Not Determined **VOCs (lbs./gallon):** Not Determined **Viscosity, Dynamic @ 20 C (centipoise):** Not Determined **Viscosity, Kinematic @ 20 C (centistrokes):** Not Determined **Partition Coefficient/n-Octanol/Water:** Not Determined **Molecular Weight (g/mole):** Not Determined

10. STABILITY AND REACTIVITY

Stability Data: Stable Hazardous Polymerization: Will Not Occur

BENTONITE PELLETS 3/8 Inch Page 3 of 7

Conditions to Avoid None anticipated

Incompatibility (Materials to Avoid) Hydrofluoric acid.

Hazardous Decomposition Amorphous silica may transform at elevated temperatures to tridymite (870 C) or

Products cristobalite (1470 C).

Additional Guidelines Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause mechanical skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation,

should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity **Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.**

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information **For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).**

Toxicity Tests

Oral Toxicity: Not determined **Dermal Toxicity:** Not determined **Inhalation Toxicity:** Not determined **Primary Irritation Effect:** Not determined **Carcinogenicity** Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).

Genotoxicity: Not determined

Reproductive / Not determined

Developmental Toxicity:

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not Determined

Ecotoxicological Information Acute Fish Toxicity: Not determined **Acute Crustaceans Toxicity:**Not determined **Acute Algae Toxicity:** Not determined **Chemical Fate Information** Not determined **Other Information** Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

Not restricted

Canadian TDG

Not restricted

ADR Not restricted

Air Transportation ICAO/IATA Not restricted

Sea Transportation IMDG

Not restricted

Other Shipping Information Labels: None

15. REGULATORY INFORMATION

US Regulations	
US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund	Not applicable.

Reportable Spill Quantity For This

Product EPA RCRA Hazardous Waste If product becomes a waste, it does NOT meet the criteria of a hazardous waste as **Classification** defined by the US EPA.

California Proposition 65 The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory.

WHMIS Hazard Class D2A Very Toxic Materials

Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS

Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****