

August 29, 2011

Russell Kirkham,  
Manager Coal Regulatory Program  
550 W 7<sup>th</sup> Ave., Suite 920  
Anchorage, AK 99501-3577

Dear Mr. Kirkham,

Please find attached Linc Energy Operations' response to your review of our exploration permit applications for the Tyonek and Kenai license area as well as the Healy license area dated August 23, 2011. Included in our response are the following:

- Replies to your comments on your permit checklist for each application;
- A revision of the body of the application addressing your comments;
- Applications for permits to drill; and
- MSDS for drilling mud.

Please contact me should you need any further information.

Sincerely,

Bartly Kleven,  
Environmental Permitting Manager

# Linc Exploration Healy Area E-1402

## Permit Checklist

page # INTITAL

Comment

Reply

General Requirements		

Part A: General information, Ownership and Control		

Part B: Notice of Intent to explore		

Part C: Exploration Application		
Section 7.0 Exploration Area Description		
RK	No list of references for the information listed in section 7.	
CW	7.3.6 Healy Creek and Lignite Creek flow east and drain into the Nenana: Creeks actually from the East to West.	
RK	7.4.1 Vegetation discussion is focused on the Healy area. Description of the Anderson area is inadequate.	
RK	7.4.2 Section does not include enough information on the terrestrial wildlife in the Anderson area.	
RK	Application is mark "no" for archeological resources but the description at 7.6 indication differently.	
CW	7.6, Cultural and Archeological Res. We need a map submitted showing where the two historic sites are, especially in relation to how close planned drill holes are in the area. GPS Coordinates would be helpful.	
RK	8.2.4 Drill Sites: What is the approximate area to be disturbed as part of the drilling operations.	

# Linc Exploration Healy Area E-1402

## Permit Checklist

page # INTITAL

Comment

Reply

CW	Sec8.2.5, Can applicant provide a better idea what kind of gas tester will be used? What will the diverter do? The process mentioned needs to be clearly outlined.	
CW	Sec. 8.2.5, General Drilling operations. What will the applicant do to prevent fuel spills and drill mud spills while operations ensue? There should be barriers in place and the crew should be familiar with minimizing the impacts of Fuel/oil/hydraulic spills. Ideally, any spills that occur should have the ability to be completely negated, so far as the	
RK	8.2.5 General Drilling Operations: does this section mean that it is expected that a maximum of 20,000 gallons of water will be used a day but will more likely be 4,000? Please clarify.	
LJ	8.2.5 General Drilling Operations, ""Water usage at the drill site will be up to 20,000gallons, average water usage on the order of 4,000gallons." If water circulation is frequently lost due to intersection of faults, fractures voids.,this could raise more than 20, 000 gallons per day.We would like to know water tank capacity at drilling site and how to manage water resource.	
LJ	8.2.7 Revegetation " The seed mix to be used will be a variation of the seed mix used locally on disturbed coal mine property". How about fertilizer? How to determine the exact seeding mix appropriate for the Best Management Practices of disturbed area.To meet the requirements of 11 AAC 90.453 , the DNR encourages company to get seed mix appropriate recommendations from Alaska Plant Material Center, Palmer.	
RK	8.2.7 Revegetation; the Plant Material center has made significant changes to what they would approve for a seed mix. Many of the species used in the past have been put on the invasive or noxious weeds list. We need a list of what seed will be used on site for reclamation.	
RK	8.2.6 Drill hole Plugging: If drill holes are to be retained for monitoring, a compltion diagram will be needed showing how the hole will be packed, screened and what insturmentation will be left inplace.	
CW	HEEX01 is shown on the south bench overlooking a creek, above what will be called its water source. Why was this picked as a site?	



# Linc Exploration Healy Area E-1402

## Permit Checklist

page #	INITIAL	Comment	Reply
		N/A	

### Other Comments

LJ		An annual report needs to be submitted to DNR by January 31st each year. This report will discuss the types of exploration activities performed during the previous year and will include a map depicting the location of any new access trails and completed drill holes.	

### Technical Issues


*(Headings correspond to those found in the Alaska Department of Natural Resources Exploration Permit Application.)*

## **Part A – GENERAL INFORMATION**

**1.0 APPLICANT INFORMATION** – see application form.

### **2.0 LOCATION OF THE EXPLORATION**

Exact siting of drillhole locations will be dependent upon ongoing seismic exploration results. No less than 30 days prior to drilling, Linc Energy Operations, Inc. (Linc) will submit exact locations to ADNR for each drill hole.

#### **2.1 Legal Description**

Interior Underground Coal Gasification (UCG) Exploration License Area (70,653.26 acres)

T.006 S., R.008 W., Fairbanks Meridian

Section 1: W1/2E1/2, W1/2  
Section 10: All  
Section 11: All  
Section 12: All  
Section 13: All  
Section 14: All  
Section 15: All, Excluding Trade and Manufacturing Site F-20764  
Section 22: All  
Section 23: All  
Section 24: Lots 1-4 inclusive and W1/2NE1/4, W1/2, W1/2SE1/4  
Section 25: NW1/4, N1/2SW1/4, SW1/4SW1/4  
Section 26: All  
Section 27: All  
Section 28: S1/2  
Section 32: SE1//4NE1/4, E1/2E1/2SE1/4, E1/2W1/2E1/2SE1/4  
Section 34: All  
Section 35: All

Section 36: NW1/4NW1/4

T.004 S., R.007 W., Fairbanks Meridian

Section 17: Lot 6 and 11, and NE1/4NE1/4

Section 18: Lots 1, 2 and 11

Section 19: Lots 2-8, 10, 11 and SE1/4SE1/4

Section 30: Tracts A, B, C, D, E, F, G, H, I and Lot 9,13,14 in Block A of AKSLS 80-106 and Lots 1-8 inclusive and Lot 10 in Block B of AKSLS 80-106

T.004 S., R.008 W., Fairbanks Meridian

Section 1: That portion of Lot 6 and Lot 7 in Section 1 of AKSLS No. 82-123, Lot 8-10 inclusive in Block 1, Lot 1 in Block 4, Lot 1 in Block 65, Lot 2 and 3 in Block 6 all falling within the Farmview Subdivision

Section 2: Tract E-2 of ASLS 95-33

Section 2: Tracts A, C, F, H and SE1/4

Section 3: Lots 3, 4, 7 and 8 and W1/2W1/2SE1/4NE1/4, N1/2NE1/4SE1/4

Section 4: Lots 1-4 inclusive

Section 10: Lots 3, 4, 5, 11, 12 and 13

Section 13: N1/2NE1/4, SE1/4NE1/4;NW1/4NW1/4

Section 14: Lot 8

Section 15: Lots 4, 5, 9 and NW1/4NW1/4

Section 22: Lots 2, 4, 6-13 inclusive, and W1/2NW1/4, NW1/4SW1/4, SW1/4SE1/4

Section 23: Lots 2, 3, 4, 5, and 7

Section 25: W1/2NE1/4, SE1/4NE1/4

Section 26: Lots 2 and 3

Section 27: Lots 1-12 inclusive and Lots 9-14 inclusive and W1/2SW1/4, SE1/4SW1/4

Section 32: Lot 15

Section 34: Lots 2-6 inclusive and Lots 9-14 inclusive and W1/2SW1/4, SE1/4SW1/4

Section 35: Lots 5 and 6 and E1/2E1/2, SW1/4NE1/4, SE1/4NW1/4, E1/2SW1/4, W1/2SE1/4

Section 11: NE1/4

Section 11: Tract A-2A, A-2B, A-2C, A-2D, A-2E, B-2A, B-2B

T.011 S., R.007 W., Fairbanks Meridian

Section1: Lots 1-4 inclusive and S1/2N1/2, S1/2

Section 2: Lots 1-4 inclusive and S1/2N1/2, S1/2  
 Section 3: Lots 1-4 inclusive and S1/2N1/2, S1/2  
 Section 4: Lots 1-4 inclusive and S1/2N1/2, S1/2  
 Section 5: Lots 1-4 inclusive and S1/2N1/2, S1/2  
 Section 6: Lots 1-7 inclusive and S1/2NE1/4, SE1/4NW1/4, E1/2SW1/4, SE1/4  
 Section 7: Lots 1-4 inclusive and E1/2, E1/2W1/2  
 Section 8: All  
 Section 9: All  
 Section 10: All  
 Section 11: All  
 Section 12: All  
 Section 13: All  
 Section 14: All  
 Section 15: All  
 Section 17: All  
 Section 18: Lots 1-4 inclusive and E1/2, E1/2W1/2  
 Section 19: Lots 1-4 inclusive and E1/2, E1/2W1/2  
 Section 20: All  
 Section 21: All  
 Section 22: All  
 Section 23: N1/2  
 Section 24: N1/2, N1/2SW1/4  
 Section 27: N1/2, N1/2S1/2, S1/2NW1/4SW1/4, S1/2NE1/4, SE1/4SE1/4  
 Section 28: All  
 Section 29: N1/2, SW1/4, N1/2SE1/4, SW1/4SE1/4  
 Section 30: Lots 1-4 inclusive and E1/2, E1/2W1/2  
 Section 31: Lots 1-2 inclusive and E1/2, E1/2NW1/4  
 Section 35: SE1/4NE1/4SW1/4, S1/2SW1/4NE1/4SW1/4, S1/2S1/2

T.012 S., R.006 W., Fairbanks Meridian

Section 4: All  
 Section 5: All  
 Section 6: E1/2, E1/2W1/2  
 Section 7: E1/2, E1/2W1/2  
 Section 8: All  
 Section 9: N1/2, SW1/4, N1/2SE1/4, RW1/4SE1/4, N1/2N1/2SE1/4SE1/4,  
 SE1/4NE1/4SE1/4, S1/2SE1/4SE1/4

Section 13: NE1/4SW1/4, NW1/4SE1/4  
Section 14: SE1/4  
Section 17: N1/2  
Section 18: NE1/4,E1/2W1/2  
Section 19: NE1/4NW1/4, SE1/4SW1/4, S1/2SE1/4  
Section 20: S1/2  
Section 21: S1/2NE1/4, NW1/4, S1/2  
Section 22: All  
Section 23: S1/2NE1/4, NW1/4, N1/2SW1/4, SE1/4  
Section 24: W1/2E1/2, W1/2  
Section 25: All  
Section 26: All  
Section 27: All  
Section 28: All  
Section 29: All  
Section 30: All  
Section 31: All  
Section 32: All  
Section 33: All  
Section 34: All  
Section 35: All  
Section 36: All

Section 6: Lots 1-4 inclusive  
Section 7: Lots 1-4 inclusive  
Section 18: Lots 1-4 inclusive  
Section 19: Lots 1-4 inclusive

Section 13: Lots 7-12 inclusive  
Section 23: Lots 1-4 inclusive  
Section 24: Lots 1-4 inclusive

T.012 S., R.007 W., Seward Meridian

Section 8: Lot 7  
Section 17: Lots 5-8 inclusive  
Section 20: Lots 5 and 6  
Section 28: Lots 2-5 inclusive  
Section 29: Lots 4-6 inclusive  
Section 32: Lots 6-10 inclusive

Section 1: All  
 Section 2: All  
 Section 8: NE1/4, N1/2SE1/4, SE1/4SE1/4  
 Section 9: NW1/4NE1/4NW1/4, S1/2NE1/4NW1/4, NW1/4NW1/4, S1/2N1/2, S1/2  
 Section 10: All  
 Section 11: All  
 Section 12: All  
 Section 13: All, Excluding the SE1/4NW1/4SW1/4NW1/4  
 Section 14: All  
 Section 15: All  
 Section 17: E1/2NE1/4, NE1/4SE1/4  
 Section 21: N1/2;SE1/4  
 Section 22: N1/2,S1/2S1/2S1/2  
 Section 23: NE1/4,N1/2NW1/4, S1/2SW1/4, N1/2SE1/4, N1/2NE1/4SW1/4SE1/4,  
 N1/2SW1/4NE1/4SW1/4SE1/4, S1/2SW1/4SE1/4, SE1/4SE1/4  
 Section 24: N1/2,N1/2S1/2, N1/2NE1/4SW1/4SW1/4, SE1/4NE1/4SW1/4SW1/4,  
 W1/2SW1/4, SW1/4SE1/4Sw1/4, E1/2SE1/4SW1/4, E1/2W1/2SE1/4,  
 NW1/4NW1/4SE1/4SW1/4, S1/2SW1/4SE1/4, SE1/4SE1/4  
 Section 25: NE1/4, E1/2NE1/4NW1/4, E1/2NW1/4NW1/4,  
 SW1/4NW1/4NE1/4NW1/4, E1/2NW1/4NW1/4NW1/4,  
 S1/2NW1/4NW1/4, S1/2NW1/4, S1/2  
 Section 26: W1/2NE1/4NW1/4NE1/4, W1/2NE1/4NE1/4, SE1/4NE1/4NE1/4,  
 W1/2NE1/4, SE1/4NE1/4, S1/2  
 Section 27: All  
 Section 28: E1/2, E1/2SW1/4, SW1/4SW1/4  
 Section 32: All  
 Section 33: All  
 Section 34: All  
 Section 35: All  
 Section 36: All

**2.2** See Application  
**2.3** See Application  
**2.4** See Application  
**2.5** See Application  
**2.6** See Attached Figures

### **3.0 PERIOD OF EXPLORATION**

**3.1** See Application

**3.2** See Application

### **4.0 OWNERSHIP OF SURFACE/SUBSURFACE MINERAL ESTATE**

**4.1** See Application

**4.2** See Application

**4.3** See Application

**4.4** See Application

**4.5** See Application

**4.6** Right to Enter

Linc Energy holds Underground Coal Gasification Exploration License MHT No. 9400424 and is authorized to enter upon and explore for lands within its license area in accordance with applicable law. The proposed drilling will be performed by Linc contractors under the direction of Linc employees.

**Insert Figure**  
**Linc Energy Exploration Map**  
**Interior License Area**

**Insert Figure**  
**Linc Energy Drill Hole Location**  
**Healy, Interior License Area**

**Drill Hole Location  
Anderson, Interior License Area**

# **PART C – EXPLORATION PERMIT APPLICTON**

## **7.0 Exploration Area Description**

### **7.1 Surface Disturbance:**

Surface disturbances will be limited to core drilling and surface activities associated with small diameter core drilling. These surface activities will include the drill rig pad and staging area.

### **7.2 Map:**

See Figures.

### **7.3 Area Description:**

**7.3.1 Borough** – Both exploration areas lie within the Denali Borough.

**7.3.2 Land Use** – The Healy Exploration Area falls within Subunits 4D1 and 4D3 of the Tanana Basin Area Plan. State land in these subunits is retained in public ownership for multiple use management. The management emphasis is on subsurface coal and hard rock mineral development, recreation while maintaining fish and wildlife habitat. Within and adjacent to the exploration license area there are several active placer mines and the only operating coal mine in Alaska

The Anderson Exploration Area falls within Subunits 4K3 and 4J1 of the Tanana Basin Area Plan. The state land is retained in public ownership for multiple use management. Recreation is designated a primary use in Subunit 4K1 as is forestry. Subunit 4J1 has fish and wildlife as a primary designation.

**7.3.3 Surface Topography** – The topography of the Healy Exploration Area consists of steeply graded terrain. In the adjacent areas there are actively eroding slopes resulting in badland topography. The exploration area near Healy has natural topographic breaks ranging from 40 to 45%.

The Anderson Exploration Area is mostly flat to undulating hills with small streams, ponds and muskeg.

- 7.3.4** Access – Access to both Exploration Areas is limited. Proposed exploration activities will make use of existing roads and trails to the extent practicable. Helicopter support will also be utilized.
- 7.3.5** Geology – The exploration license areas are located in the Nenana Coal Basin in three separate geographic locations. These are located near the towns of Healy, Anderson and Nenana. The Nenana Coal Basin includes a structurally similar series of disconnected sub-basins resulting in subfields. The approximately 3,000 foot thick Tertiary coal-bearing group rests directly on a highly irregular surface of Precambrian and Paleozoic aged metamorphic rocks and is overlain by Nenana Gravels and Quaternary surficial deposits. The belt of Tertiary coal-bearing rocks of interest for UCG development are found within the informally named Usibelli Group. The Suntrana Formation found within this group contains the bulk of the coal resource of highest potential for UCG development.
- 7.3.6** Surface Waters - The Nenana River, Healy Creek and Lignite Creek are the dominant drainage features in the Healy exploration area. Healy and Lignite Creeks are braided streams that flow west and drain into the Nenana River, which flows north in this area. This portion of the Nenana River is characterized by a developed channel with a moderate gradient. A gaging station situated at 1,350 feet above mean sea level (AMSL) at the Nenana River at Healy was reviewed for stream flow information. Based on a review of 2005 USGS discharge records, the Nenana River at Healy had a mean flow of 1,678 cubic feet per second (cfs) with a daily flow ranging from 800 to 20,800 cfs. Peak flows on the Nenana River typically occur between June and August. The referenced gaging station drains an area of 2,100 square miles.
- In the Anderson Exploration Area, the Lost Slough tributary of the Nenana River is the dominant drainage feature. Associated tributaries in the project area include Glacier Creek, Clear Creek, Fish Creek and Julius Creek. This portion of the Nenana River situated at approximately 500 feet AMSL and the river is characterized by a low gradient. No discharge information was available for this portion of the Nenana or other nearby drainages.
- 7.3.8** Soils – Soils in the exploration area are formed in wind deposited material (loess), glacial outwash and water laid sediments. At Usibelli Coal Mine, directly south of the Healy exploration area, it has been found that pH values are more than 4.0. The lower values are found mostly in the organic and A horizons. The bulk density of the organic horizons is only

20% of the mineral horizons. After stockpiling the pH values of the mixed soil horizons would range from 5.0 to 5.6. Soils in the exploration are predominantly medium textured because windblown materials blanketed the area during the last 7000 to 10,000 years. The windblown soils were eroded and redeposited by water in low land and along the streams (UCM, Two Bull Ridge ASMCRA Permit).

## **7.4 Vegetation and Habitat:**

- 7.4.1** Vegetation – In the Healy area vegetation has been influenced by disturbance: soil movement along slopes and fire in flat uplands. Burned areas frequently contain the four major tree species: black and white spruce, paper birch and aspen. Broadleaf forests dominate south-facing slopes. Some gentler slopes contain paper birch – white spruce communities, frequently with blue joint reed grass in the understory. (UCM, Two Bull Ridge ASMCRA Permit).

Terrestrial vegetation in the Anderson area is predominantly composed of white spruce, paper birch, black spruce, and open areas of shrubs, mosses and lichens. Shrubs include Labrador tea, bog cranberry, willow, crowberry, blueberry, resin birch and dwarf arctic birch. Plant include cotton grass, sedges, rushes, forbs, lichens, mosses, liverworts, mushroom and other fungi (AEIDC, 1974).

- 7.4.2** Terrestrial Wildlife – The Healy Exploration Area falls within Subunits 4D1 and 4D3 of the Tanana Basin Area Plan. State land in these subunits is retained in public ownership for multiple use management. The management emphasis is on subsurface coal and hardrock mineral development, recreation and maintaining fish and wildlife habitat. Fish and wildlife habitat is designated a primary use in these subunits. Five species of particular importance, because of subsistence, recreational, or ecological values are found in the exploration area include black bear, brown bear, caribou, Dall sheep and moose. Smaller mammals include porcupine, beaver, snowshoe hare, red squirrel, red fox, lynx and wolf. Numerous species of small fur bearing animals, birds and water fowl live in, or migrate through the exploration area on a seasonal or longer basis.

The Anderson Exploration Area falls within Subunits 4K3 and 4J1 of the Tanana Basin Area Plan. Subunit 4J1 has fish and wildlife as a primary designation. Moose, black bear and furbearer's habitat is rated as important in this area. Game animals hunted include moose, black bear and brown bear. Furbearers include wolves, coyote, red fox, lynx, wolverine, river otter, marten, mink, weasels, beaver and muskrat.

**7.4.3** Aquatic Wildlife - The creeks, rivers and ponds within the Healy and Anderson Exploration areas are home to a variety of species of fish including but not limited to grayling, arctic char, northern pike, rainbow trout and salmon species. (Nenana Basin Oil and Gas Exploration License Final Findings of the Director, 2002, ADNDR).

During the coal exploration project, a temporary water use permit will be obtained. These permits mandate pump water intakes in fish bearing creeks be screened to prevent minnow sized and larger fish from being sucked into the pumps. Stormwater from any area disturbed will be managed using best management practices such as vegetative or gravel filters.

**7.5** Threatened or Endangered Species - Within the Tanana Basin, the U.S. Fish and Wildlife Service and ADF&G list the Arctic peregrine falcon as threatened and the American peregrine falcon as endangered under the state and federal Endangered Species Act. No endangered or threatened species occur in this area. However, these birds may pass through the exploration areas during migration. Bald Eagles and Trumpeter Swans may be found in the exploration areas during the summer and fall seasons. If a nest is encountered, every effort will be made to not disturb it.

**7.6** Cultural and Archeological Resources – Two historic sites exist within the Interior Exploration Areas. Joan Dale of the Alaska Department of Natural Resources Office of History and Archeology reviewed the UCG tracts for the Interior License Area. She called out two areas containing known historic sites: one located within 011S007W, Fairbanks Meridian and one more area within 012S007W. One drill hole is planned in 2011 for 011S007W. Ms. Dale has the proposed location of this drill hole and has advised we are in the near vicinity.

Should any historic sites be encountered during field work, they will be reported.

## 8.0 EXPLORATION/RECLAMATION METHODS

### 8.1 Exploration Area Map and Drill Hole Location Maps

The attached figures depict the UCG Exploration License Areas as well as the 2011 proposed drillhole locations.

### 8.2 Project Description:

**8.2.1 Surface Drilling Program** –The Drilling program in the Interior license area for this planning period is estimated to be up to a total of 7 site characterization holes with an estimated depth of 3500’ each. At a minimum 2 holes will be cored and all associated samples, tests and physical information necessary to evaluate it will be obtained. The Interior UCG Exploration Area has a total of two drillholes planned for 2011. HEEX01, located in the Healy Exploration Area, and ANEX01, located in the Anderson Exploration Area will be drilled to approximately 3,000 feet. The drilling and coring will be accomplished with a core drilling rig with the capabilities of reaching the previously noted depth and obtain a core with an outside diameter of approximately 2.5”. Based on geophysical data that has not yet been obtained and analyzed, surface casing depths, core drilling depths will be determined. Important physical, chemical and geotechnical data is needed to evaluate the coals, overburden, and underburden for future UCG development. It is estimated at this time that exploratory drilling will commence on September 1, 2011 and continue throughout the license area year as deemed necessary.

**8.2.2 Equipment and Equipment Use** – Drilling operations will be conducted with a Boart Longyear LY50 (or similar) that is helicopter transportable. The LY50 drill uses a wireline core system and is unable to perform rotary drilling. Borehole specifics are as follows: surface to approximately 100 feet bgs will be PQ (5” diameter). Approximately 100 feet bgs to TD will be HQ (3.895” diameter). If necessary, it will telescope to NQ (3.032” diameter). Because this drill uses a wireline core system, no pilot hole will be drilled. Only a single core hole will be advanced at each selected location, until a second corehole is warranted.

Due to the difficulties and costs associated with drilling through unconsolidated surface sediments, it would be advantageous to perform coring operations in lieu of a rotary pilot hole provided that the coal-bearing strata depth is known with reasonable accuracy from the geophysical work. For planning purposes, one hole per site is envisioned in 2011 for the Anderson Exploration Area and the Healy Exploration Area. Additional holes may be drilled at the site if hole conditions or coal core recovery issues arise requiring re-drilling of the original hole.

**8.2.3** Access – Due to the lack of existing roads in the Interior license areas, a helicopter supported drilling project is planned. However, if existing roads are found that can be used to access drilling sites they will be used. Support services for any exploration work would be drawn from existing commercial services offered in nearby communities. Crew housing, food, supplies, transportation, and fuel are available in Healy or Nenana while drilling supplies could be obtained in Anchorage or Fairbanks.

**8.2.4** Drill Sites - Drill pad construction would be limited to the smallest possible size necessary to support safe, efficient drilling operations at each location. For helicopter supported sites, a portable excavator may be transported to the site to remove brush and level the ground for a safe work area. It would also be used in excavation of the pit that would contain the drill cuttings and fluids.

During pad construction the topsoil will be retained for future reclamation. Slash and brush will be maintained onsite to provide stormwater filtration. The overburden in many of these areas is very porous and should provide ample capacity for infiltration of stormwater. However, to ensure that any runoff does not impact surrounding water bodies, stormwater runoff will be managed through Best Management Practices such as gravel or vegetative filters.

No acidic or toxic drainage is anticipated from surface runoff from drill cuttings that may be deposited on the surface during drilling.

**8.2.5** General Drilling Operations – Local services and lodging will be utilized as opposed to setting up a camp. Crews will be housed locally or within the near vicinity and transported to the job daily.

Due to the softness of the Tertiary coal-bearing strata, drilling fluid that would create a mud cake along the annulus of the hole may be needed to assure an open hole suitable for geophysical logging. All mud products used on site will be fresh-water based and biodegradable.

It is estimated that water usage, if needed at all, will average 2,000 to 4,000 gallons per day. This source will be identified prior to mobilization to the field. A temporary water use permit will be obtained for each drillhole location. Proper screening will be employed to inhibit the intake of aquatic species.

Numerous types of analyses are required to characterize the coal, overburden and underburden therefore high core recovery of the coal seam is paramount. A double or triple tube core barrel assembly is desirable for generation of the best geotechnical descriptions and samples for geotechnical testing.

A wellsite geologist will be onsite to describe drill cuttings and core during the program. Drill cuttings will be obtained by the drilling contractor at the designated depth interval. The cuttings will be washed, fully described, and a dry

sample of the cuttings will be retained for later use. It is possible that chip samples may be collected for overburden geochemical analysis. All cores will be cleaned of drilling fluids and debris, measured, photographed, described both lithologically and geotechnically, labeled, sampled, and placed in heavy mill plastic sleeves and boxed. Core sample selection for geotechnical testing may either be completed by the geologist and/or a geotechnical engineer. All cores will be retained at a designated area for future testing and reference.

Holes drilled within the Interior license area will require a diverter. Smoking will be banned within the perimeter of each drill site and welding will require gas tests prior to and during the work. As a safety precaution, a gas tester will be present on the rig. Gas desorption and analytical testing of the gas is planned for the target coal seams. All Linc personnel and subcontractors working on the drill site will be trained in all health and safety procedures prior to work.

Pending hole conditions, geophysical wireline logging is planned for all holes. A standard coal suite of logs will be run down the entire length of the hole. The typical log suite will likely include gamma, compensated density, caliper and resistivity. Sonic, high resolution density and verticality logs may also be included. It may be necessary to log the hole through the drill pipe therefore the wireline service contractor will need to plan for an additional smaller diameter gamma tool for inner pipe clearance.

A summary exploration report outlining the methods and results of the drilling program will be prepared. A file will be created for each hole and will include all data pertinent to the hole.

An updated cost estimate and a list of contractors will be provided prior to the commencement of drilling when final bids are received.

- 8.2.6** Drillhole Plugging and Reclamation - Upon completion of drilling, the drillhole will be backfilled with cement. By cementing the entire stratigraphic column, all potential interaction of groundwater between formations, either from permeable coal seams, porous sandstones, unconfined surface deposits and/or faults will be eliminated.

None of the Suntrana Formation strata have toxic or acid-forming characteristics. This is shown in extensive overburden and coal characteristic studies and water quality sampling at the adjacent Usibelli Coal Mine. Studies at that location also indicate that groundwater aquifers tend to travel along coal-bearing intervals and faults. It is these locations, therefore, where any potential groundwater contamination from drilling could occur.

Cement used for plugging the wells will weigh a minimum of 10 lbs. per gallon and will be comprised of a typical Portland cement mixed on site within the mud tanks. Cuttings collected during the drilling and present in the mud tanks will be

combined with the cement and sent down the wellbore. The cement will be pumped down the well through the drill rods in approximately 5 foot lifts from bottom to top.

Excess cuttings not sent down the drillhole with the cement will be spread over the site prior to topsoil placement. There are no metal-bearing cuttings within the Suntrana Formation or in the surficial gravels that might prove to be toxic to vegetation.

After the pad has been determined to be no longer needed for the exploration program the site will be graded to original contour, topsoil will be spread, and the site seeded.

Drilling consumables will be staged and flown out of the Healy or Nenana Airports.

- 8.2.7** Revegetation – After the completion of the drillholes topsoil will be redistributed to the original contour. It is the intention that the drill sites be fully reclaimed at the end of the drilling program. Seeding will take place in the summer months and will likely be done by hand. The seed mix to be used will be selected upon recommendation of the Plant Material Center in Palmer, Alaska. It will consist of mostly grasses to encourage quick cover and soil amendment until natural reinvasion of local woody species is established.

Due to the small areas disturbed no planting of woody species or fertilization is proposed.

- 8.2.8** Hydrologic Balance Control Measures - Data collected during the hydrologic characterization of the license area will be used to determine if the site is suitable for UCG selection. The hydrologic characterization will begin with a desktop study of available surface hydrologic data. Regional watershed maps (1:250K) along with watershed and discharge information collected from available state, academic and private sources will be evaluated. A desktop study of nearby wells and other available groundwater information will be conducted to evaluate potential groundwater conditions in preparation of exploration activities and to evaluate the site for preliminary characterization.

During exploration activities, the groundwater characterization effort will be performed on selected intervals in the borehole with an emphasis on the target coal, immediate overburden and underburden intervals. The characterization will be based on information collected during core-logging, open-hole geophysical logging, drill stem testing, and potential water quality sampling. Following completion of the borehole, an open-hole geophysical logging suite will be equipment and acquire data from the borehole. The logging types will depend on tool availability and borehole configuration and may include: natural gamma, SP, resistivity, neutron porosity, sonic, PEF, and acoustics. The borehole will be

logged from the surface to total depth to determine the lithology, water bearing formations, formation water salinity, porosity and other relevant formation features.

Pending evaluation of the core logs and geophysical logging results, the borehole may be selected for further evaluation of groundwater conditions. Groundwater flow and pressure information may be collected at selected lithologic units. Drill stem testing methods will be performed by a contractor to acquire the data. Drill stem testing of the selected intervals, including the target coals, overburden and underburden materials, will include hydraulic conductivity and hydraulic head measurements. Groundwater samples from selected units may be collected and submitted to an analytical laboratory for evaluation if borehole conditions allow.

**8.2.9** Removal of Facilities and Equipment – At the conclusion of exploration drilling, all facilities and equipment will be promptly removed. Demobilization will occur via the same routs and landing areas that were used to bring the equipment in.

### **8.3 Schedule**

Exploration efforts are anticipated to commence in September of 2011 for the first two drill holes. It is expected that each well will take two months to drill. Reclamation for wells drilled in 2011 will take place in June of 2012.

### **8.4 Quantity of Coal Removed**

Only coal associated with the cores will be removed.

## 8.5 Reclamation Costs For 2011

### DIRECT COSTS

### DRILLHOLE CLOSURE COSTS

#### Drillhole Closure Costs

Cement = 1.19 CF/bag

0' – 100' PQ – 5" diameter 14 bags

100' – 3000' HQ – 3.895" diameter 202 bags

(216 bags of cement/hole) (\$13.00/bag) (2holes) = \$5,616.00

#### Labor

(16 hours/hole)(\$97/hr./driller+\$52/hr./helper)(2 holes) = \$4,768.00

#### Helicopter

Three day minimum \$15,000.00

**Total Drillhole Closure Cost \$25,384.00**

### FACILITY REMOVAL

#### Labor

(8 hours/hole)(\$97/hr./driller+\$52/hr./helper(2 helpers)(2 holes) = \$3216.00

#### Helicopter

3 days \$15,000.00

#### Disposal

\$2,000.00

**Total Removal Cost \$20,216.00**

### REVEGETATION

Grass Seed	
(1200sf/pad)(2 pads) (4lb/1000sf)(\$2.04/lb.)=	\$19.58
Labor	
(2 laborers)(8 hrs. total)(\$44.54/hr.)=	\$712.64
Helicopter	
Three hour minimum	<u>\$3,315.00</u>
<b>Total Revegetation Cost</b>	<b>\$4,047.22</b>
<b>TOTAL DIRECT RECLAMATION COST:</b>	<b>\$49,647.22</b>

#### INDIRECT COSTS

<b>Mobilization/Demobilization@10%</b>	<b>\$4,964.72</b>
<b>Contingency@10%</b>	<b>\$4,964.72</b>
<b>Contractor Profit/Overhead@15%</b>	<b>\$7,447.08</b>
<b>Project Management Fee@4%</b>	<b>\$1,985.89</b>
<b>Engineering Redesign Fee@ 5%</b>	<b><u>\$2,482.36</u></b>
<b>Total Indirect Costs</b>	<b>\$21,844.77</b>

<b>GRAND TOTAL – 2011 RECLAMATION BOND</b>	<b><u>\$71,491.99</u></b>
--	---------------------------

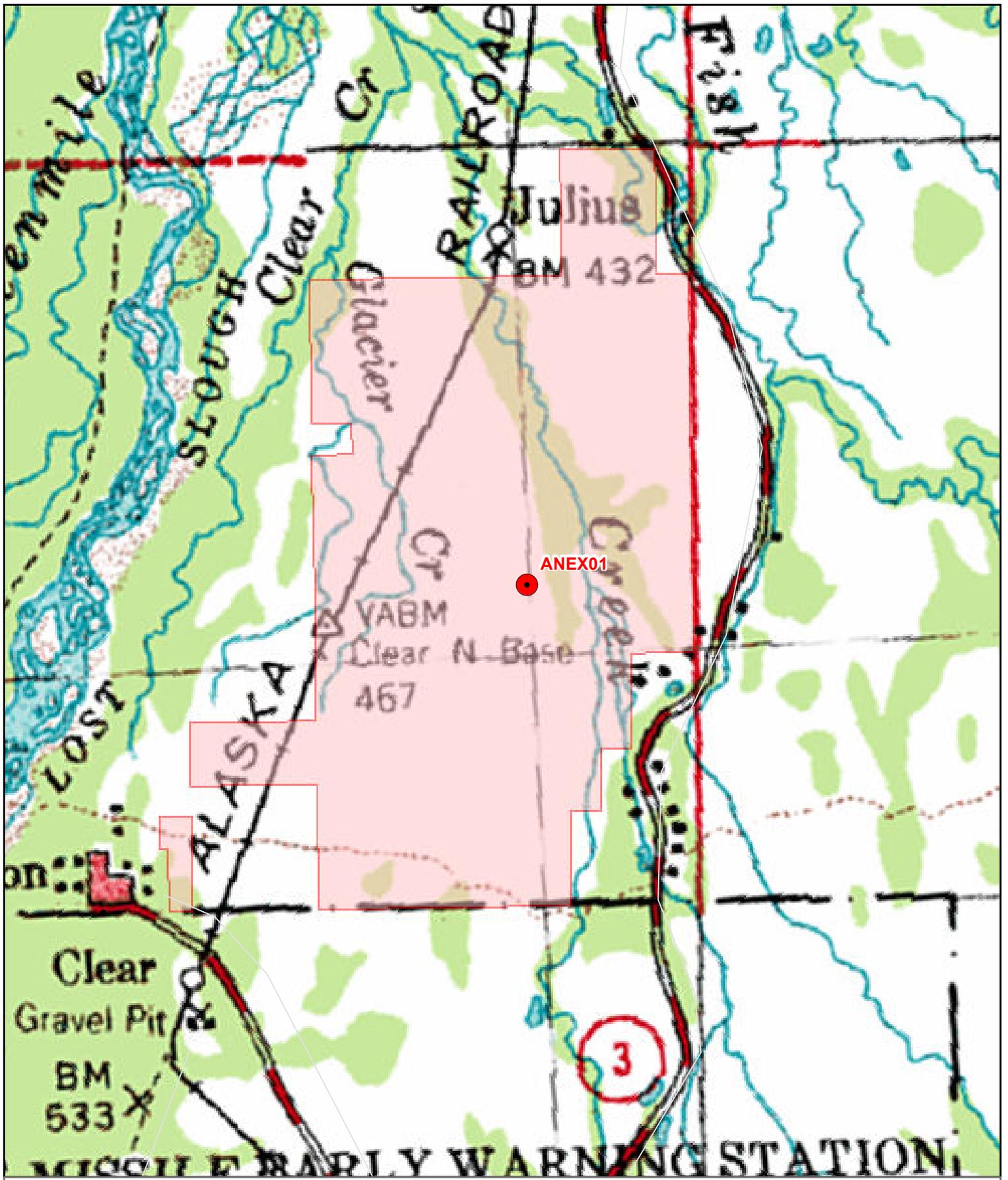
## **PART D – EXPLORATION ON LANDS UNSUITABLE FOR MINING**

- 9.1**            Not applicable
- 9.2**            Not applicable
- 9.3**            Not applicable

## **PART E – APPLICANT NAME AND SIGNATURES**

See Application

## FIGURES

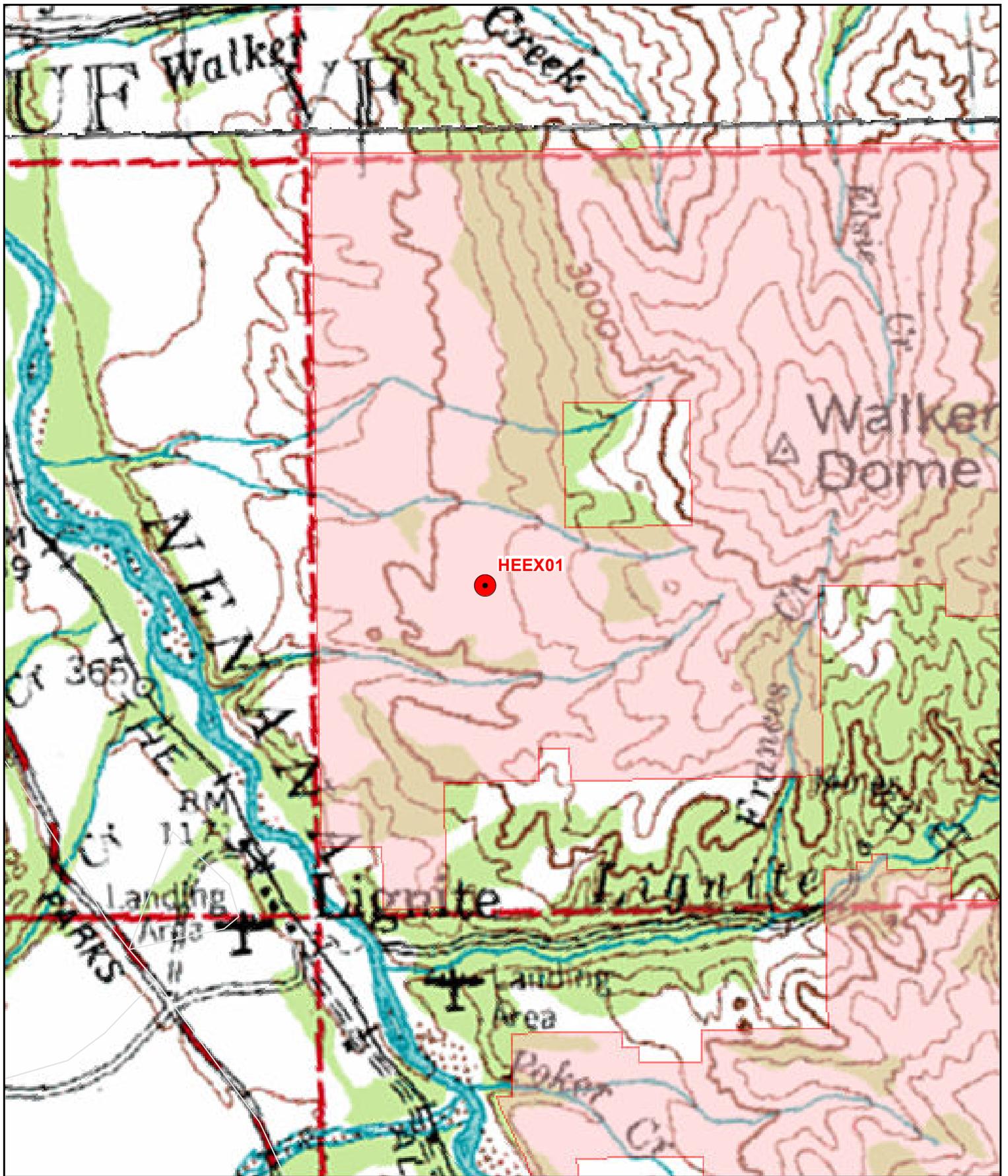


- Exploration Holes
- License Areas



UCG Exploration License Areas  
**ANEX01**





-  Exploration Holes
-  License Areas



UCG Exploration License Areas  
**HEEX01**

