

ENVIRONMENTAL ASSESSMENT

SHAMROCK GROUP OF MINING PLAN OF OPERATIONS

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APPENDIX A: REGIONAL DIRECTORS ANALYSIS: LAMAL SHAMROCK GROUP MINING PLAN OF OPERATIONS

TITLE 36 CFR 9.10 (d) Summary Evaluation

This analysis is for approval of a proposed mining plan of operations submitted to the National Park Service by Thomas and Kathryn Lamal. The mining plan describes placer mining and exploration operations utilizing a suction dredge, highbanker and metal detector on land impacted by previous mining activities along Bonanza Creek within Wrangell-St. Elias National Park and Preserve. The NPS prepared and Environmental Assessment “Shamrock Group Mining Plan of Operations, Wrangell-St. Elias NP/P”. The NPS would approve the Lamal’s mining plan of operation on Shamrock and Tony M placer mining claims and attach stipulations to control and minimize impacts to park resources and values.

Title 36, Chapter I, Part 9 of the Code of Federal Regulations provides the regulations for Minerals Management in National Park units. The Regional Director’s analysis may include the following criteria listed in Title 36 CFR 9.10 (d). The criteria below serve as a guideline checklist for evaluation of the proposed plan. Analytical comments concerning the plan follow each criterion.

1. An examination of the environmental report filed by the operator.

Comment:

The environmental report submitted by the operator with the plan of operations references existing NPS data and analysis and/or briefly addresses fish and wildlife, past mining activities, cultural resources, water resources, geology, vegetation, and the impacts resulting from proposed operations, fuel use and storage, and waste disposal. That report references the Wrangell-St.-Elias NP/P Mining EIS and the Chisana –Gold Hill Cultural Landscape Study as well as other environmental assessments,

NPS review of the submitted information indicates that it recognizes most of the issues relevant to the proposed operation. The information in the operator’s report was essentially derived from existing data and past environmental studies. NPS information and reports are consistent with the operator's statements concerning the environmental conditions on the claims. Information collected by the NPS is on file at the WRST Headquarters. Review of this information was incorporated into the EA covering the plan proposed by the operator.

Although the operator's report was brief and contained no new or independent supporting data, the NPS review of the environmental conditions on the claims and surrounding area, it did not contain incorrect or misleading information. Considering the scope of the proposed mining operation, the NPS has determined that the operator's environmental report is adequate.

2. An evaluation of measures and timing required to comply with reclamation requirements.

Comment:

The proposed plan of operations addresses reclamation as an on going process during the mining. Gravel processed through the suction dredge would be discharged from the dredge directly into the stream. Reclamation of suction dredge operations was previously analyzed and discussed in the Bonanza Nos. 1-6 MPO EA covering a proposed plan of operations which is similar in scope. Reclamation requirements as outlined in 36 CFR 9.11 (a) (2) and (b) would be complied with under the proposed plan. The NPS

would attach stipulations that assure removal of mining equipment, supplies and debris, resulting from the operation. Stipulations would effectively manage short-term blockage of the stream from dams and address reclamation of excavated sites to a condition that approximate pre-mining topography.

Additional specific measures for reclamation procedures are not considered necessary for the operation. Time restrictions for reclamation compliance would require the operator to assure that reclamation is on going and completed each season prior to the operator leaving the area at the end of the mining season.

3. An evaluation of necessary conditions and amount of the bond or security deposit to cover the estimated reclamation costs.

Comment:

The conditions of a performance bond, as required under 36 CFR 9.13 (a), are presented in the EA. Stipulations are integrated into the operator's proposal. These stipulated conditions are primarily a clarification of the regulatory requirements to assure that reclamation is adequate and provide little change to the proposed reclamation of the operation.

Reclamation for the proposed operations was developed to address any potential need for the NPS to remove mining equipment, supplies and debris. The amount of the performance bond was calculated to "...be in an amount equal to the estimated cost of completion of reclamation requirements..." as required under 36 CFR 9.13 (c). An explanation of the bonding and cost estimate calculations were included in the Engineering and Geological Analysis appended to this EA (Appendix B).

4. An evaluation of the need for any additional requirements for the access permit.

Comment:

Access to the mining operation is regulated by 43 CFR Part 36. Mining claimants may file for an access permit as part of the plan of operations under 43 CFR 36.10 (c). Under the guidelines of these regulations, the NPS has determined that access as proposed in the plan of operations would require granting an ANILCA 1110(b) Right of Way Certificate of Access (RWCA) and hence the operator submitted an SF 299 application for access during February 2013.

ANILCA Section 1110(b) provides for non-federal landowners to be given "such rights as may be necessary to assure adequate and feasible access for economic and other purposes to the concerned land by such . . . private owner or occupier and their successor in interest," while such rights would be subject "to reasonable regulations issued by the Secretary to protect the natural and other values of such lands." Access to mining claims situated within Alaska parks is governed by the Department of Interior transportation and utility system regulations at 43 CFR Part 36. Section 36.10 of these access regulations specifies procedures for access across park lands to valid inholdings, including patented and valid unpatented claims. Section 36.10(c), allows mining claimants who acquired their rights under the General Mining Act of 1872 to file their request for access as part of their mining plan of operations.

Lamal submitted an SF-299 application for access in February 2013. The NPS Alaska Region utilizes the July 2007 "Interim User's Guide to Accessing Inholdings in National Park System Units in Alaska" and employs the criteria and processes articulated in Wrangell-St. Elias National Park and Preserve's (WRST) 2008 "Established and Maintainable Access to Inholdings Programmatic Plan and Environmental Assessment" to describe, analyze and grant the applicant an Alaska National Interest Lands Conservation Act (ANILCA), Section 1110(b) Right-of-Way Certificate of Access (RWCA) for access to the Shamrock Group to conduct mining operations. That RWCA will include the terms and conditions for use and

maintenance along a existing trail that serves as the established ORV access between Chicken Creek Airstrip and the Shamrock Group as well as the use and maintenance of Chicken Creek Airstrip. Similar RWCAs could also be granted to other claimants for access to placer mining claims on Little Eldorado and Bonanza Creek.

5. A determination regarding the impact of this operation and the cumulative impact of all operations on the management of the unit.

Comment:

Anticipated impacts of the mining operation are discussed in this EA and in other environmental documents pertaining to placer mining at Gold Hill. A review of the proposed plan and a review of the available environmental information on the area of operations by the NPS, determined that the impacts of the operation would not be significant.

The EA for the Bonanza Nos. 1- 6 plan of operations and the EA “Ten-Year Mining Plan of Operations, Big Eldorado Creek Claim Group,” include a review of the potential for cumulative impacts from those operations. The conclusion of those reviews was that there would not be any cumulative impacts as a result of implementation of mining activities as proposed under those mining plans. No operations have been conducted on Big Eldorado since the 1990’s; and we do not anticipate mining within that drainage in the foreseeable future. Suction dredge and/or highbanker operations have been undertaken on Bonanza Nos. 1 – 6 continuously since the 1970’s. These operations occur on lands previously impacted by mining. Impacts from those operations are temporary and do not add to any along term cumulative impact to the Chisana –Gold Hills study area. Similarly impacts from proposed operations on Shamrock would be temporary and would not add to any long term cumulative impact to the Chisana –Gold Hills study area either.

There is potential for future mining development in the Gold Hill area and at several other areas within WRST. Any such development would be under the regulation of the NPS and subject to review of potential cumulative impacts. A plan of operations whose implementation would cause significant and cumulative adverse impacts to the unit would either be revised to prevent such impacts or not permitted.

The NPS would continue monitoring operations to assure compliance with the plan operating stipulations and to assure that no unforeseen impacts occur from the operation, should the proposed plan of operations be approved and implemented.

6. An evaluation of Alternative 1 - No Action Alternative, No Mining Operations Authorized.

Comment:

Under this alternative the submitted plan of operations would not be approved by the NPS, Regional Director, Alaska under 36 CFR 9.10, and the operator would not be permitted to mine. There would be no additional long-term or short-term, physical biological impacts under this alternative and the Cultural Landscape would not be affected by proposed mining. There would be no additional cumulative impacts to target resources identified in the Final Environmental Impact Statement, Cumulative Effects of Mining, Wrangell-St. Elias National Park and Preserve (FEIS) (NPS 1991).

This alternative would impact the local economy by resulting in economic loss to the operator/claimants and some local businesses.

Non-approval of the plan would leave the operator with the options of submitting a new plan of

operations or appealing to the Regional Director for a reversal of the decision. Continued Non-approval by the NPS would leave the operator with the option of filing an appeal to the United States District Court for approval of the plan. Denial of the plan by both the NPS and the federal court would give the operator the option of pursuing a case against the United States for compensation as provided for in Section 11 of the Mining in the Parks Act (Public Law 94-429).

APPENDIX B: ENGINEERING AND GEOLOGICAL ANALYSIS FOR LAMAL - SHAMROCK GROUP MINING PLAN OF OPERATION

Property and Rights:

The operator proposes conducting mining operations on Shamrock and Tony M (BLM #AA0026813 and #AA0026810) unpatented placer claims. The claims are located in Township 4 North, Range 19 East, Sections 19 and 20, CRM, approximately six miles northeast of Chisana within Wrangell-St. Elias NP/P (Figure B1). They are situated along Bonanza Creek, east of Gold Hill. These claims were located June 30, 1970. Thomas and Kathryn Lamal, 1734 Becker Ridge Road, Fairbanks Alaska 99709 are current the claimants of record (Table B1). The claimants are also the operators. The claimants are exercising their rights under Title 36 Code of Federal Regulation (CFR) Part 9A.

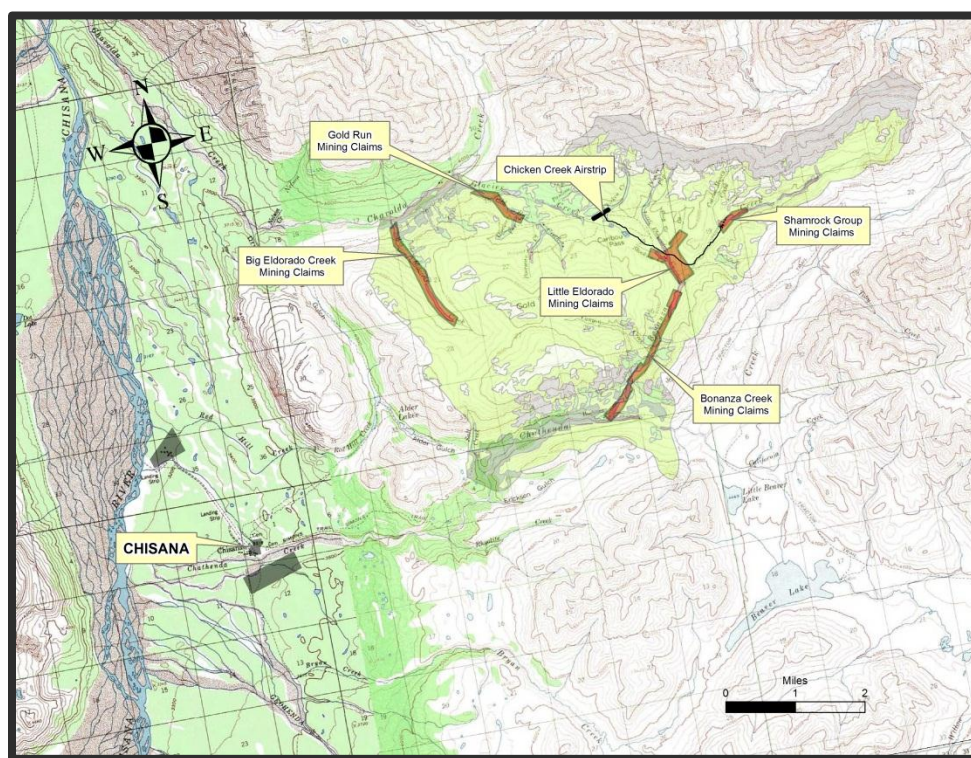


Figure B1: Location Map; Shamrock Group

Table B1: Shamrock Group Placer Claims

Claim Name	BLM Number	Date Located	Location Notice Filed	Current Claimant	Acreage
Shamrock	AA0026813	June 30, 1970	July 3, 1979	Lamal	17.20
Tony M	AA0026810	June 30, 1970	July 3, 1979	Lamal	11.49
Total					28.69

The claimant's rights were acquired under the General Mining Laws of the United States prior to inclusion of the area into the National Park system. Shamrock and Tony M claims (Shamrock Group) were located on land open to mineral entry. President Carter invoked the Antiquities Act on December 1, 1978; the land was closed to mineral entry at that time subject to valid existing rights. With passage of Alaska National Interest Lands Conservation Act on December 2, 1980 and establishment of Wrangell-St Elias National NP/P (WRST), the Shamrock Group claims became subject to The Mining in the Parks Act. Regulations controlling mining operations within boundaries of the National Park system are found in Title 36 CFR Part 9 subpart A. A proposed mining plan of operations must be submitted to the NPS for review, analysis and approval prior to conducting mining related activities. "Significant surface disturbance for the purpose of commercial mineral extraction" occurred on Shamrock Group prior to inclusion within WRST (Figure B2). Plan of operations approval standards are found at Title 36 CFR 9.10 (a) 3. Reclamation standards are found at Title 36 CFR 9.11(a) 2, (b) and (c).

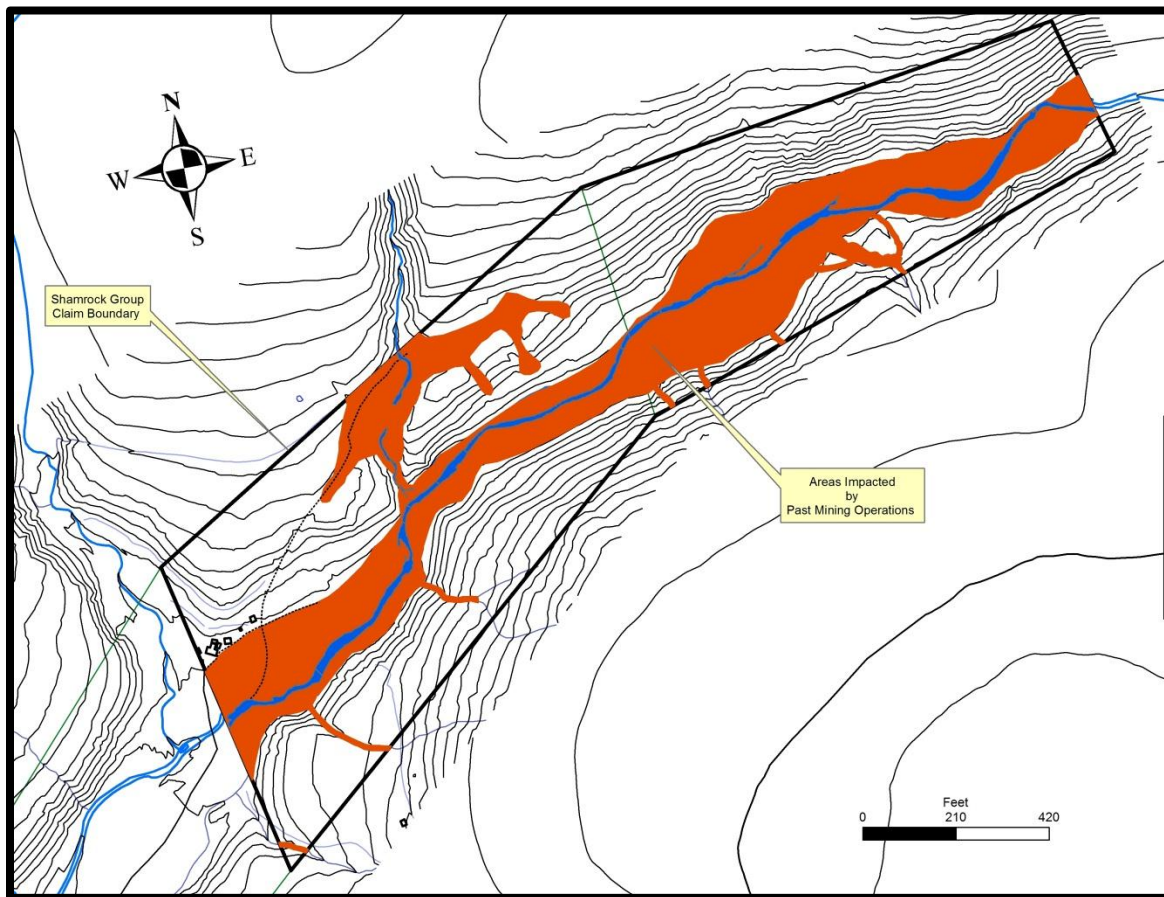


Figure B2: Shamrock Group – Surface Disturbance

The claimants acquired the Shamrock Group placer claims in 2005 from the Carolyn and Lloyd Webb; Ivan Thorall was the original claimant of record. The BLM conducted field work for mineral examinations of the subject property in 2010; the NPS anticipates that the "Mineral Report - Validity Examination of Shamrock and Tony M Federal Placer Mining Claims" will be completed and approved during 2013. The NPS minerals management program is guided by the 1990 WRST Mining EIS record of decision (ROD). That ROD preferred approach for minerals management is to acquire all mining claims located within WRST from willing sellers. The Shamrock Group claimants of record have not expressed an interest in selling the claims to the NPS. Hence, the NPS is directed to process proposed

Mining Plan of Operations (MPO) and authorize those MPOs which would not result in significant impact to park resources and values.

The Lamals developed and subsequently submitted a draft Mining Plan of Operations to the NPS for placer mining operations on Shamrock Group in November 2012. The NPS determined that Lamal's MPO was essentially complete, and published a "Notice of Availability" for the MPO in the Federal Register on February 27, 2013.

ANILCA Section 1110(b) provides for non-federal landowners to be given "such rights as may be necessary to assure adequate and feasible access for economic and other purposes to the concerned land by such . . . private owner or occupier and their successor in interest," while such rights would be subject "to reasonable regulations issued by the Secretary to protect the natural and other values of such lands." Access to mining claims situated within Alaska parks is governed by the Department of Interior transportation and utility system regulations at 43 CFR Part 36. Section 36.10 of these access regulations specifies procedures for access across park lands to valid inholdings, including patented and valid unpatented claims. Section 36.10(c), allows mining claimants who acquired their rights under the General Mining Act of 1872 to file their request for access as part of their mining plan of operations. Lamal submitted an SF-299 application for access in February 2013.

The NPS Alaska Region utilizes the July 2007 "Interim User's Guide to Accessing Inholdings in National Park System Units in Alaska" and employs the criteria and processes articulated in Wrangell-St. Elias National Park and Preserve's (WRST) 2008 "Established and Maintainable Access to Inholdings Programmatic Plan and Environmental Assessment" to describe, analyze and grant the applicant an Alaska National Interest Lands Conservation Act (ANILCA), Section 1110(b) Right-of-Way Certificate of Access (RWCA) for access to the Shamrock Group to conduct mining operations. That RWCA will include the terms and conditions for use of motorized equipment along a bladed route that serves as an existing ORV trail between Chicken Airstrip and the Shamrock Group as well as the use and maintenance of Chicken Creek Airstrip. Similar RWCAs could also be granted to other claimants for access to placer mining claims on Little Eldorado and Bonanza Creek.

Based upon the information summarized in the preceding section, it has been determined that Thomas and Kathryn Lamal have a valid existing right to access, and conduct NPS approved mining operations on the Shamrock Group placer claims.

Geology and Mining History:

The original Gold Hill discoveries occurred in the early 1900's. Most of Bonanza Creek drainage, including its tributaries were staked and explored by 1913. Placer deposits have yielded an estimated 50,000 ounces of gold this century. Gold and minor amounts of copper and silver nuggets are recovered. Some of the richest deposits mined were located on Little Eldorado Creek, a Bonanza Creek tributary. The area encompassed by Shamrock and Tony M placer claims contains auriferous reserves in the active floodplain and bench deposits paralleling the stream valley. Alluvial deposits are generally only 1 to 2 feet thick. Bedrock outcrops on the claims and overburden thickness ranges from 0 to 5 feet thick.

DISCUSSION AND ANALYSIS: ACCESS

The claimants (Lamal) described their access to the Shamrock Group in their MPO and subsequently submitted an SF-299 application (February 2013) which incorporates that information. Access to the claims during the mining season would consist of using fixed-wing aircraft to fly to Chicken Creek Airstrip. ATVs pulling a trailer would be used to transport equipment, supplies, materials, fuel and personnel over a distance of 2.4 miles between Chicken Creek Airstrip and the Shamrock Group claims

along an established trail. Travel with ATVs would be confined to the existing trail alignment between Chicken Creek Airstrip and Shamrock Group (Figure B3).

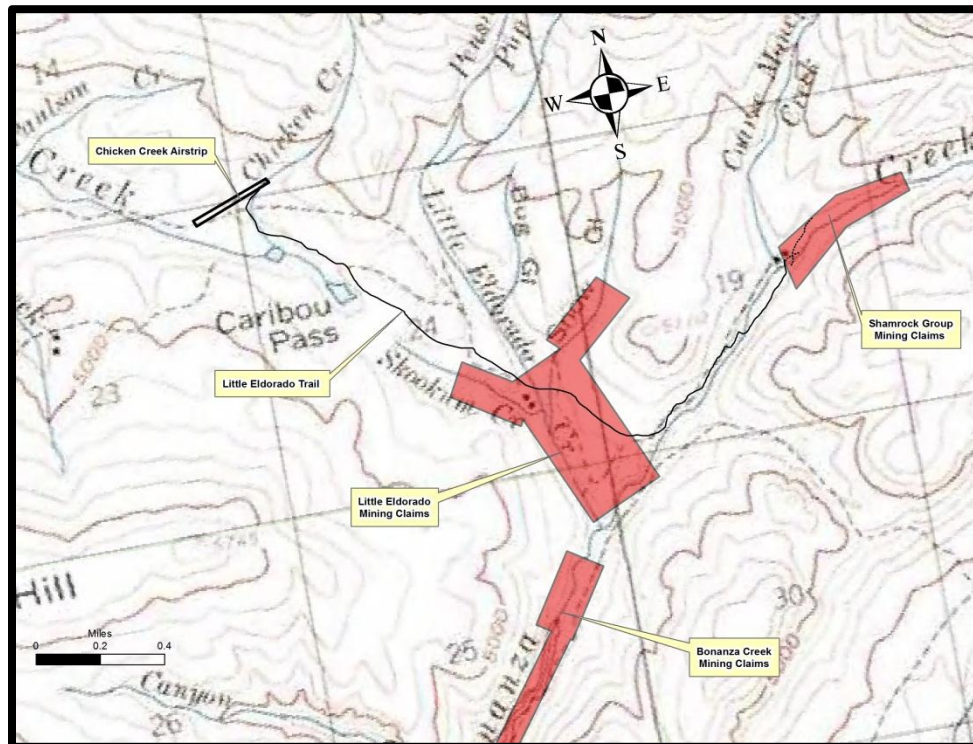


Figure B3: Access Chicken Creek Airstrip to Shamrock Group



Figure B4: Chicken Creek Airstrip

The first trip to the claims would occur when summer begins, usually in June. Initially up to three flights per week for the first 2 to 4 weeks of summer would occur so that supplies can be delivered to the Chicken Creek airstrip (Figure B4). Up to three ATV trips per week would occur between Chicken Creek

Airstrip and the claims for the first two weeks of summer. Up until the cessation of annual mining activities, which is anticipated to be in mid-September each year, it is anticipated that two flights into the Chicken Creek airstrip would occur, and on average two ATV round trips over the trail would take place between the claims and Chicken Creek airstrip per week. There may be periods when there would be no travel to and from the Chicken Creek airstrip on the overland route, and no flights in or out of the Chicken Creek airstrip.

ATV access would follow the Little Eldorado Trail, the trail towards No. 8 Pass and the Shamrock Group Spur Trail (Figures: B5&B6). It is anticipated that use of the airstrip and trail would occur from early June until mid-September each year; however conditions may change this period by up to two weeks.



Picture B5: Little Eldorado Trail – Caribou Pass Area

Summer Access:

Facilities the claimants would use include the Chicken Creek Airstrip and the ORV trail to Shamrock Group (Table B2). Chicken Creek Airstrip and the ORV trails in the Gold Hill area have been mapped and conditions described. These trails are used to access mining claims during the summer in support of mining operations. The airstrip and trail facilities are established and maintainable.

The claimants would be granted a Right of Way Certificate of Access (RWCA) to use and maintain the airstrip and the established trail which connects to Shamrock Group. It would be the claimant's responsibility to utilize the existing alignment and to undertake maintenance to insure that the travel on the trail is be confined to that alignment (no braiding-multiple alignments). Operations and maintenance activities would be confined to the existing disturbance footprint and maintenance would be undertaken to mitigate and avoid unnecessary impacts to park resources and values. The NPS prepared detailed trail maintenance prescription for the Chicken Creek Airstrip – Little Eldorado Creek Trail Segment.

Chicken Creek Airstrip Description:

- Constructed prior to the park, surface smoothed and bladed, maintained by miners
- Length Disturbed Land: 1400 feet
- Width Disturbed Land: 85 to 105 feet
- Surface Area Disturbed Land: approximately 3 acres

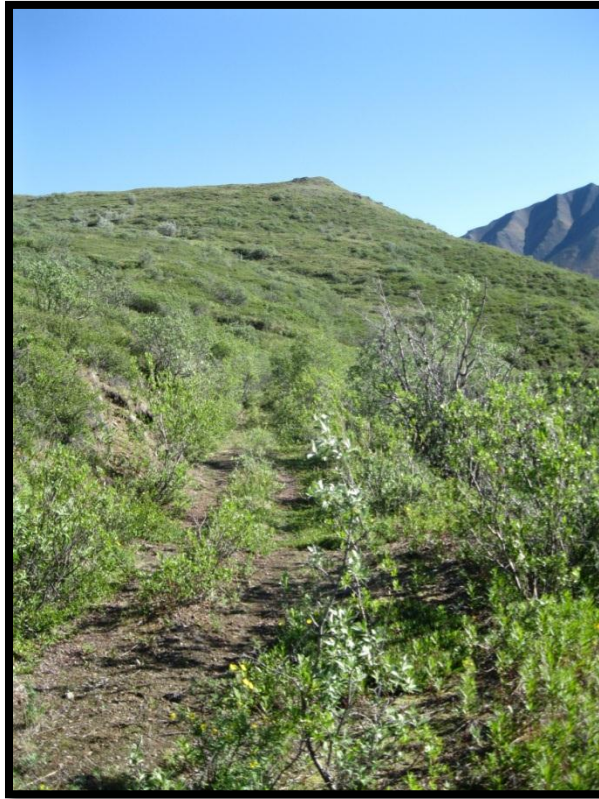
- Surface: Bladed gravel alluvial fan with some soil & vegetation
- Existing landing surface: 15-22 feet wide and 1100 feet long
- Existing vegetation management envelop: 15-20 additional feet
- Existing tie-down areas: 2

Airstrip Maintenance:

- Blade, scrape and smooth landing surface with motorized equipment
- Brush vegetation envelop adjacent to landing surface with hand tools

ORV Trail Chicken Creek Airstrip to Shamrock Group:

- Length: 2.4 miles
- Width: 6 to 8 feet
- Operator estimates up to 30 trips per year



Picture B6: Constructed ORV Trail - Little Eldorado to No. 8 Pass Segment

Winter Access:

Winter access operations would occur when the ground is frozen and there would be 6 to 18 inches of snow cover to allow safe travel by snow machine and sled. Most freighting of supplies and equipment would occur during February and March; with approximately six trips per year. Winter access would originate in Chisana and follow either the Chisana - Beaver Lake - Gold Hill Trail Corridor or the Chisana - Alder Lakes – Beaver Lake Trail Corridor (Figure B1). The Chicken Creek airstrip would not be utilized in the winter.

Note that the claimants own property in Chisana. They plan to access their property in Chisana during the winter over the winter snow machine trail between Nabesna and Chisana as well as fly into their private airstrip at the Chisana-Oatfield year round.

Access equipment and vehicles includes:

- Aircraft- Super cub 150hp, PA-18; weight is 1150 pounds; 31” tundra tires, or similar
- ATV - Honda 350cc Rancher, 4x4 or similar machine, gasoline powered; 600 pounds (full fuel); front tire 24x8-12, rear tire 24x10-11, 3.5 gallon fuel capacity.
- ATV Trailer - 2.5ft x 4ft deck or similar, weight 50 pounds empty, may carry up to 1000 pounds, 20 x 9.5 high floatation tires.
- Snow machine and sled

Maintenance Chicken Creek Airstrip:

Some maintenance at Chicken Creek Airstrip would be necessary. Brush would be trimmed and removed from the envelope adjacent to landing strip so that it does not hinder safe landings and take-offs. In addition, a tie down area would be maintained so that the plane can be tied down well off of the active landing area. All maintenance would be done within in the existing facility footprint. The airstrip may be smoothed and/or graded for safety purposes using a tire or chain pulled behind the ATV.

Maintenance - ORV Trail Chicken Creek Airstrip to Shamrock Group:

Maintenance on the existing alignment would be done as needed using any one or more of the following methods:

- Drainage ditches would be excavated using hand tools to drain standing or running water from the travel surface to the surrounding vegetated areas.
- Gravel from the barren floodplain would transported to the trail and placed in holes below grade within the existing tread.
- Grade reversals/water bars would be constructed with hand tools.
- Synthetics may be installed in bog areas (geoblock or similar).

ORV Trail Maintenance:

ORVs would also be used on the claims along existing trails, barren uplands and floodplains and sparsely vegetated floodplains. A RWCA would be granted to the claimants for the airstrip and ORV trail use. Stipulations for maintenance to mitigate and control impacts to park resources and the environment would be incorporated in the access authorization.

Winter Access - Snow Machines:

The Beaver Lake Trail “overland route” connects Chisana and Gold Hill. An alternative route passes Alder Lakes and follows Chathenda Creek. Materials, supplies, and fuel would be staged on private property at Chisana. Most materials, supplies and fuel would be transported to the Shamrock Group during the winter with snow machines and sleds. Overland travel with a snow machine is a traditional mode of access in the Chisana area. Snow machine access during the winter would only occur when there is sufficient snow cover. Snow machines would follow established routes and there would be no contact or impacts to the soils or vegetation.

Table B2: Access Facilities

Route/Facility	Length (feet)	Width (feet)	Surface Area (acres)	Stream Crossings
Chicken Creek Airstrip	1100	15 to 22	0.6	0
Chicken Creek Airstrip - Little Eldorado Creek Trail	6500	6 to 8	1.2	1
Shamrock Spur Little Eldorado Creek to Bonanza Creek	4000	6 to 8	0.75	1
Shamrock Spur Bonanza Creek Floodplain	2000	6	0.15	2
Shamrock Group Trails on claims	1200	6 to 8	0.22	0
Total	14700		2.9	3

DISCUSSION AND ANALYSIS: MINING PLAN OF OPERATIONS

Mining Operations:

Mining and exploration activities will commence after start up mobilization has been completed in early June. Mining operations will cease by mid-September when weather conditions generally prevent mining operations. The proposed placer mining activities would consist of suction dredge mining operations, highbanker mining operations and use of a metal detector for exploration and nugget detection. Proposed mining operations would occur for at least 6 years and would likely continue for the next 10 years or more. The operations would start in early June each year and may continue until September 30 depending upon weather conditions. These operations would occur along Bonanza Creek upstream of the Shamrock Support Camp at the confluence of Coarse Money and Bonanza Creek (Figure B7)



Figure B7: Upper Bonanza Creek Shamrock and Tony M Placer Claims-
(note Shamrock Support Camp in center of picture)

The mining operation consists of suction dredge and semi-concurrent highbanker placer mining and use of a metal detector for prospecting/nugget detection. All mining would be confined to the claim block (Fig B8). The suction dredge would operate in the active channel and within those adjacent barren reaches of channel/floodplain. This area includes those portions of the creek bed normally covered by water as well as those covered by water when flow inundates adjacent barren floodplain. During periods of reduced flow, exposed gravel bars within the outer channel boundaries would be subject to suction dredge mining. Note that seasonal and daily changes in discharge affect stage and what is "normally" covered by water. Vegetation and soil covered areas would not be mined with a suction dredge. Generally the typical crew size will be two people. The scope of proposed suction dredge operations is comparable to ongoing operations on Bonanza Nos. 1-6.

A Keene 6 inch suction dredge with a 5 inch intake nozzle will be used; a smaller sized dredge may be substituted for the 6-inch dredge. A metal detector and/or highbanker sluice system will also be used for mining and exploration. High-Banker operations are proposed for the barren and sparsely vegetated floodplain, the barren upland bench as well as the tributary draws -essentially only those areas that were previously mined and where there is insufficient water to operate a suction dredge.

The operators propose to dredge up to 15 linear feet of channel each day that dredge is operated. They estimate that the dredge would be operated 30 days per season and that over the life of the plan the entire channel within the boundary of the claims would be dredged. This may take up to ten years or more. The operator anticipates utilizing the highbanker at 5 to 10 sites each year. Each highbanker mine site footprint would generally be less than 100 square feet with an estimated annual surface impact of less than 500 square feet.

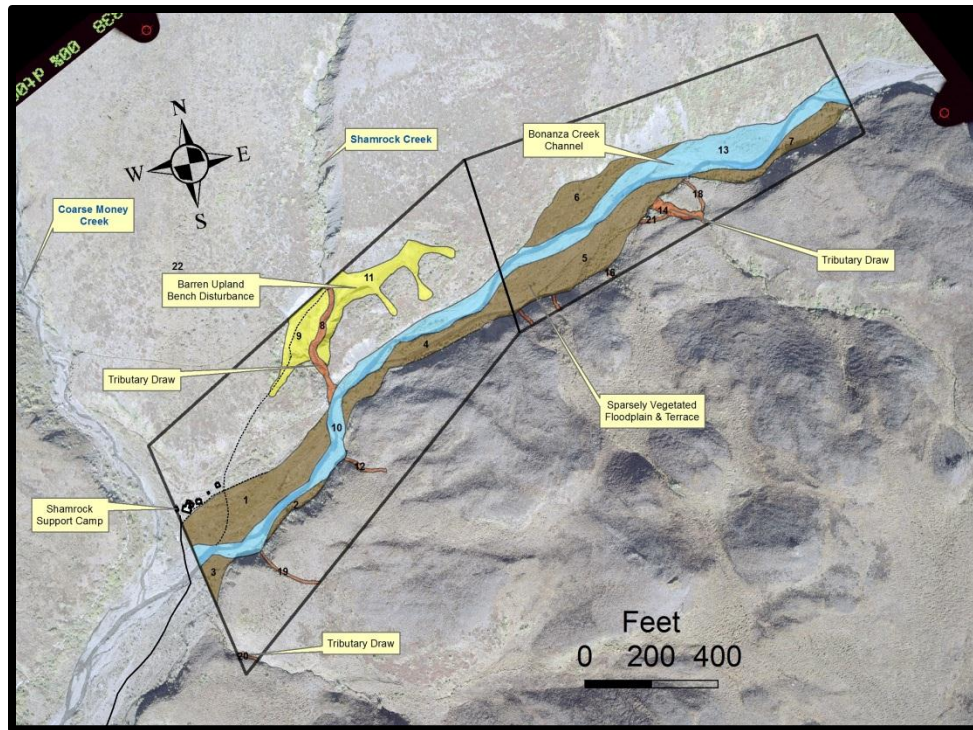


Figure B8: Areas of Potential Operations (colored)

Four buildings would be used at the Shamrock Support Camp in support of the mining operation. Any maintenance to the structures would be undertaken in consultation with park staff and performed in such a manner to avoid adversely impacting the historic resources and would incorporate NPS technical guidance and recommendations. Structures would be used to house workers and store equipment and supplies. Non-burnables would be back-hauled to Tok for disposal. The existing outhouse on the Shamrock placer claim would be utilized.

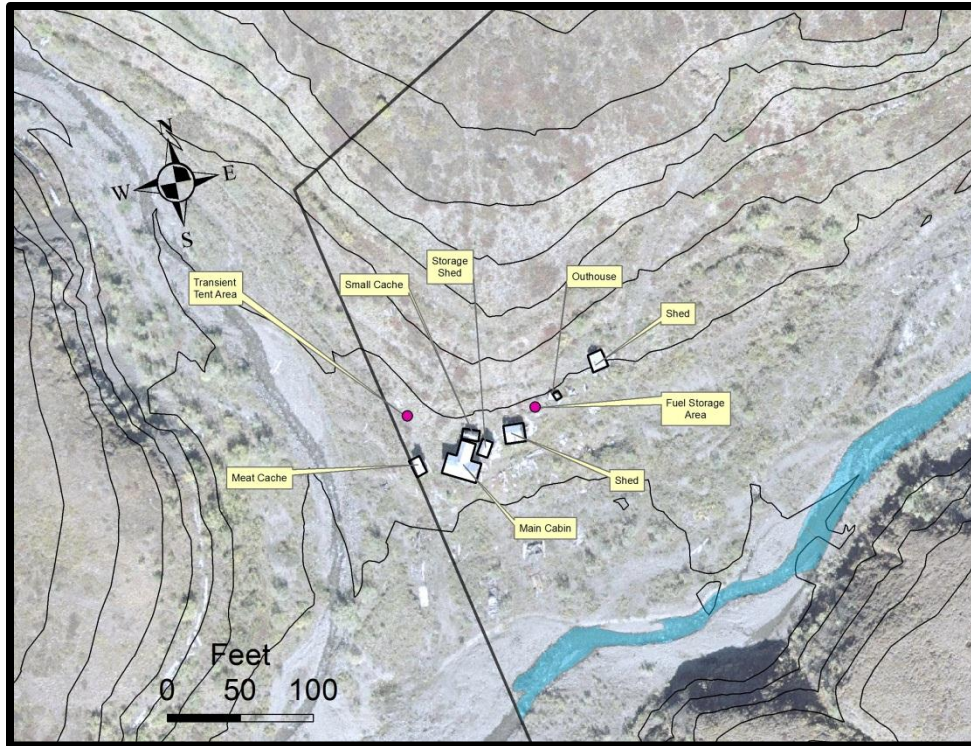


Figure B9: Shamrock Support Camp

Metal Detector Component:

Surface Disturbance: Annual: up to 200 square feet; Ten Years: up to 2000 square feet

The operator will periodically use a metal detector for the purpose of prospecting in areas of exposed bedrock, barren ground, or shallow overburden with soil and vegetation cover. Prospecting detected anomalies is the activity which causes surface disturbance. Impacts resulting from prospecting of anomalies would consist of excavating small holes, displacing and mixing of overburden and temporary removal of mineral and organic soils and vegetation at that site.

Use of the metal detector would be confined to the 28.69 acres encompassed within the boundaries of the claim block (Figure B8). This includes the 9.6 acres where other operations could also occur. Development would involve digging shallow holes usually less than one foot in depth within any of the existing landforms or land cover on the claims. Bedrock, previously disturbed barren or sparsely vegetated areas would be extensively prospected. Some small areas with soil or vegetation would be excavated with hand tools and disturbed; these holes would be reclaimed and soils/vegetative material replaced.

We anticipate that a few hundred metal detector sites could be delineated each year. They would be scattered over the landscape and would potentially become temporary small prospect holes. Dug with a shovel or hand spade, a prospect hole is generally less than a 1 foot in diameter and less than 1 foot deep. Digging a one foot hole with hand tools/shovel would impact soils and vegetation in a 1 to 3 square foot area or less. All sites would be reclaimed (filled back in) at cessation of operations at that site. We anticipate that the annual total surface disturbance from this mining component would be between 100 and 200 square feet. We anticipate that only a very small area totaling 2000 square feet would be directly affected by prospecting with a metal detector in a 10 year period.

Highbanker Mining Component:

Surface Disturbance: Annual: up to 500 square feet; Ten Years: up to 5000 square feet (not to exceed 9.6 acres)

Mining and development work would be conducted on both claims, using a highbanker, shovel and gold pan to identify and mine reserves. The highbanker operations component would be confined within the 9.6 acres delineated by the operator; this area was impacted by past mining and mining related activities (Fig B10 & Table B3). The operator anticipates that the total annual area mined, for this component would be less than 500 square feet. The highbanker is a portable sluice box, pump/dredge combination processor. It contains a high pressure washing system. A pump would withdraw water from a nearby point in Bonanza Creek or Shamrock Creek. Highbanker material would be classified and then run through a sluice box. Tailings would accumulate at the end of the sluice. Water would be discharged onto the ground and would infiltrate or flow back to the active channel.

Between ten and twenty sites would be explored/develop each year. Highbanker pits would vary in size and occur in barren ground or with limited to no soil development and sparse vegetation. Those areas include; barren floodplain and channel (3.11 acres), sparsely vegetated floodplain (4.84 acres), barren upland bench (1.2 acres) and small side tributaries with some soil and vegetation cover (0.44 acres) situated within the claim block (Table B3 and Figure B11).

Table B-3 articulates areas shown in Figure B-8.

Table B3: Shamrock Group Mining: Potential Areas of Operation

Area_#	Category	Polygon Acreage	Equipment	Category Acreage
10	Channel & Floodplain barren	1.29	Suction Dredge	
13	Channel & Floodplain barren	1.82	Suction Dredge	
Total				3.11
1	Floodplain vegetated	1.30	Highbanker	
2	Floodplain vegetated	0.11	Highbanker	
3	Floodplain vegetated	0.16	Highbanker	
4	Floodplain vegetated	0.74	Highbanker	
5	Floodplain vegetated	1.33	Highbanker	
6	Floodplain vegetated	0.72	Highbanker	
7	Floodplain vegetated	0.48	Highbanker	
Total				4.84
8	Tributary draw	0.17	Highbanker Suction Dredge?	
12	Tributary draw	0.03	Highbanker	
14	Tributary draw	0.11	Highbanker Suction Dredge?	
15	Tributary draw	0.01	Highbanker	
16	Tributary draw	0.01	Highbanker	
17	Tributary draw	0.01	Highbanker	
18	Tributary draw	0.02	Highbanker	
19	Tributary draw	0.04	Highbanker	
20	Tributary draw	0.01	Highbanker	
21	Tributary draw	0.02	Highbanker	
Total				0.44
9	Upland barren	0.47	Highbanker	
11	Upland barren	0.73	Highbanker	
Total				1.2
TOTAL				9.59



Figure B10: Highbanker Operations Bonanza Creek Uplands

Development at each site would consist of excavating a hole to bedrock through 0 to 5 feet of overburden. Typically, overburden in the stream bottom is between 0 and 3 feet thick, most locations the thickness is between 1 and 2 feet. Overburden in the upland bench is up to 5 feet thick. Overburden would be removed with hand tools or excavated and stockpiled by a “bobcat”. Gold bearing gravel and fractured bedrock would be stockpiled adjacent to the excavation and/or immediately fed into the highbanker. Gravel and fines would be processed with the high banker. The tailings and overburden would be returned to the mined site and it would be recontoured to a condition that approximates the pre-mining topography.

Mine sites would vary in size. A six foot diameter excavation would encompass approximately 30 square feet. A 6 foot by 15 foot excavation would encompass 90 square feet. Many sites may be smaller. Temporary overburden stockpiles may be necessary adjacent to or within mined area. On site conditions and overburden thickness would control volume of material removed and stockpile size. During operations, a maximum surface disturbance resulting from implementation of the highbanker component over a ten year period would be 5000 square feet. All excavations would be reclaimed at cessation of operations at that site. In general, material would be processed at the site, if water is available. In some cases material may need to be transported to a nearby point for processing. We anticipate that only about 2 percent of the 6.5 acres delineated for highbanker mining would potentially get mined in a 10 year period.

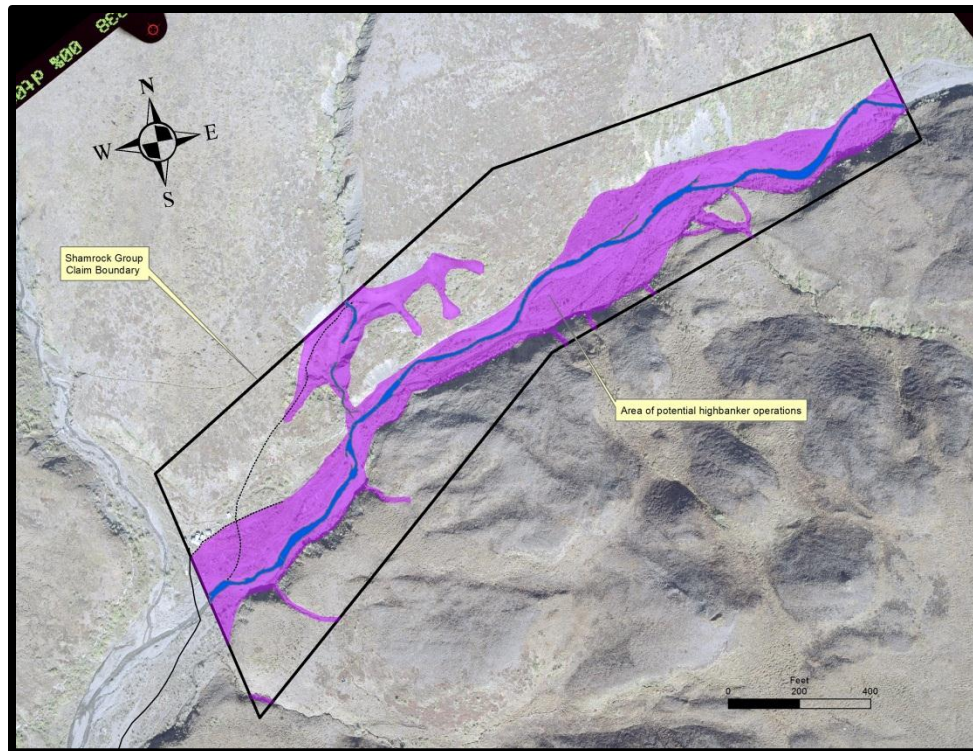


Figure B11 Shamrock Group: Potential highbanker Mine Area

Suction Dredge Mining Operations Component:

Surface Disturbance: Annual up to 6750 square feet; Ten Years: approximately 0.9 acres (not to exceed 3.1 acres.)

Floating suction dredges consist of a pump, compressor, dump box and intake nozzle and hose with a single or multiple sluice box systems. A 6-inch suction dredge with a 5-inch intake nozzle is the largest size dredge that would be utilized, a smaller dredge may be substituted or operated concurrently.

Suction dredge operations would be undertaken within Bonanza Creek channel (Fig. B12). The operator proposes to dredge the entire channel (wetted perimeter) length of Bonanza Creek within the Shamrock Group. Daily operations would entail mining up to 15 feet of creek bed. In a typical mining season the dredge would operate for approximately 30 days. Hence we anticipate that up to 450 linear feet of channel could potentially be mined annually. There are approximately 2650 linear feet of channel within the claim block. Six years of suction dredge mining at a rate of 450 linear feet per year would be necessary to mine the entire length of channel.

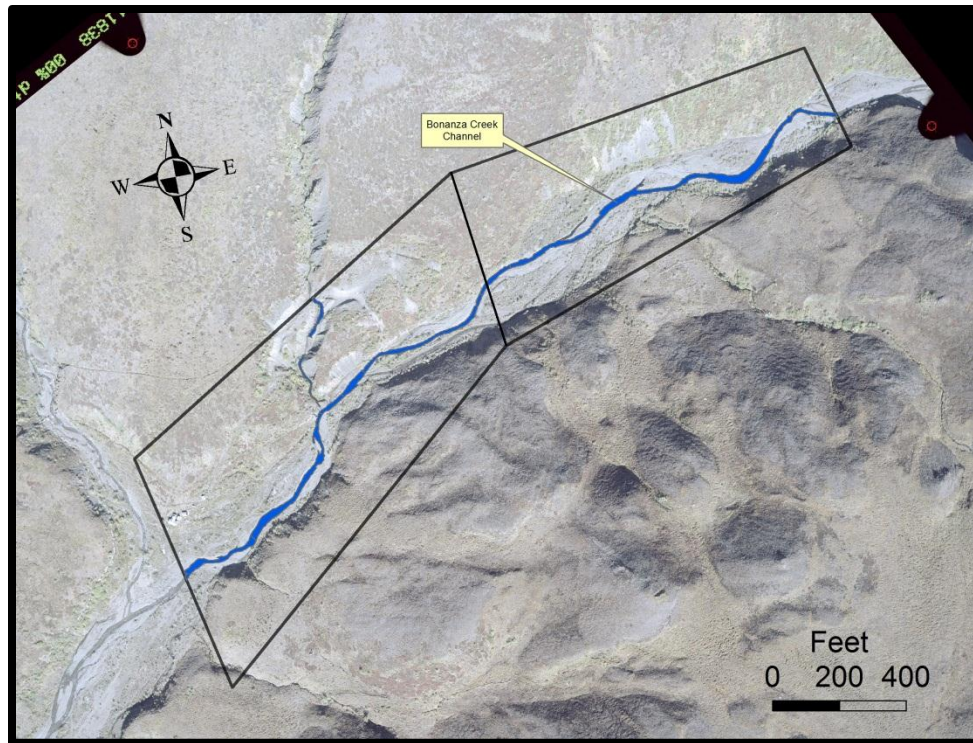


Figure B12: Shamrock Group Suction Dredge Area - Active Channel

The channel ranges in width from 10 to 30 feet and averages about 15 feet wide, yielding an area of approximately 0.9 acres over the 2650 linear feet. This is approximately one third of the area which is encompassed within the 3.1 acres of channel and adjacent barren floodplain area delineated for operations (Fig. B12). The active channel moves within the barren floodplain over time because it is very dynamic. A migrating channel could potentially provide opportunity to conduct suction dredge mining operations elsewhere within the 2.2 acres of barren floodplain area that generally is not inundated by water.

Miners undertaking suction dredge operations on Bonanza Nos. 4-6, one mile downstream of the Shamrock Group, dredge less than 250 linear feet of creek bed annually. Based upon observations pertaining to the dynamic nature of the Bonanza Creek and information obtained from monitoring those suction dredge operations, we anticipate that it would likely take 10 years or more to dredge entire length of 2650 linear and more to dredge the entire 3.1 acres delineated for potential operations within Shamrock Group. Although the plan allows for mining all 3.1 acres we anticipate that only one-third (0.9 acres) of the area delineated for suction dredge mining (3.1 acres) would likely be mined during a 10-year period.

The Lamals operations would utilize a 4 or 6 inch suction dredge or smaller. A 6 inch dredge has a 6 inch diameter suction hose and the nozzle is necked down to 5 inches, thus reducing the size of rocks entering the suction hose and reducing clogs (Fig. B13). The operator would construct a small rock wall 1 to 2 feet high across the active stream channel. This creates a temporary impoundment which allows the dredge to float. The miner would submerge the intake nozzle into the gravel streambed. Water and gravel would be drawn into the intake hose by the suction pump. The material would then be pumped into the sluice box to separate the gold from the gravel. The processed gravel and used water would then be discharged into the impoundment/stream from the end of the sluice box. All gravels 5 inches and smaller would be processed through the floating sluice box (Fig B14). Material larger than 5 inches would be moved out of the way by hand and then returned back into the hole once the hole has been dredged. It is anticipated that generally only one suction dredge would be operated at any one time, but the miner may choose to

operate two suction dredges simultaneously at different locations. The distance of separation would be sufficient to avoid causing any compounding impacts to water quality.

A mining operation with a suction hose six inches or less in diameter, powered by an engine of 18 or fewer horsepower, is considered to be a recreational operation by the State of Alaska (11 AAC 97.100 APPLICABILITY (a)). The claimant has intentionally restricted the size of the suction dredge selected for this MPO to meet those State regulations. The claimant's intent is to not exceed, in aggregate, 30,000 gallons of non-consumptive water use per day through the dredge operations. Dredging is considered to be a non-consumptive use of water by the State of Alaska if daily throughput is less than 30,000 gallons. Any dredging operation with water through-put in excess of 30,000 gallons of water per day from a single source would require a water use authorization permit to appropriate (or certificate of appropriation) from the State of Alaska, Department of Natural Resources, Water Resources Section. If the claimant's dredging operation were to exceed a use of 30,000 gallons per day, the claimant would be required to first, secure the water-use-authorization from the State.



Figure B13: Sampling on Gold Run Creek (BLM)

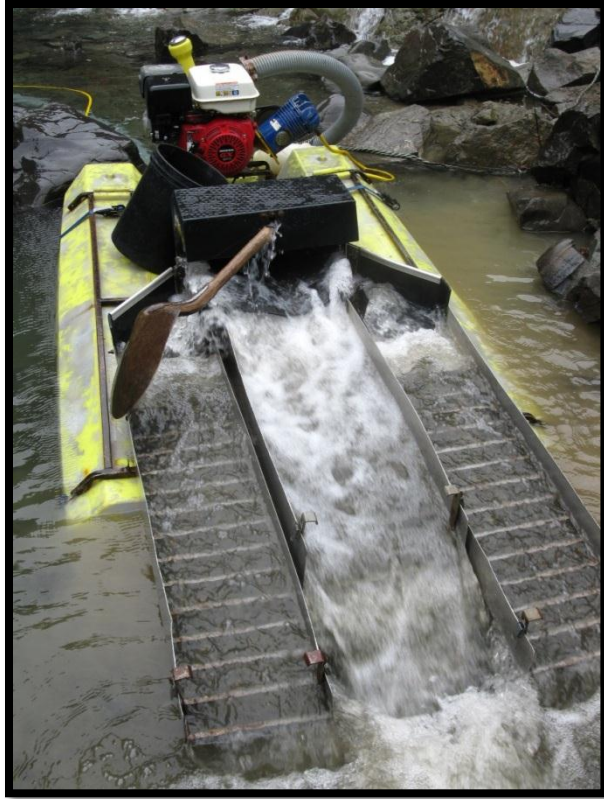


Figure B14: Suction Dredge Operating on Bonanza Creek

Proposed suction dredge mining would occur in areas previously disturbed by mining related activities. Suction dredge operations are not proposed in vegetation covered areas. Areas subject to suction dredge mining would extend from bank to bank within the active Bonanza Creek channel. Suction dredge operations would remain in the stream channel. No stream channel diversions are proposed. Note that a Bob-Cat or its equivalent may be used to roll or move any large boulder located in the barren floodplain so that the suction dredge can process the material around and beneath it. Stream elevations range from 4742 to 4814 feet. This yields a slope of approximately 3% over the 2650 linear feet of stream channel

After overburden is dredged the operator would use hand tools to break open fractured bedrock and use the dredge to extract concentrates from the bedrock. As operations move upstream the dredge would redeposit smaller gravels over the mined bedrock surface. In this fashion, reclamation is concurrent with the operations. Further reclamation would consist of breaking down or leveling any dams that were constructed to a natural contour when the dredge is moved or at the end of the season. Frequent high water/floods events reestablish the original contour; stream flow reclaims tailing piles and dams, and fills in holes.

Surface disturbance results from removal of overburden and deposition of tailings. The area affected by mining a reach of the creek includes the zone of deposition immediately downstream from the mined area. For some sites, the deposition zone can cause an additional 50 percent increase in surface disturbance to the area dredged. Dredging operations which prospect for reserves (numerous small sites) disturb greater surface areas and creek bottom lengths than continuous mining operations per unit of material processed. Field observations at suction dredging sites support this conclusion, ie. that for a given production, surface area disturbance is greater if numerous small sites are mined instead of one continuous reach of the creek. Surface disturbances in the active stream channel range from very minor

to a complete reorganization of the unconsolidated gravel bed. Swell factor for the stream gravel ranges from 10 to 20 percent. The end result is that the stream is temporarily terraced and the material is size sorted. Although dams help trap sediment and retard sediment transport, terracing is more pronounced and remains for a longer time interval, if the dams are not completely reclaimed.

Physical characteristics of the short-term effects caused by suction dredge mining within a stream channel are discussed below. A hole is excavated at the upstream end of the operation. Material is processed by the suction dredge. Hand stacked tailings of oversized material are placed adjacent to and within the dredged area. Gravel and boulders are overturned and the pre-existing protective surface "lag" deposits are disturbed. Once disturbed, the creek bed armoring is weakened, compactness decreases and porosity increases making the stream bed gravel more susceptible to scouring and flood related impacts. If operations continue upstream a sufficient distance, the oversized material is covered by dredge tailings. Fine sediments mix with the processed gravel and/or are transported below the site, generally being deposited within 100 feet of operations. Clay and some silt disperse further downstream. The pre-existing stream gradient and stream bed class size mixture is temporarily changed until the stream reclaims itself. Sometimes the channel width increases or the flow patterns change around the tailings piles. The channel location can change due to suction dredging; channel migration potentially can cause undercutting of stream banks. When the water channel attacks a gravel bank, gravel is eroded.

Bonanza Creek is approximately six miles long and has more than seven additional miles of tributaries. Fourteen unpatented placer claims are located within the Bonanza Creek drainage (Fig. B15). Approximately 14500 linear feet of Bonanza Creek is currently covered by placer claims. This includes the 6 unpatented placer claims downstream of the Shamrock Group; these claims cover an estimated 13000 feet of creek bottom. An additional 6700 feet of creek bottom within tributaries is covered by placer claims. Review of suction dredge operations on Bonanza Creek Nos. 1– 6 indicates that between 800 and 2800 linear feet of creek bed encompassing 1/3 to 1 acres (14,520 and 43,560 square feet) are mined during a 5 year period. Impacts to channel substrate and morphology are temporary; often natural processes remove all physical evidence of suction dredging after the first flood event. A year after mining has ceased algae reestablishes on the substrate by natural processes.

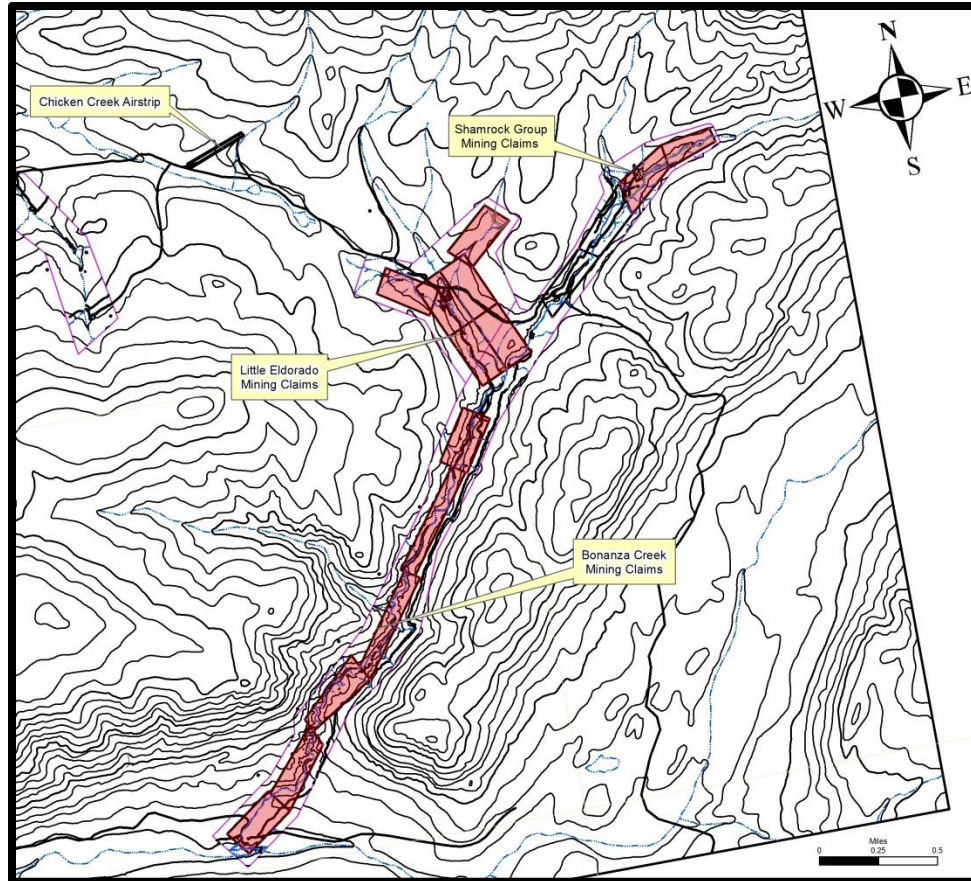


Figure B15: Mining Claims on Bonanza Creek Drainage

Dams:

The operator proposes to construct small temporary dams sufficient to float the dredge with gravel and boulders (fig. B16). These dams may be lined with an impermeable tarp or plastic/visqueen. Diversion of water from the stream channel for purposes other than operation of the dredge is not proposed. The operator proposes to remove all dams and dam linings once mining at that site has ceased. With small dam construction, minor amounts of additional creek bed are submerged by increases in water level. The amount of dam induced submerged lands depends upon bank slope and stream gradient. In areas of steep gradient it is negligible but can submerge areas adjacent to the channel for a distance of 1 to 2 feet. Areas submerged by water due to small dams, lie within the zone normally subject to active channel influences. Dams that are in place during a high water event, could alter stream flow and cause a minor changes in the channel location. Construction of dams does not reduce stream discharge; water flows through and over the dam. The operator would probably use 2.5 cubic yards or less of material to construct most dams.



Figure B16: Suction Dredge Dam

Water:

NPS personnel have measured water discharge from a dredge operation utilizing a triple sluice on Bonanza Creek, downstream below the Shamrock Group. This dredge used a 10 horse power (hp) engine and a 5 inch suction hose setup. Measurements indicate that while the suction dredge is operating between 490 to 620 gallons per minute (gpm) [1.1 and 1.4 cfs] flows out of the triple sluice box.

Amount of water issuing from the sluice system is affected by pump size, intake nozzle diameter, material amount, size, shape, and characteristics, restrictions at the intake nozzle and depth and length of the suction hose to the nozzle. Based upon the MPO and NPS monitoring on lower Bonanza Creek, we anticipate water usage will range approximately between 0.2 and 1.5 cfs. This corresponds to less than 10 percent of the average normal stream flow measured on Bonanza Creek (NPS, 1995). Minimum measured Bonanza Creek water flow is 0.3 cfs. Low flow occurs during periods of heavy frost at night after the seasonal snow pack has melted. Low flow due to lack of rainfall or freezing may result in periods when there is insufficient flow to efficiently operate the dredge on the Shamrock Group. Operations would be halted or a smaller sized dredge would be utilized. Use of 30,000 gallons (or less) of water used by a suction dredge per day is considered a non-consumptive use of water when pumping a slurry (AKDNR cor, 2013). It is anticipated that operations over a 6-hour period would yield a non-consumptive use of 28,800 gallons per day. Operations would likely cease during periods of high flow due to turbidity and safety concerns.

NPS - Bonanza Creek Water Flow Data:

Bonanza Nos. 3 through 6 claims:

Average	11.0 cfs
Range - lowest (after freeze up)	0.3 cfs
Range - highest (flood)	45.3 cfs

Mouth of Bonanza Creek:

Average	21.2 cfs
Range Lowest	4.3 cfs

Range Highest (flood?) 69.6 cfs

Results of 35 discharge measurements on Bonanza Creek:

Average discharge	15 cfs
Range - lowest	0.3 cfs
Range - highest	69.6 cfs

Monitoring of suction dredge operations shows temporary short-term changes in water quality parameters. While suction dredge operations process the gravel, there is local degradation of the water quality. A Discussion of the effects of placer mining is described in "Placer Mining Technology and Associated Environmental Effects". The BLM Report "Effects of Placer Mining on Hydrologic Systems in Alaska" reports the following physical effects: increased turbidity, alteration of channels, including flow patterns and velocities, depth and width, scouring characteristics, pool-riffle ratio, ground water-surface water relationships, recharge characteristics and water temperature, changes in the stream bottom material, particle size composition, deposition of fine material and gravel on riffle areas, and changes in bed load.

Water quality effects of placer mining reported from investigations conducted within Chugach National Forest follow. Turbidity, suspended solids and temperature increase proximal to the mining operation. Trends reported for heavy and trace metals include: slight increase downstream from mining sites, wash water samples show highest concentration and decreased stream flow could be correlated with increased parameter concentrations. Suction dredging and hand tool operations in the active stream channel caused no "noticeable" impact to water quality. Note that mercury was utilized in conjunction with historic mining operations and has been observed on bedrock while dredging on Bonanza Creek, but it was not identified as a concern during the geochemical investigation conducted by the USGS (USGS, 2001).

All areas within the flood plain (between valley walls) are periodically affected by sediment transport and scour during flood events. Rapid rises in stage can occur during an interval of high rain fall. Floodplain areas that were previously mined are barren or have limited vegetation cover. High stream flows, landslides and land disturbances often increase turbidity. During flood events, high discharge and increased turbidity levels cause suction dredge operations to shut down due to safety and visibility concerns.

Fuel Storage and Handling:

All gasoline and heating fuel would be transported and stored containers. A total of 300 gallons of petroleum product and some propane would be consumed annually. Petroleum products will be stored at Shamrock Support Camp. An impermeable lined containment would be used at the Support Camp to prevent any spillage or leakage that would contaminate the ground. A drip pan would be used when refueling the suction dredge.

Reclamation Component:

Reclamation of mining sites will be concomitant with operations; it would include concurrent back-filling with tailings, and removing any dams, and leveling tailings piles to an approximate premining topography and natural condition. The original grade and contour would be reestablished. Tailings would be redeposited immediately into the excavation, when feasible or shortly thereafter. Bedrock and large boulders which are removed during the operations would be replaced in the hole as the dredge advances. Upon cessation of mining, the unfilled portion of all pits would be back-filled by hand with gravel and material removed from the excavation. Reclamation of the dredged site would include spreading gravel

and rocks used in dam construction or accumulated piles of processed gravel/tailings on the stream bed at the end of each season to eliminate any obstruction to the stream. Excavations/holes would be back-filled filled. Equipment would be stored at the Support Camp at the end of the season. Debris would be burned or transported out of the park.

The claimants have removed existing non-historic debris and abandoned equipment in consultation with NPS staff which would not be required under the approved plan.

Periodic high water flow regimes on Bonanza Creek result in sediment transport that would fill in depressions and reestablishes natural grades and conditions. The operator's reclamation in conjunction with and ongoing natural processes would provide for restoration of the stream contour and gradient. Performing reclamation concurrent with dredging would avoid delays in reclamation and insure that the reclamation responsibilities of the operation are fulfilled.

ALTERNATIVE MINING METHODS:

At this time, suction dredge mining of stream gravel and highbanker mining on the floodplain and uplands appear to be the only feasible and reasonable mining method for those areas. It is possible that a 20 to 30 yard per hour screening/wash plant with sluice, backhoe and bulldozer could be utilized if sufficient reserves (yardage and grade) are delineated on the claims. Heavy equipment operations with a wash plant would have greater impacts on Shamrock Group. The least impacting viable mining method alternative is attaching mitigation stipulations to the operator's proposed suction dredge – highbanker operation. Therefore, no alternative mining methods are analyzed.

PERFORMANCE BOND LAMALS MINING PLAN OF OPERATIONS ON SHAMROCK GROUP PLACER CLAIMS, GOLD HILL, WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE, ALASKA

BOND PURPOSE AND REQUIREMENTS:

Upon approval of a plan of operations the operator is required to file a suitable performance bond with a satisfactory surety, payable to the secretary or his designee. The bond is conditioned upon faithful compliance with applicable regulations, the terms and conditions of the authorization permit, and the plan of operations as approved, revised or supplemented. In lieu of a performance bond an operator may elect to deposit with the Secretary, or his designee, cash or negotiable bonds of the US Government.

BOND CALCULATION:

The bond or security deposit shall be in an amount equal to the estimated cost of completion of the reclamation requirements either in their entirety or in a phased schedule for their completion as set forth in the approved, supplemented or revised plan of operations.

RECLAMATION STANDARDS:

1. Reclamation shall be a planned component of the mining operations and shall be accomplished contemporaneously with mining.
2. Reclamation shall provide for the safe movement of native wildlife, the reestablishment of native vegetative communities, the normal flow of surface and reasonable flow of subsurface waters, the return of the area to a condition which does not jeopardize visitor safety or public use of the unit or archeological resources.
3. Reclamation of mining sites would be concomitant with operations. Reclamation of mined areas will include concurrent back-filling with tailings, and removing any dams and leveling tailings piles to a natural condition at the end of each season. Reclamation of all excavations outside the stream channel would include reestablishing the original grade and contour.
4. Reclamation would include the removal from the Shamrock Group claims all mining equipment, access vehicles and trailers, materials, supplies, petroleum products and debris.
5. Annual mine site reclamation shall consist of:
 - A.) Reclamation of the sites disturbed by mining with the suction dredge and highbanker sites.
 - B.) Leveling the tailings and back-filling holes to a condition that approximate the contours and slopes of the adjoining land, floodplain and stream channel.
 - C.) Reclaiming and spreading out the gravel used in dams constructed for the purpose of operating the dredge and eliminating any barriers to allow for the natural flow of water and free passage of macro and microfauna and stream biomass.
 - D.) Insuring that reclamation of disturbed areas prevents to the extent practical erosion of the stream bank and stabilizes the area to minimize downstream turbidity.
 - E.) All debris from the mining operation will be removed from along the stream bed and out of the

floodplain each season.

6. Final reclamation at conclusion of plan:

A.) Removing all equipment: four-wheelers and trailers, suction dredges, highbanker, fuel, fuel containers, tents, and support materials and supplies transported to the claims for the mining operation.

B.) Removing and disposing at an approved location all garbage, refuse or waste, abandoned and dysfunctional equipment transported to the claims in support of approved operations.

7. The operator shall notify the NPS as to the when reclamation has been or would be completed. A field inspection with the operator present would be conducted to evaluate the completed reclamation. Failure to accomplish reclamation in accordance with the approved plan shall result in forfeiture of the reclamation bond. The proposed plan of operations with NPS stipulations as described in alternative 2 of the 2013 EA constitute the approved plan of operations.

BOND RECALCULATION DUE TO PLAN OF OPERATIONS MODIFICATION:

In the event that an approved plan of operation is revised or supplemented in accordance with section 9.12, the Superintendent may adjust the amount of the bond or security deposit to conform to the plan of operations as modified.

DURATION:

The operator's and his surety's responsibility and liability under the bond and/or security deposit shall continue until such time as the Superintendent determines that successful reclamation has occurred.

BOND RELEASE:

When all required reclamation requirements of the approved plan of operations are completed, the Superintendent shall notify the operator that performance under the bond or security deposit has been completed and that it is released.

PERFORMANCE BOND CALCULATION:

This performance bond calculation is for the approved plan of operations. It addresses 1) removal of all access vehicles, fuel, fuel containers, mining equipment (suction dredge and highbanker), supplies and debris, and 2) reclamation of areas disturbed by mining operations. Monitoring of similar operations on Bonanza Nos. 1-6, integration of concurrent reclamation practices, recognition that natural process would play a significant role in reclamation, and a determination that essentially all operations would be confined to areas previously impacted by mining with sparse vegetation and soil development allow development of a practical performance bond because there would be limited concern and potential for any NPS reclamation undertaking.

Table B4: Performance Bond Calculation

Component	Task – Items	Description	Estimated Cost
Remove all mining and access equipment and operations support items from Gold Hill	-- ATV - Honda 350cc Rancher, 4x4 or similar machine,; 600 pounds (full fuel); -- ATV Trailer - 2.5ft x 4ft deck or similar, weight 50 pounds empty. -- Suction Dredge(s) 4- Inch and 6-inch -- Highbanker -- Metal Detector -- Pumps --Tools -- Petroleum products, gasoline, diesel, heating fuel, propane and containers -- Food, debris, supplies and materials.	Snow machine to Lamal's Chisana property with an option for helicopter support	\$1500
Reclamation of mined sites and excavations	.Leveling tailings piles, removing dams filling in pits and holes	Wages and per diem for two staff for two days	\$1000
TOTAL (est)			\$2500

Note: Numerous containers that are located in one of the sheds at the Shamrock Support Camp were reported to the NPS by the claimants. These appear to contain petroleum products that have been on site since the 1970's and are not considered part of this performance bond. The NPS plans to inventory and sample the containers; if warranted the NPS will remove or mitigate.

RECOMMENDED PERFORMANCE BOND \$2500.00

APPENDIX C: ANILCA SECTION 810(a): SUBSISTENCE EVALUATION AND FINDINGS

I. INTRODUCTION

Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) requires Federal agencies having jurisdiction over lands in Alaska to evaluate the potential impacts of proposed actions on subsistence uses and needs. This analysis evaluates the potential restrictions to ANILCA Title VIII subsistence uses and needs that could result from the National Park Service (NPS) authorizing suction dredge gold mining operations on the Shamrock Group unpatented mining claims located at Gold Hill within Wrangell-St. Elias National Park and Preserve (WRST). The EA provides a detailed description of the proposed alternatives.

II. THE EVALUATION PROCESS

Section 810(a) of ANILCA states:

"In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands . . . the head of the federal agency . . . over such lands . . . shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency -

(1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;

(2) gives notice of, and holds, a hearing in the vicinity of the area involved; and

(3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions."

ANILCA created new units and additions to existing units of the national park system in Alaska. Wrangell-St. Elias National Park, containing approximately eight million one hundred and forty-seven thousand acres of public lands, and Wrangell-St. Elias National Preserve containing approximately four million one hundred and seventeen thousand acres of public lands, was created by ANILCA, section 201(9), for the following purposes:

“To maintain unimpaired the scenic beauty and quality of high mountain peaks, foothills, glacial systems, lakes, and streams, valleys, and coastal landscapes in their natural state; to protect habitat for, and populations of, fish and wildlife including but not limited to caribou, brown/grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals; and to provide continued opportunities including reasonable access for mountain climbing, mountaineering, and other wilderness recreational activities. Subsistence uses by local residents shall be permitted in the park, where such uses are traditional, in accordance with the provisions of Title VIII.”

The potential for significant restriction must be evaluated for the proposed action's effect upon "...subsistence uses and needs, the availability of other lands for the purposes sought to be achieved and other alternatives which would reduce or eliminate the use."

III. PROPOSED ACTION ON FEDERAL LANDS

A mining plan of operations (MPO) has been submitted to the National Park Service (NPS) by Thomas and Kathryn Lamal for the purpose of conducting a suction dredge placer gold mining operation on the Shamrock Group unpatented mining claims located at Gold Hill within Wrangell-St. Elias National Park and Preserve. The proposed plan would involve two people, living and working in the Gold Hill area from June through September, with occasional short-term visits by others. Lamal also submitted an application for ANILCA 1110(b) access to the Shamrock Group.

The Shamrock Group claims were previously mined and encompass approximately 28.7 acres. An area delineated by the miners consisting of 9.6 acres of disturbed creek bed, adjacent riparian zone and vegetated bench would be subject to mining operations under the plan. A metal detector could be used anywhere within the claims for exploration and nugget detection. Initial access and annual resupply would occur by snowmachine from Chisana along existing routes during periods of frozen ground and snow cover. During the summer ATVs pulling a trailer would be used to transport equipment, supplies, materials, fuel and personnel over a distance of 2.4 miles between Chicken Creek Airstrip and the Shamrock Group claims along an established trail. For more details on the alternatives see the EA.

Alternative 1 – No Action Alternative: No Mining Operations Authorized: Under this alternative, the NPS Alaska Regional Director would not approve the operator's proposed mining plan of operations. As a result, authorized mining would not occur on the Shamrock Group claims at Gold Hill, and there would be no need to access the claims. This alternative provides a baseline for evaluating the changes and impacts of the proposed alternative.

Alternative 2 – Authorize Mining Operations on the Shamrock Group Claims with NPS Stipulations (Proposed Action): Under this alternative, the NPS Alaska Regional Director would approve the operator's mining plan of operations (MPO) on the Shamrock Group unpatented placer claims. In a separate process, the Lamals have also applied for a Rights of Way Certificate of Access (RWCA) for motorized vehicle access between Chicken Creek Airstrip and Shamrock

Group (SG) claims along an established ATV trail in support of authorized mining operations. Both of these authorizations would include NPS stipulations for resource protection.

IV. AFFECTED ENVIRONMENT

A summary of the affected environment pertinent to subsistence use is presented here. The following documents contain additional descriptions of subsistence uses within Wrangell-St. Elias National Park and Preserve:

Bleakley, Geoffrey T. 2002. *Contested Ground, An Administrative History of Wrangell-St. Elias National Park and Preserve, Alaska, 1978-2001*, NPS Alaska Region.

Final Environmental Impact Statement, Wilderness Recommendation, NPS Alaska Region, 1988.

Haynes, Terry L., Martha Case, James A. Fall, Libby Halpin, and Michelle Robert. 1984. *The use of Copper River salmon and other wild resources by Upper Tanana communities, 1983-1984*. ADF&G Division of Subsistence, Technical Paper No. 115.

Kukkonen, Malla, and Garrett. Zimpelman. 2012. *Subsistence harvests and uses of wild resources in Chistochina, Alaska, 2009*. Alaska Department of Fish and Game, Division of Subsistence Technical Paper No. 370.

Marcotte, James R. 1992. *Wild fish and game harvest and use by residents of five Upper Tanana communities, Alaska, 1987-88*. ADF&G Division of Subsistence, Technical Paper No. 168.

Norris, Frank. 2002. *Alaska Subsistence: A National Park Service Management History*, NPS Alaska Region.

NPS Alaska Region. 1986. *General Management Plan/Land Protection Plan, Wrangell-St. Elias National Park and Preserve*.

NPS Alaska Region. 1988. *Wrangell-St. Elias Subsistence Management Plan*. (Updated most recently in 2004.)

NPS Alaska Region. *Wrangell-St. Elias National Park and Preserve Subsistence Users Guide*. (Updated most recently in 2005.)

Stratton, Lee, and Susan Georgette. 1984. *Use of fish and game by communities in the Copper River Basin, Alaska: a report on a 1983 household survey*. ADF&G Division of Subsistence, Technical Paper No. 107.

Subsistence uses are allowed within Wrangell-St. Elias National Park and Preserve in accordance with Titles II and VIII of ANILCA. The national preserve is open to federal subsistence uses and state-authorized general (sport) hunting, trapping and fishing activities. NPS-qualified

subsistence users may engage in subsistence uses within the national park. The proposed action would take place within the national preserve.

To engage in federal subsistence hunting and wildlife harvest activities in Wrangell-St. Elias National Preserve, you must be a local rural resident who maintains a primary place of residence in a rural community or area that has a positive customary and traditional use determination for the species and the area where you wish to take fish and wildlife.

Based on 2010 U.S. Census data, the National Park Service estimates that approximately 5,200 individuals are eligible to engage in federal subsistence uses in Wrangell-St. Elias National Park and Preserve. Most of these individuals live in communities along the road system, although there are a few scattered pockets of population off of the road system. Subsistence uses in WRST include hunting, trapping, fishing, berry picking, gathering mushrooms and other plant materials, collecting firewood, and harvesting timber for house construction. Most subsistence hunting within Wrangell-St. Elias occurs off the Nabesna and McCarthy roads and the trails that originate from them. The Copper, Nabesna, Chisana and Chitina rivers serve as popular riverine access routes for subsistence users. Most of the subsistence fishing takes place in the Copper River.

Gold was discovered near the headwaters of the Chisana River in 1913. This discovery prompted a stampede that established the town of Chisana. Miners worked the gold fields on nearby Gold Hill, establishing camps and workings. Starting in the 1920s, both mining activities and population levels significantly declined from stampede levels.¹ The 2010 US Census lists no residents of Chisana, however park staff conversations with local residents suggests that a handful of people make Chisana their primary place of residence. Subsistence use by area residents centers on wildlife food resources and furbearer harvest. In this remote area, wildlife resources are used to augment store purchased goods. Residents of Chisana occasionally utilize subsistence resources on Gold Hill. The Gold Hill area has traditionally been primarily used for the harvest of caribou, sheep and moose. Subsistence hunting of the Chisana caribou herd was closed in 1994 due to declining population numbers, however the herd population has since stabilized, and a small subsistence harvest was authorized starting in the fall of 2012.

Moose, caribou, grizzly bear, and Dall sheep are all indigenous to the area. Dall sheep are most prevalent in the high mountains north and south of the area. A few sheep, mostly ewes and lambs, occupy the Gold Hill area. Grizzly bear and caribou range over the Gold Hill, Beaver Creek valley and Solo Flats areas. Moose occur in the Gold Hill area drainage bottoms and in a

¹ Bleakley, Geoffrey T. 2007 (revised and expanded web version). *A History of the Chisana Mining District, Alaska, 1890-1990*. NPS Alaska Region, Resources report NPS/AFARCR/CRR-96/29. (Accessed on 2/21/2013 at <http://www.nps.gov/wrst/historyculture/upload/chisanaminingdistricthistory.pdf>.)

few higher areas with sufficient forage. Moose are more common towards the Chisana and White Rivers. The majority of meat utilized by north Wrangell residents is moose followed by caribou and then Dall sheep. Furbearers are important to subsistence trappers in the Gold Hill area. Red fox are common in the area. Wolf, coyote and wolverine are common but not plentiful in the area. Lynx sometimes range into the area but usually remain at lower elevations. Trapping in the area takes place in the winter and is generally confined to the Chathenda Creek drainage. Residents of the area utilize local plant materials in their subsistence activities. Blueberries and cranberries are of primary importance. There are no timber resources in the area of proposed action. The proposed mine site is not a traditional area for gathering of plant materials. Freshwater fish have been observed in Cathenda Creek, into which Bonanza Creek flows. Specifically surveys conducted in 2003 show the presence of Artic grayling and round whitefish.

The NPS recognizes that patterns of subsistence use vary from time to time and from place to place depending on the availability of wildlife and other renewable natural resources. A subsistence harvest in a given year may vary considerable from previous years due to weather conditions, migration patterns, and natural population cycles.

V. SUBSISTENCE USES AND NEEDS EVALUATION

To determine the potential impact on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources that could be impacted.

The evaluation criteria are as follows:

1. the potential to reduce important subsistence fish and wildlife populations by (a) reductions in numbers, (b) redistribution of subsistence resources, or (c) habitat losses;
2. what affect the action might have on subsistence fisher or hunter access; and
3. the potential for the action to increase fisher or hunter competition for subsistence resources.

The potential to reduce populations:

The Chisana/Gold Hill area supports the four large mammal species (moose, caribou, Dall sheep, and grizzly bear) important to interior Alaska residents. Wildlife populations are unlikely to be significantly affected under any of the alternatives. It is possible that distribution of individual animals would change somewhat, but this is insignificant biologically. Short-term relocation would occur due to temporary avoidance of the trail corridor, airstrip, and claim area due to noise and human activity. The Dall sheep that frequent the project area normally consist of ewes and lambs, which are not legally harvestable. No mining would take place during calving or lambing

in the spring. Impacts on birds would be limited to specific sites without high use and of such small acreage that impacts will be minimal or nonexistent. No critical habitat for large mammals would be damaged by the operation. Thus the operation is not expected to significantly redistribute or otherwise impact wildlife populations.

Noise created by the operation may temporarily affect hunting and foraging areas used by furbearers. Considering that the local furbearers are predominately crepuscular (active in the twilight) or nocturnal (times when the operation would be shut down) in their hunting habits, it is expected that any displacement would be minimal. Mining activity would cease at least one month prior to trapping season and would have no direct effect on fur harvest.

In conclusion, the proposed alternatives are not expected to significantly alter wildlife movements or wildlife habitat or reduce populations of important subsistence wildlife. Fish are not a significant subsistence resource in the area.

The effect on subsistence access:

The alternatives evaluated in this analysis are not anticipated to result in a significant restriction to subsistence access. Access for federal subsistence uses in the Wrangell-St. Elias National Park and Preserve is granted pursuant to Section 811 of ANILCA. Allowed means of access by federally qualified subsistence users in WRST include motorboat, snowmachine (subject to frozen ground conditions and adequate snow cover), ORVs, and airplane (preserve only), along with non-motorized means such as foot and horses. The alternatives would have no direct impact on allowed means of subsistence access, nor would the alternatives affect the areas open to subsistence uses or access routes to those areas. Thus, none of the alternatives discussed in this analysis would affect access to subsistence uses.

The potential to increase competition:

The proposed actions are not expected to significantly restrict or increase competition for subsistence resources on federal public lands within the affected area.

AVAILABILITY OF OTHER LANDS

The proposed actions are consistent with NPS mandates. The applicant's right to utilize the land for mining purposes is confined within the bounds of the mining claims involved. Because all public lands within Wrangell-St. Elias National Park and Preserve have been withdrawn from mineral entry, there are no other suitable lands available for the operator to conduct mining operations. There is no allowance for use of lands outside the claim for mining purposes except for access. There are no other lands available for mining operations that would result in less impact to subsistence resources than those proposed by the operator.

For subsistence purposes, other lands remain available outside of the proposed mining area. The availability of lands near the proposed mine site and other adjacent lands would not be affected for subsistence purposes.

VII. ALTERNATIVES CONSIDERED

No other alternatives were identified that would reduce or eliminate the use of NPS public lands needed for subsistence purposes.

VII. FINDINGS

This analysis concludes that neither of the proposed actions will not result in a significant restriction of subsistence uses.

APPENDIX D: APPENDIX D: STATEMENT OF FINDING FLOODPLAIN MANAGEMENT (EXECUTIVE ORDER 11988: FLOODPLAIN MANAGEMENT)

STATEMENT OF FINDINGS

Description of Site:

Bonanza Creek is an integral part of the Chisana Historic Mining Landscape which was listed on the NRHP in 1998. The NPS has chosen to manage the Gold Hill area and Bonanza Creek for its historic value and therefore preservation and restoration of the historic landscape take precedent over natural resources and processes. Multiple historic features and structures have been identified within the drainage. Wooden remnants of boomer dams and linear hand-stacked tailings rows are situated within the active floodplains and channel. These adversely impact the floodplain function and associated natural resource character and associated values within the Shamrock Group. Bonanza Creek basin is situated in an un-forested alpine drainage. Water flow in the stream varies substantially with peak discharges observed during spring snow melt/runoff and summer rainstorm events. The barren streambed between side slopes and the sparsely-vegetated floodplain are periodically inundated. All of the 2650 linear feet of stream bed within the Shamrock Group has been mined. The entire 5-mile length of Bonanza Creek including all reaches upstream and downstream of the claims were mined or impacted by mining. Within the claim block the channel is dynamic and the adjacent streambed is barren and "braided".

Under this plan, approximately 2650 linear feet of creek bed and adjacent floodplain would be affected. The proposed mining operations area contains approximately 8 acres of floodplain and channel. All of which is situated within the 100-year regulatory floodplain. The floodplain width ranges from 80 to 200 feet on the claim block. The active channels range from 10 to 30 feet wide. During normal flow conditions, one or two channels are active and the stream has a braided character. During floods the barren streambed, inactive channels, portions of the adjacent sparsely-vegetated floodplain gravel bars and banks are covered by water.

Natural processes are slowly reclaiming the disturbed landscape. Floodwaters periodically alter the historic landscape and its component features. Loss of vegetation and soils and a dysfunctional floodplain have increased the ability for floodwaters to cause erosion. All historic cabins and the established mining support facilities are located outside the active floodplain. Some historic features and artifacts have been lost due to erosion and natural processes. Due to the small size of the drainage, discharge and location of permanent structures outside the floodplain, flood risks and threats to historic features are minor.

Proposed Action:

The scope of the proposed action is described in detail as the preferred Alternative 2 of an Environmental Assessment. This EA analyzes the environmental consequences in detail of two alternatives for floodplains and related resources including water resources, wildlife, vegetation, soils, and wetlands. Under the preferred alternative, the NPS would fundamentally authorize what the Lamals originally proposed, but monitor operations and attach stipulations to that proposed plan. These stipulations would modify the scope and ensure a higher level of protection to park resources and values and minimize and/or avoid potential adverse impacts. The proposed action would be confined to two unpatented mining claims..

Placer mining operations would be by necessity, conducted within the active floodplain of Bonanza Creek. Most of the proposed mining activities would be situated in the floodplain, although some mining would occur in the disturbed upland benches outside the floodplain. The support facilities are situated outside the active floodplain. This floodplain reach was extensively impacted by previous mining operations; it is in a condition of recovery by natural processes. Past mining and related disturbances have affected the floodplain and stream channel resulting in a comparatively barren floodplain over most reaches of the stream within the claim block. The majority of the mining operations would occur in a floodplain that has limited soil development and vegetative understory.

Operations as proposed would result in a negative, but temporary degradation to a disturbed and dysfunctional floodplain caused by remining the stream bottom and channel. Previous mining directly and indirectly impacted natural processes, channel morphology and all of the floodplain within the proposed mining area. No "pristine" floodplain reaches would be disturbed. Impacts to the floodplain would be controlled by NPS stipulations and monitoring. Stipulations would be attached to prevent loss of soil and erosion, restore and/or improve fluvial conditions and facilitate revegetation of the floodplain and disturbed areas. The NPS would monitor operations and require compliance with and NPS reclamation standards. This would minimize any direct or indirect impacts to the floodplain and prevent unnecessary degradation. There would be a temporary degradation in floodplain function while mining some areas. Floodplain function would be temporarily impacted during operations due to dams, excavations and stockpiling materials. By keeping the mine footprint small and reclaiming as operations proceed up drainage, impacts to the floodplain would be minimized.

Non-historic tailings and features that currently negatively impact the floodplain and natural processes would remain after mining. This would allow for continued minor long-term impacts to floodplain function. NPS stipulations would provide protection to the historic features. The Shamrock Support Camp is located on an elevated terrace such that a flood event would not wash out the facility. The camp has existed on this location for more than 70 years without flood damage. All fuels, waste, and the latrine would be located outside of the active floodplain.

Justification for Use of Floodplain:

Alternatives Considered:

Two alternatives were considered (Alternatives 1 and 2) in the Environmental Assessment). These include a no action and the, (preferred alternative) modified mining plan of operations and with stipulations to control impacts. The claimants do not want to sell the claims so acquisition is not feasible at this time. There would be no risk to property, natural or cultural resources or humans from flooding. The proposed mining action was chosen over the no action alternative because it is unlikely to cause any significant short or long-term impacts to the floodplain or natural resources and allows the miners to exercise their mineral rights. There would be no significant risk to property or humans posed by Alternative 2, the proposed action. NPS monitoring and stipulations minimize what threats do exist to property.

Floodplain Determination:

The proposed action would occur within a 100-year regulatory floodplain. The action proposed can not be successfully carried out unless it is located in or near water. It is a placer mining operation. Most of the direct disturbance would occur within a barren or sparsely-vegetated gravel and cobble zone of the active streambed and floodplain below ordinary high water. We do not anticipate any measurable long-term changes in natural floodplain values such as ecosystem quality, soils, vegetation, and wildlife habitat or ground water recharge.

We do not anticipate that any adverse short and long-term impacts would likely result in any long-term threat to property and/or cultural/historic resources. The proposed action does not pose any potential for negative long-term impacts or to short-term impacts. This proposed action is consistent with NPS guidance for compliance with Executive Order 11988 (Floodplain Management).

The objective of the preferred action is to avoid, to the extent possible; any long and short-term adverse impact associated with temporary modification of the floodplain and to avoid direct or indirect development of floodplain whenever there is a practical alternative. Where a floodplain can not be avoided, NPS actions would focus on mitigation of adverse effects. This includes mitigation so as to minimize harm to life, property and natural values, and restore and preserve natural and beneficial floodplain values.

The proposed mining operations in the creekbed can not avoid temporary manipulation of the natural system. The proposed action would be monitored and controlled. The operator would be required to reclaim mine disturbances to a condition that approximates existing historic landscape concurrent with operations or as soon as feasible but within a one-year period from the original disturbance. The miner would also be required to keep his unreclaimed disturbed footprint to a minimum. Operations would be controlled to minimize and/or avoid impacts to historic features and artifacts that contribute to the historic landscape. Non-historic features and tailings piles would be

removed. Restoration would allow for natural processes to facilitate reestablishment of the floodplain within the historic context.

NEPA Considerations:

The proposed action would directly and indirectly affect the Bonanza Creek floodplain. These effects have been evaluated in an EA. Other alternatives were considered and/or evaluated. This included a discussion of the no-action alternative. The proposed action was chosen because it offers a high level of protection to park resources including floodplain while enabling the claimants to exercise their rights under applicable law and regulation. The action reduces the potential for flood-related hazards to private property and the historic landscape. The EA states that we are in compliance with Executive Order 11988.

Summary:

There is no practical or feasible alternative to authorizing mining on the Shamrock Group on Bonanza Creek. The floodplain was impacted by mining in the past. Existing historic tailings piles and dam structure continue to impact floodplain function. The proposed action would not pose any significant threats to NPS property or human life. Although temporary, minor impacts to the floodplain system would occur, no significant impacts to floodplain values are anticipated.

APPENDIX E: PROPOSED CONDITIONS TO ATTACH TO AUTHORIZATION TO MINE ON SHAMROCK GROUP

All future plan of operation supplements, revisions, modifications and/or amendments shall be submitted, in writing, to the Superintendent for analysis and determination of appropriate action. The operator shall notify the Superintendent, or the Superintendent's designee, prior to operations start up and end of season shut down to enable park staff to meet with the operator and conduct the required monitoring and compliance investigations.

The operator shall work with park staff in (1) documenting specific sites mined within the claims, (2) conducting field measurements to determine and verify (a) water usage, (b) volume of material processed, and (c) extent of surface area disturbed by operations, and (3) conducting trail reclamation and mitigation activities.

An annual report shall be submitted to the Superintendent by the permittee. The report shall be submitted by November 30 of the year in which operations were conducted. Authorization to continue mining operations the following year is subject to the operator's submitting an annual report. The annual report shall include, at a minimum, the following information:

- a. Beginning of season arrival date on claims.
- b. End of season departure date from claims.
- c. Mining operations startup date.
- d. Number of days dredging and highbanker was conducted.
- e. Number of days metal detector exploration was conducted.
- f. Locations where dredging operations were conducted
- g. Locations where highbanker operations were conducted.
- h. Location on claims where exploration was conducted and methods employed.
- i. Volume (cubic yardage) of material mined.
- j. Volume processed by dredge and highbanker.
- k. Total linear footage of streambed worked.
- l. Total surface area (square yardage) of streambed disturbed.
- m. Total surface area (square yardage) of floodplain and uplands disturbed.
- n. Average number of hours processing material daily.
- o. Map showing locations of areas mined and prospected (explored).
- p. Number of dams constructed.
- q. Reclamation completed in previously disturbed, unvegetated areas.
- r. Number of access trips taken by ATV
- s. Condition of and/or problems with the access route.
- t. Mitigation performed on access route.
- u. Support facilities maintenance/construction conducted.
- v. Volume of fuel used during the season.
- w. Volume and location of fuel stored on claims over the winter.
- x. Cultural resources found (description and map location) which are not on the maps provided in the environmental assessment, including items discovered during mining operations reported to the Superintendent as required under operating stipulations.\
- y. Operational changes to the approved plan of operations which occurred and may need to be considered as alterations to the plan of operations.
- z. Future mining and exploration plans.

Vehicle (ATV) use shall be restricted to the single most used (disturbed) track on the existing trails. Access to the support camp from the airstrip shall not exceed 50 ATV round-trips in support of mining activities per season. Trail mitigation techniques identified by the NPS shall be conducted. A "trip" consists of one round trip (travel in both directions with one four-wheeler) with or without the trailer attached. Additional trips require prior approval, in writing, from the Superintendent.

On Shamrock Group claims vehicle (ATV) access is restricted to existing trails and to barren-disturbed areas on the floodplain.

Use of ATVs is restricted to support of mining operations. Approval from the Superintendent to use ATV for summer access to Gold Hill from Chisana along the Beaver Lake Trail is required. Recreational or other uses of ATVs is not permitted.

Modification or changes in transport vehicle or suction dredge mining equipment requires prior approval, in writing, from the Superintendent.

The suction dredge or highbanker may not be used, or setup for use, as a water jet to move gravel or other material.

Refueling of the suction dredge shall be done with the use of a large funnel and a catch pan under the fuel can.

Fuel storage sites shall be bermed and lined with an impermeable layer such as visqueen. Storage of fuels shall be confined to the support camp and not in areas subject to flooding. Sorbent pads shall be kept on site.

Fuel storage is not permitted at Chicken Creek airstrip when claimants are not at their mining claims. The maximum fuel storage amount authorized in the Gold Hill area in support mining operations is 300 gallons.

Any leakage or spillage of oil based fuels, onto the ground or into the stream, shall be reported, according to Alaska State regulations to the State of Alaska Department of Environmental Conservation and the superintendent. Immediate actions shall be taken to confine the spill to the smallest area.

Waste oil will be secured in bear resistant containers and stored on-site under the same requirements as fuel until the waste oil is transferred out of the park and properly disposed of.

Suction dredge mining operations are restricted to areas normally covered by water within the submerged portions of the active stream channel.

When feasible, wash water from the highbanker shall be discharged onto barren unvegetated areas.

Mining and exploration activities shall not cause deterioration of Bonanza Creek waters exceeding State of Alaska DEC water quality standards.

Mining operations shall be conducted to insure that vegetated areas outside the approved area of operations, areas of cultural significance, and/or stream banks are not subject to increased erosion.

If more than one suction dredge is operating simultaneously those mine sites shall be separated by a minimum of 1000 feet. Likewise the water discharged from the highbanker shall not occur within 500 feet of a suction dredge operation.

Construction of small dams to provide sufficient water depth to keep the suction dredge intake nozzle beneath the water is permitted if the dam construction does not significantly reduce water flow down stream or cause increased stream bank erosion. Maximum dam height is restricted to 2.5 feet.

Construction of water diversions are not permitted. Water pumping in support of suction dredge and/or high-banker operation is permitted as these practices essentially return water immediately to the stream and/or floodplain.

Water impoundments shall not utilize any material from historic features nor shall their construction or use impact any cultural features.

Care shall be taken during mining operations, including the moving or storage of equipment, while near or adjacent to cultural features or isolated cultural objects to insure no damage to those items would occur. Areas of cultural significance depicted, shall be avoided and no mining operations shall be conducted in those areas.

Utilization of the historic structures is permissible only in support of the approved mining plan of operations. Repairs and alterations to the structures shall be in keeping with the *Secretary of the Interiors Standards for the Treatment of Historic Properties* with oversight and technical assistance provided by NPS. Care shall be exercised to avoid impacts to the historic cultural features in the vicinity of the cabin area. Artifacts located at historic structures shall be left as found.

During all phases of the mining operation, all federal laws and regulations protecting cultural resources shall apply. Known cultural resources occurring within the vicinity of the claims under review shall not be altered, destroyed or collected. In the event that concealed cultural and/or scientific resources are encountered during mining operations, the Superintendent or the Superintendent's designee, shall be notified immediately. The discovery shall be left intact and steps shall be taken to protect it.

Reclamation at the end of the season shall include spreading the gravel used in dam construction, and any accumulated piles of processed gravel, on the stream bottom to eliminate any obstruction to the stream. Excavated pits shall be filled with tailings. Original stream gradients shall be reestablished. Reclamation of all dams, mined areas and prospect pits upon cessation of operations at that site and by the end of the season, is required.

Mine and prospect excavation shall be reclaimed when operations cease at that site. All debris from the mining operation shall be removed from along the streambed each season.

Annual reclamation shall consist of:

- A.) Leveling the tailings piles to conditions that approximate the contours and slopes of the adjoining land, floodplain and stream channel. Reestablishing the original gradient of the stream in the mined areas.
- B.) Filling in pits and mine cuts/dredged areas to conditions that approximate the contours and slopes of the adjoining land, flood plain and stream channel.
- C.) Reclaiming and spreading out the gravel used in dams constructed for the purpose of

operating the dredge.

D.) Eliminating any barriers that were constructed to allow for the natural flow of water and free passage of macro and microfauna and stream biomass.

E.) Stabilization of the tailings to prevent their erosion due to subsequent normal occurrences, such as heavy rains or floods.

F.) Placing tailings and fine material in a manner which facilitates natural revegetation of the disturbed area.

G.) Replacing the substrate with a mix of material (gravel, rubble, and/or boulders) to form a streambed that approximates original conditions.

H.) Insuring that reclamation of disturbed areas prevents erosion of the stream bank and stabilizes the area to minimize down stream turbidity.

I.) Upon completion of dredging activities, reclamation shall insure that the channel width and depth are similar to natural conditions and allow for normal stream discharge.

Final reclamation at conclusion of approved mining operations shall consist of:

A.) Removing all equipment (four wheelers, access vehicles, mine equipment, fuel, and camp support materials) transported to the claims for the mining operation.

B.) Removing and disposing at an approved location all garbage, refuse or waste, broken or unused equipment transported to the claims in support of approved operations.

C.) Operator shall notify the NPS as to when reclamation has been or will be completed. A field inspection with the operator present shall be conducted to evaluate the completed reclamation. Failure to accomplish reclamation in accordance with the approved plan shall result in forfeiture of the performance bond.

Any large animal causing a nuisance, and/or the death of a large mammal or bird of prey occurring in the vicinity of the mine site shall be reported to the Superintendent and the Alaska Department of Fish and Game as soon as possible. All state and federal game regulations shall be adhered to.

Refuse generated by the operator and/or his employees and coworkers shall be removed from the claims and disposed of in accordance with State and Federal law. Handling and disposal of all solid waste material shall be conducted according to Alaska State Regulations.

All food, perishables, and organic trash shall be secured from bears in bear proof containers and other wildlife. Burnable trash shall be burned. Non-burnable trash shall be backhauled outside the park at the end of the season.

The operator shall obtain all necessary State of Alaska and Federal permits prior to commencing operations, and keep them current during the life of the operation.

Compliance with all State and Federal laws and regulations is required.

Authorization to continue mining operations is contingent upon Shamrock and Tony M being maintained as valid existing unpatented mining claims with the BLM.

A performance bond shall be posted and maintained with the National Park Service bonding officer at the Alaska Regional Office in the amount of \$2500 prior to the implementation of the approved mining plan of operations. The performance bond shall be increased to reflect any changes in operations or adjustments for inflation.

APPENDIX F: PLANT SPECIES DOCUMENTED IN GOLD HILL STUDY AREA

Species listed in RED are considered rare by the Alaska Natural Heritage Program

TAXON	COMMON NAME	FAMILY
Trees		
<i>PICEA GLAUCA</i>	White Spruce	Pinaceae (Pine Family)
Shrubs		
<i>ALNUS CRISPA</i>	Green Alder	Betulaceae (Birch Family)
<i>BETULA GLANDULOSA</i>	Shrub Birch	Betulaceae (Birch Family)
<i>BETULA NANA</i>	Bog Birch	Betulaceae (Birch Family)
<i>LEDUM PALUSTRE</i>	Marsh Labrador Tea	Ericaceae (Heath Family)
<i>POTENTILLA FRUTICOSA</i>	Shrubby Cinquefoil	Rosaceae (Rose Family)
<i>RHODODENDRON LAPPONICUM</i>	Lapland Rosebay	Ericaceae (Heath Family)
<i>SALIX ALAXENSIS</i>	Alaska Willow	Salicaceae (Willow Family)
<i>SALIX ARBUSCULOIDES</i>	Littletree Willow	Salicaceae (Willow Family)
<i>SALIX BARCLAYI</i>	Barclay's Willow	Salicaceae (Willow Family)
<i>SALIX BARCLAYI</i>	Barclay's Willow	Salicaceae (Willow Family)
<i>SALIX BARRATTIANA</i>	Barratt's Willow	Salicaceae (Willow Family)
<i>SALIX BRACHYCARPA</i>	Barrenground Willow	Salicaceae (Willow Family)
<i>SALIX GLAUCA</i>	Grayleaf Willow	Salicaceae (Willow Family)
<i>SALIX MYRTILLIFOLIA</i>	Low Blueberry Willow	Salicaceae (Willow Family)
<i>SALIX PLANIFOLIA</i> ssp. <i>PULCHRA</i>	Diamondleaf Willow	Salicaceae (Willow Family)
<i>SHEPERDIA CANADENSIS</i>	Soapberry	Elaeagnaceae (Oleaster Family)
<i>VACCINIUM ULIGINOSUM</i>	Bog Blueberry	Ericaceae (Heath Family)
<i>VACCINIUM ULIGINOSUM</i> ssp.	Bog Blueberry	Ericaceae (Heath Family)

MICROPHYLLUM

Dwarf Shrubs

<i>ANDROMEDA POLIFOLIA</i>	Bog Rosemary	Ericaceae (Heath Family)
<i>ARCTOSTAPHYLOS ALPINA</i>	Alpine Bearberry	Ericaceae (Heath Family)
<i>ARCTOSTAPHYLOS RUBRA</i>	Red Fruit Bearberry	Ericaceae (Heath Family)
<i>ARCTOSTAPHYLOS UVA-URSI</i>	Kinnikinnick	Ericaceae (Heath Family)
<i>CASSIOPE TETRAGONA</i>	Mountain Heather	Ericaceae (Heath Family)
<i>DIAPENSIA LAPPONICA</i>	Lapland Diapensia	Diapensiaceae (Diapensia Family)
<i>DRYAS DRUMMONDII</i>	Yellow Dryas	Rosaceae (Rose Family)
<i>DRYAS OCTOPETALA</i>	White Dryas	Rosaceae (Rose Family)
<i>EMPETRUM NIGRUM</i>	Crowberry	Empetraceae (Crowberry Family)
<i>LOISELEURIA PROCUMBENS</i>	Alpine Azalea	Ericaceae (Heath Family)
<i>OXYCOCCUS MICROCARPUS</i>	Bog Cranberry	Ericaceae (Heath Family)
<i>SALIX ARCTICA</i>	Arctic Willow	Salicaceae (Willow Family)
<i>SALIX POLARIS</i>	Polar Willow	Salicaceae (Willow Family)
<i>SALIX RETICULATA</i>	Netleaf Willow	Salicaceae (Willow Family)
<i>VACCINIUM VITIS-IDAEA</i>	Mountain Cranberry	Ericaceae (Heath Family)

Forbs

<i>ACHILLEA BOREALIS</i>	Northern Yarrow	Asteraceae (Sunflower Family)
<i>ACONITUM DELPHINIFOLIUM</i>	Monkshood	Ranunculaceae (Crowfoot Family)
<i>ADOXA MOSCHATELLINA</i>	Moschatel	Adoxaceae (Moschatel Family)
<i>ANDROSACE CHAMAEJASME</i>	Rock Jasmine	Primulaceae (Primrose Family)
<i>ANEMONE PARVIFLORA</i>	Small-flowered Anemone	Ranunculaceae (Anemone Family)
<i>ANEMONE RICHARDSONII</i>	Yellow Thimbleweed	Ranunculaceae (Anemone Family)

<i>ANTENNARIA MONOCEPHALA</i>	Pygmy Pussytoes	Asteraceae (Composite Family)
<i>ARNICA LESSINGII</i>	Nodding Arnica	Asteraceae (Composite Family)
<i>ARTEMISIA ARCTICA</i>	Arctic Wormwood	Asteraceae (Composite Family)
<i>ARTEMISIA BOREALIS</i>	Boreal Wormwood	Asteraceae (Composite Family)
<i>ARTEMISIA FRIGIDA</i>	Prairie Sagewort	Asteraceae (Composite Family)
<i>ARTEMISIA TILESII</i>	Tilesius' Wormwood	Asteraceae (Composite Family)
<i>ASTER ALPINUS</i>	Alpine Aster	Asteraceae (Composite Family)
<i>ASTER SIBIRICUS</i>	Siberian Aster	Asteraceae (Composite Family)
<i>ASTRAGALUS NUTZOTINENSIS</i>	Nutzotin's Milkvetch	Fabaceae (Pea Family)
<i>ASTRAGALUS UMBELLATUS</i>	Tundra Milkvetch	Fabaceae (Pea Family)
<i>BISTORTATA VIVPARA</i>	Alpine Bistort	Polygonaceae (Buckwheat Family)
<i>BISTORTA PLUMOSA</i>	Mountain Meadow Bistort	Polygonaceae (Buckwheat Family)
<i>BOSCHNIAKIA ROSSICA</i>	Broomrape	Orobanchaceae (Broomrape Family)
<i>CALTHA PALUSTRIS</i>	Yellow Marshmarigold	Ranunculaceae (Anemone Family)
<i>CAMPANULA LASIOCARPA</i>	Mountain Harebell	Campanulaceae (Bellflower Family)
<i>CARDAMINE BELLIDIFOLIA</i>	Alpine Bittercress	Brassicaceae (Mustard Family)
<i>CARDAMINE PURPUREA</i>	Purple Cress	Brassicaceae (Mustard Family)
<i>CARDAMINE UMBELLATA</i>		Brassicaceae (Mustard Family)
<i>CERASTIUM BEERINGIANUM</i>	Bering Chickweed	Caryophyllaceae (Carnation Family)
<i>CHRYSOPLANIUM TETRANDEM</i>	Northern Water-carpet	Saxifragaceae (Saxifrage Family)
<i>CHRYSOPLANIUM WRIGHTII</i>	Wright's Water-carpet	Saxifragaceae (Saxifrage Family)
<i>CLAYTONIA SARMENTOSA</i>	Alaska Spring Beauty	Portulacaceae (Purslane Family)
<i>CORYDALIS PAUCIFLORA</i>	Fewflower Fumewort	Fumariaceae (Earth Smoke Family)
<i>CREPIS NANA</i>	Dwarf alpine Hawksbeard	Asteraceae (Composite Family)
<i>DELPHINIUM GLAUCUM</i>	Sierra Larkspur	Ranunculaceae (Anemone Family)

<i>DODECATHEON FRIGIDUM</i>	Northern Shooting Star	Primulaceae (Primula Family)
<i>DRABA BREWERI</i> var. <i>CANA</i>	Draba	Brassicaceae (Mustard Family)
<i>DRABA CRASSIFOLIA</i>	Snowbed Whitlowgrass	Brassicaceae (Mustard Family)
<i>DRABA FLADNIZENSIS</i>	Draba	Brassicaceae (Mustard Family)
<i>DRABA GLABELLA</i>	Smooth Whitlowgrass	Brassicaceae (Mustard Family)
<i>DRABA PRAEALTA</i>	Lancepod Whitlowgrass	Brassicaceae (Mustard Family)
<i>DRABA LONGIPES</i>	Longstalk Whitlowgrass	Brassicaceae (Mustard Family)
<i>DRABA STENOPETALA</i>	Anadyr Whitlowgrass	Brassicaceae (Mustard Family)
<i>EPILOBIUM ANGUSTIFOLIUM</i>	Fireweed	Onagraceae (Evening Primrose Family)
<i>EPILOBIUM LATIFOLIUM</i>	Dwarf Fireweed	Onagraceae (Evening Primrose Family)
<i>ERIGERON COMPOSITUS</i>	Cutleaf Daisy	Asteraceae (Composite Family)
<i>ERIGERON ERIOCEPHALUS</i>	Erigeron	Asteraceae (Composite Family)
<i>ERIGERON HUMILIS</i>	Arctic Alpine Fleabane	Asteraceae (Composite Family)
<i>ERIGERON PURPURATUS</i>	Purple Fleabane	Asteraceae (Composite Family)
<i>ERYSIMUM INCONSPICUUM</i>	Shy Wallflower	Brassicaceae (Mustard Family)
<i>EUTREMA EDWARDSII</i>	Edwards' Mock Wallflower	Brassicaceae (Mustard Family)
<i>GENTIANA GLAUCA</i>	Glaucous Gentian	Gentianaceae (Gentain Family)
<i>GENTIANA PROPINQUA</i>	Arctic Gentian	Gentianaceae (Gentain Family)
<i>GENTIANA PROSTRATA</i>	Pygmy Gentian	Gentianaceae (Gentain Family)
<i>GEOCAULON LIVIDUM</i>	False Toadflax	Santalaceae (Sandalwood Family)
<i>GEUM ROSSII</i>	Ross' Avens	Rosaceae (Rose Family)
<i>HEDYSARUM ALPINUM</i>	Eskimo Potato	Fabaceae (Pea Family)
<i>HEDYSARUM HEDYSAROIDES</i>	Licorice root	Fabaceae (Pea Family)

<i>KOENIGIA ISLANDICA</i>	Island Purslane	Polygonaceae (Knotweed Family)
<i>LAGOTIS GLAUCA</i>	Weaselsnout	Scrophulariaceae (Figwort Family)
<i>LEPTARRHENA PYROLIFOLIA</i>	Leatherleaved Saxifrage	Saxifragaceae (Saxifrage Family)
<i>LINNAEA BOREALIS</i>	Twinflower	Caprifoliaceae (Honeysuckle Family)
<i>LLOYDIA SEROTINA</i>	Alp Lily	Liliaceae (Lily Family)
<i>LUPINUS ARCTICUS</i>	Arctic Lupine	Fabaceae (Pea Family)
<i>MELANDRIUM AFFINE</i>	Arctic Lynchis	Caryophyllaceae
<i>MELANDRIUM APETALUM</i>	Nodding Lynchis	Caryophyllaceae (Carnation Family)
<i>MERTENSIA PANICULATA</i>	Tall Bluebell	Boraginaceae (Borage Family)
<i>MINUARTIA MACROCARPA</i>	Longpod Stichwort	Caryophyllaceae (Carnation Family) (Carnation Family)
<i>MOEHRINGIA LATERIFLORA</i>	Blunt-leaved Sandwort	Caryophyllaceae (Carnation Family) (Carnation Family)
<i>MONTIA BOSTOCKII</i>	Bostock's Minerslettuce	Portulacaceae (Purslane Family)
<i>MYOSOTIS ALPESTRIS</i>	Asian forget-me-not	Boraginaceae (Borage Family)
<i>OXYRIA DIGYNA</i>	Mountain Sorrel	Polygonaceae (Knotweed Family)
<i>OXYTROPIS MAYDELLIANA</i>	Maydell's Oxytrope	Fabaceae (Pea Family)
<i>OXYTROPIS NIGRESCENS</i>	Blackish Peavine	Fabaceae (Pea Family)
<i>OXYTROPIS SCAMMANIANA</i>	Scamman's Oxytrope	Fabaceae (Pea Family)
<i>OXYTROPIS VISCIDA</i>	Sticky Crazyweed	Fabaceae (Pea Family)
<i>PAPAVER MACOUNII</i>	Macoun's Poppy	Papaveraceae (Poppy Family)
<i>PARNASSIA KOTZEBUEI</i>	Kotzebue Grass-of-Parnassus	Saxifragaceae (Saxifrage Family)
<i>PARNASSIA PALUSTRIS</i>	Bog Star	Saxifragaceae (Saxifrage Family)
<i>PARRYA NUDICAULIS</i>	Parrya	Brassicaceae (Mustard Family)
<i>PEDICULARIS CAPITATA</i>	Capitate Lousewort	Scrophulariaceae (Snapdragon Family)

<i>PEDICULARIS CAPITATA</i>	Capitate Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PEDICULARIS LABRADORICA</i>	Labrador Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PEDICULARIS LANATA</i>	Woolly Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PEDICULARIS OEDERI</i>	Oder Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PEDICULARIS SUDETICA</i>	Sudetic Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PEDICULARIS VERTICILLATA</i>	Whorled Lousewort	Scrophulariaceae (Snapdragon Family)
<i>PETASITES FRIGIDUS</i>	Arctic Sweet Coltsfoot	Asteraceae (Compostie Family)
<i>PETASITES HYPERBOREUS</i>	Arctic sweet coltsfoot	Asteraceae (Compostie Family)
<i>PINGUICULA VILLOSA</i>	Hairy Butterwort	Lentibulariaceae (Bladderwort Family)
<i>POLEMONIUM ACUTIFLORUM</i>	Acutish Jacob's Ladder	Polemoniaceae (Polemonium Family)
<i>POTENTILLA UNIFLORA</i>	Oneflower cinquefoil	Rosaceae (Rose Family)
<i>PYROLA ASARIFOLIA</i>	Liverleaf Wintergreen	Pyrolaceae (Wintergreen Family)
<i>PYROLA GRANDIFLORA</i>	Largeflowered Wintergreen	Pyrolaceae (Wintergreen Family)
<i>PYROLA SECUNDA</i>	One-sided Wintergree	Pyrolaceae (Wintergreen Family)
<i>RANUNCULUS HYPERBOREUS</i>	High Northern Buttercup	Ranunculaceae (Composite Family)
<i>RANUNCULUS REPTANS</i>	Creeping Spearwort	Ranunculaceae (Composite Family)
<i>RHODIOLA INTEGRIFOLIA</i>	Roseroot	Crassulaceae (Stonecrop Family)
<i>RUBUS ARCTICUS</i>	Nagoonberry	Rosaceae (Rose Family)
<i>RUBUS CHAMAEMORUS</i>	Cloudberry	Rosaceae (Rose Family)
<i>RUMEX ARCTICUS</i>	Arctic Dock	Polygonaceae (Knotweed Family)
<i>SAGINA INTERMEDIA</i>	Snow Pearlwort	Caryophyllaceae (Carnation Family)
<i>SAUSSUREA ANGUSTIFOLIA</i>	Narrowleaved Saussurea	Asteraceae (Composite Family)
<i>SAUSSUREA ANGUSTIFOLIA</i> ssp. <i>YUKONENSIS</i>	Narrowleaved Saussurea	Asteraceae (Composite Family)
<i>SAXIFRAGA BRONCHIALIS</i>	Spotted Saxifrage	Saxifragaceae (Saxifrage Family)

<i>SAXIFRAGA CAESPITOSA</i>	Tufted Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA CERNUA</i>	Nodding Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA DAVURICA</i>	Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA FLAGELLARIS</i>	Spiderplant	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA HIERACIFOLIA</i>	Stiff-stemmed Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA HIRCULUS</i>	Yellow Marsh Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA LYALLII</i>	Red-stem Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA NELSONIANA</i>	Heartleaf Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA OPPOSITIFOLIA</i>	Purple Mountain Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SAXIFRAGA TRICUSPIDATA</i>	Three-toothed Saxifrage	Saxifragaceae (Saxifrage Family)
<i>SENECIO ATROPURPUREUS</i>	Arctic Senecio	Asteraceae (Compostie Family)
<i>SENECIO CONGESTUS</i>	Marsh Fleabane	Asteraceae (Compostie Family)
<i>SENECIO FUSCATUS</i>	Senecio	Asteraceae (Compostie Family)
<i>SENECIO LUGENS</i>	Small Blacktip Grounse	Asteraceae (Compostie Family)
<i>SENECIO RESEDIFOLIUS</i>	Senecio	Asteraceae (Compostie Family)
<i>SILENE ACAULIS</i>	Moss Campion	Caryophyllaceae (Carnation Family)
<i>SOLIDAGO MULTIRADIATA</i>	Mountain Goldenrod	Asteraceae (Compostie Family)
<i>SPARGANIUM HYPERBOREUM</i>		Sparganiaceae (Bur Reed Family)
<i>STELLARIA EDWARDSII</i>	Longstalk Starwort	Caryophyllaceae (Carnation Family)
<i>STELLARIA LAETA</i>	Longstalk Starwort	Caryophyllaceae (Carnation Family)
<i>STELLARIA LONGIPES</i>	Longstalk Starwort	Caryophyllaceae (Carnation Family)
<i>STELLARIA MONANTHA</i>	Longstalk Starwort	Caryophyllaceae (Carnation Family)
<i>SYNTHYRIS BOREALIS</i>	Northern Kittentails	Scrophulariaceae (Snapdragon Family)

<i>THALICTRUM ALPINUM</i>	Alpine Meadowrue	Ranunculaceae (Composite Family)
<i>TOFIELDIA COCCINEA</i>	Northern Asphodel	Liliaceae (Lily Family)
<i>VALERIANA CAPITATA</i>	Capitate Valerian	Valerianaceae (Valerian Family)
<i>VIOLA EPIPSILA</i>	Dwarf Marsh Violet	Violaceae (Violet Family)
<i>ZYGADENUS ELEGANS</i>	Death Camass	Liliaceae (Lily Family)

Graminoids

<i>ARCTAGROSTIS LATIFOLIA</i>	Polargrass	Poaceae (Grass Family)
<i>CALAMAGROSTIS CANADENSIS</i>	Bluejoint	Poaceae (Grass Family)
<i>CAREX AQUATILIS</i>	Water Sedge	Cyperaceae (Sedge Family)
<i>CAREX BIGELOWII</i>	Bigelow's Sedge	Cyperaceae (Sedge Family)
<i>CAREX GARBERI</i>	Elk Sedge	Cyperaceae (Sedge Family)
<i>CAREX MAGELLANICA</i>	Boreal Bog Sedge	Cyperaceae (Sedge Family)
<i>CAREX MEMBRANACEA</i>	Fragile Sedge	Cyperaceae (Sedge Family)
<i>CAREX MICROCHAETA ssp. NESOPHILA</i>	Bering Sea Sedge	Cyperaceae (Sedge Family)
<i>CAREX MISANDRA</i>	Short-leaf sedge	Cyperaceae (Sedge Family)
<i>CAREX SAXATILIS</i>	Rock Sedge	Cyperaceae (Sedge Family)
<i>CAREX SCIRPOIDEA</i>	Northern Singlespike Sedge	Cyperaceae (Sedge Family)
<i>CAREX VAGINATA</i>	Sheathed Sedge	Cyperaceae (Sedge Family)
<i>DESCHAMPSIA CAESPITOSA</i>	Tufted Hairgrass	Poaceae (Grass Family)
<i>ERIOPHORUM sp.</i>	Cottongrass	Cyperaceae (Sedge Family)
<i>FESTUCA ALTAICA</i>	Altai Fescue	Poaceae (Grass Family)
<i>FESTUCA RUBRA</i>	Red Fescue	Poaceae (Grass Family)
<i>HIEROCHLOA ALPINA</i>	Alpine Holygrass	Poaceae (Grass Family)
<i>JUNCUS ARCTICUS</i>	Arctic Rush	Juncaceae (Rush Family)

<i>JUNCUS BIGLUMIS</i>	Twoflowered Rush	Juncaceae (Rush Family)
<i>JUNCUS CASTANEUS</i>	Chestnut Rush	Juncaceae (Rush Family)
<i>JUNCUS TRIGLUMIS</i>	Threehulled Rush	Juncaceae (Rush Family)
<i>KOBRESIA MYOSUROIDES</i>	Kobresia	Cyperaceae (Sedge Family)
<i>KOBRESIA SIMPLICIUSCULA</i>	Kobresia	Cyperaceae (Sedge Family)
<i>LUZULA MULTIFLORA</i>	Woodrush	Juncaceae (Rush Family)
<i>LUZULA PARVIFLORA</i>	Smallflowered Woodrush	Juncaceae (Rush Family)
<i>LUZULA RUFESCENS</i>	Hairy Woodrush	Juncaceae (Rush Family)
<i>POA ALPINA</i>	Alpine Bluegrass	Poaceae (Grass Family)
<i>POA ARCTICA</i>	Arctic Bluegrass	Poaceae (Grass Family)
<i>POA ARCTICA</i> ssp. <i>LANATA</i>	Arctic Bluegrass	Poaceae (Grass Family)
<i>POA ARCTICA</i> ssp. <i>LONGICULMIS</i>	Arctic Bluegrass	Poaceae (Grass Family)
<i>POA SECUNDA</i>	Bluegrass	Poaceae (Grass Family)
<i>TRIGLOCHIN MARITIMUM</i>	Seaside Arrowgrass	Juncaginaceae (Arrowgrass Family)
<i>TRIGLOCHIN PALUSTRIS</i>	Marsh Arrowgrass	Juncaginaceae (Arrowgrass Family)
<i>TRisetum SPICATUM</i>	Spike Trisetum	Poaceae (Grass Family)
Lower Vasculars & Ferns		
<i>BOTRYCHIUM ASCENDENS</i>	Moonwort	Ophioglossaceae (Adder's Tongue Family)
<i>BOTRYCHIUM LUNARIA</i>	Moonwort	Ophioglossaceae (Adder's Tongue Family)
<i>BOTRYCHIUM MINGANENSE</i>	Moonwort	Ophioglossaceae (Adder's Tongue Family)
<i>CYSTOPTERIS FRAGILIS</i>	Fragile Fern	Dryopteridaceae (Wood Fern Family)
<i>DIPHASIASTRUM ALPINUM</i>	Alpine Club-Moss	Lycopodiaceae (Clubmoss Family)
<i>DRYOPTERIS SP.</i>	Shield Fern	Dryopteridaceae (Wood Fern Family)

<i>EQUISETUM ARVENSE</i>	Common Horsetail	Equisetaceae (Horsetail Family)
<i>EQUISETUM SCIRPOIDES</i>	Dwarf scouring-rush	Equisetaceae (Horsetail Family)
<i>HUPERZIA HALEAKALAE</i>	Fir Clubmoss	Lycopodiaceae (Clubmoss Family)

Mosses

AULOCOMNIUM TURGIDUM
BRACHYTHECIUM ALBICANS
BRACHYTHECIUM sp.
CAMPYLIUM STELLATUM
DICRANUM ACUTIFOLIUM
DICRANUM sp.
DICRANUM UNDULATUM
DREPANOCLADUS SP.
HYLOCOMNIUM SP.
HYLOCOMNIUM SPLENDENS
PLEUROZIUM SCHREBERI
POLYTRICHUM SP.
SCORPODIUM TURGESCENTES
SPHAGNUM sp.
THUIDIUM ABIETINUM
THUIDIUM RECOGNITUM

Liverworts

RHIZOMNIUM sp.
SCAPANIA sp.

Lichens

CETRARIA CUCULATA

CETRARIA ISLANDICA

CETRARIA SP.

CLADONIA sp.

DACTYLINA ARCTICA

MASONHALEA RICHARDOSNII

NEPHROMA ARCTICUM

PELTIGERA APHTHOSA

PELTIGERA sp.

STEREOCAULON sp.

Other

Unknown algae

APPENDIX G

ANILCA 1110(b) Right-of-Way Certificate of Access (RWCA)

National Park Service Alaska Region 240 West 5th Avenue, Room 114 Anchorage, Alaska 99501	RWCA No.: 9865-13-001 Wrangell-St. Elias National Park and Preserve
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1. An ANILCA 1110(b) Right-of-Way Certificate of Access (hereinafter “RWCA”) is hereby issued pursuant to Section 1110(b) of the Alaska National Interest Lands Conservation Act (ANILCA) of December 2, 1980 (16 USC 3170).

2. This RWCA provides access across National Park Service (hereinafter NPS) managed lands in Wrangell-St Elias National Preserve to the following non-federal interest in land:

Shamrock unpatented placer claim, Bureau of Land Management Serial Number AKAA-026813 and Tony M unpatented placer claim, Bureau of Land Management Serial Number AKAA-026810, Fairbanks Recording District, State of Alaska. Also identified as the Shamrock Claim Block, NPS tract WRST 33-109.

Shamrock Claim Block: All corners are approximate.

NW corner	141°48'45.69"W	62°06'51.49"N NAD83
SW corner	141°48'42.24"W	62°06'44.36"N NAD83
NE corner	141°47'59.29"W	62°06'59.77"N NAD83
SE corner	141°47'57.47"W	62°06'56.67"N NAD83

See Exhibit B

3. Nature of Interest:

a. By this instrument Thomas K. Lamal and Kathryn K. Lamal (hereinafter “Holders”), whose address is 1734 Becker Ridge Road, Fairbanks, Alaska, 99709, receive a right to construct, operate, use, maintain and terminate an established Off Road Vehicle (ORV) trail, the Little Eldorado-Shamrock ORV Trail, and the Chicken Airstrip on NPS managed lands in Wrangell-St. Elias National Preserve within an area described as follows:

Little Eldorado –Shamrock ORV Trail (bearings are based on the Shamrock Claim Block): Commencing at the NW Corner of Shamrock Claim, thence along the west boundary of said claim approximately 250 feet S12°46.6'E to the Point of Beginning (141°48'44.59"W, 62°06'49.14"N, NAD83), thence southwesterly approximately 2850 feet to the junction of the No. 8 Pass trail, thence approximately 1350 feet southwesterly to the boundary of the Bench 1 Claim, thence 1700 feet northwesterly to Little Eldorado Creek, thence approximately 6600 feet to Chicken Airstrip.

Chicken Airstrip:

Northeast end of runway: 141°51'37.27"W, 62°7'16.87"N NAD83

Southwest end of runway: 141°51'58.66"W, 62°7'13.34"N NAD83

The Little Eldorado-Shamrock ORV trail and the Chicken Airstrip are located in protracted Section 19, unsurveyed Township 4 North, Range 20 East, and protracted Sections 13, 14, 23 & 24, unsurveyed Township 4 North, Range 19 East, Copper River Meridian, Alaska.

The area of use authorized by this RWCA is illustrated on the attached map (Exhibit B).

b. The areas authorized by this RWCA are: (1) an established ORV trail approximately 2.4 miles (12,500 feet) long, and eight 8 feet wide with a 5 foot-wide zone on either side for brushing and ditching, encompassing approximately 5.3 acres; and (2) an eleven hundred (1100) foot long, and twenty (20) foot-wide gravel runway consisting of approximately 0.5 acres, surrounded by a twenty (20) foot-wide vegetation control area containing approximately one (1) acre.

c. This RWCA shall not be construed as an interest in the land authorized for use by this RWCA, or as an abandonment of use and occupancy by the United States, but shall be considered a use of the land as described, anything contained herein to the contrary notwithstanding. This RWCA shall not be construed as an interest in water or a water right or as an abandonment of water use by the United States.

d. The stipulations, plans, maps, or designs set forth in Exhibits A, B, C & D, dated April 12 2013, attached hereto, are incorporated into and made part of this instrument as fully and effectively as if they were set forth herein in their entirety.

4. Rental Fee. No rental fees apply because it is NPS policy not to charge fees when a requested use involves exercise of a right (not a privilege).

5. General Terms and Conditions:

a. The Holder shall comply with all applicable State and Federal law and existing regulations in the construction, operation and/or maintenance within the area authorized by this RWCA. It is the responsibility of the Holder to obtain any permits or other authorizations that are required by other governmental entities for the uses authorized by this RWCA.

b. This RWCA will expire when it is no longer needed for the purposes for which it is issued unless, prior thereto, it is relinquished, abandoned, or modified pursuant to the terms and conditions of this instrument or of any other applicable federal law or regulation.

c. This RWCA may be amended to adjust the terms and conditions for changed conditions, to correct oversights, or to address conditions not previously contemplated. Either the NPS or Holder may initiate an amendment by notifying the other in writing and providing a justification for the proposed revision or supplement. Amendments by mutual consent of the NPS and Holder may occur, but the NPS may also require an amendment without the consent of the Holder if uses within the area authorized by this RWCA or other conditions become inconsistent with the regulatory standards of

Title 43 CFR 36.9 and 36.10(e)(1). The NPS will consult with the Holder when any amendment is initiated. Any amendment must result in the Holder continuing to have adequate and feasible access to his/her property.

d. The Holder shall perform all operations in a good and workmanlike manner.

e. This RWCA is for the purpose of providing the Holder with access across NPS lands to his/her non-federal land or valid occupancy. It does not authorize the Holder to use the area authorized by this RWCA for any activities other than access.

f. This RWCA may be assigned. The proposed assignee must state in writing that he/she agrees to comply with and to be bound by the terms and conditions of the existing RWCA. With such a written statement from the proposed assignee, the NPS Regional Director will approve the assignment of the RWCA to the assignee, who shall become the Holder. The assignment becomes effective upon the written approval of the NPS Regional Director, Alaska Region.

g. Resource Protection. The Holder shall take adequate measures as directed and approved by the superintendent of the NPS unit to prevent or minimize damage to resources. This may include restoration, soil conservation and protection measures, landscaping with indigenous grasses and shrubs, and repairing roads, trails, etc. The superintendent or his/her representative may enter and inspect the area authorized by this RWCA and any facilities in it, as deemed necessary by the NPS and without restriction.

h. Cultural Resources. The Holder will halt any activities in the area authorized by this RWCA and notify the superintendent of the NPS unit upon discovery of archeological, paleontological or historical artifacts. All artifacts unearthed remain the property of the United States.

i. Pesticides/Herbicides. Use of pesticides or herbicides is prohibited within the area authorized by this RWCA.

j. Use by the Holder is subject to the right of the NPS to establish trails, roads, and other improvements and betterments over, upon or through the area authorized by this RWCA. Also, at the discretion of the NPS, the area authorized by this RWCA may be open to use by the public and others. If it is necessary for the NPS to exercise such right, every effort will be made by the NPS to refrain from unduly interfering with use of this area by the Holder for the purposes intended under this RWCA. The Holder agrees and consents to the occupancy and use by the NPS and by individuals and entities authorized by the NPS, of any part of the area authorized by this RWCA. The Holder's right to "adequate and feasible access" under Title XI of ANILCA will be respected by the NPS.

k. No deviations from the locations authorized in this RWCA shall be undertaken without the prior written approval of the superintendent of the NPS unit. The superintendent may require the filing of a new or amended application for a proposed deviation.

l. Notwithstanding the relinquishment or abandonment of this RWCA by the Holder, the provisions of this RWCA, to the extent applicable, shall continue in effect and shall be binding on the Holder, its successors, or assigns, until they have fully satisfied the obligations and/or liabilities accruing herein.

m. Upon expiration or termination of this RWCA, in the absence of any agreement to the contrary, the Holder will be allowed six (6) months or such additional time as may be granted in which to

remove from the area authorized by this RWCA all property or improvements of any kind, other than a trail or airstrip and usable improvements to a trail and airstrip, placed thereon by the Holder; but if not removed within the time allowed, all such property and improvements shall become the property of the United States.

n. Upon expiration or termination of this RWCA, the Holder may be required by the NPS to restore the NPS lands affected by the RWCA.

o. This RWCA has no effect on any valid existing rights of access pursuant to any other authority.

p. The Holder agrees that in undertaking all activities pursuant to this RWCA, it will not discriminate against any person because of race, color, religion, sex, or national origin.

q. No member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this RWCA or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this RWCA if made with a corporation for its general benefit.

r. Holder shall indemnify the United States against any liability for damages to life, person or property arising from Holder's occupancy or use of the areas authorized for their use.

s. Any alterations to this instrument must be in writing and signed by the NPS and Holder.

t. Nothing herein contained shall be construed as binding the NPS to expend in any one fiscal year any sum in excess of appropriations made by Congress or administratively allocated for the purpose of this RWCA for the fiscal year, or to involve the NPS in any contract or other obligation for the further expenditure of money in excess of such appropriations or allocations.

u. The waiver of any breach of any provision of this RWCA, whether such waiver be expressed or implied, shall not be construed to be a continuing waiver or a waiver of, or consent, to any subsequent or prior breach of the same or any other provision of this RWCA.

IN WITNESS WHEREOF, the Regional Director, Alaska Region of the National Park Service, acting on behalf of the United States, in the exercise of the delegated authority from the Secretary of the Department of the Interior, has caused this ANILCA 1110(b) Right-of-Way Certificate of Access (RWCA 9865-13-001) to be executed this _____ day of _____, 2013.

Director, Alaska Region
National Park Service
United States Department of the Interior

Regional

ACCEPTED this _____ day of _____, 2013.

Thomas K. Lamal

Signature of Holder

Kathryn K. Lamal

Signature of Holder

APPENDIX G (continued) RWCA 9865-13-001

EXHIBIT A: ALLOWABLE USES AND SPECIAL STIPULATIONS

April 12, 2013

ALLOWABLE USES:

- Holder may utilize the following types of motorized vehicles within the area authorized by this RWCA in support of authorized mining operations on Shamrock and Tony M placer claims: 4 or 6-wheeled and tracked all-terrain vehicles (ATVs) and off road vehicles (ORVs), and snowmachines.
- Holder may use ORVs or equivalent motorized equipment for maintenance operations and to transport personnel, supplies, equipment and materials.
- Holder may use ORVs or equivalent motorized equipment to grade/drag the 20 foot wide airport runway surface area, but not in the adjacent vegetation control areas.
- Holder may place fill material within the 8 foot wide established trail to a level which does not exceed the adjacent ground level.
- Holder may fill holes and depressions on the Chicken Airstrip runway with gravel and soil as warranted using hand tools.
- Holder may cut and/or remove vegetation, brush, shrubs, and living or dead trees from within the area authorized for use by this RWCA, including within the vegetation control areas.
- Holder may place synthetic materials such as geotextiles, geoblock, and/or natural materials, such as logs, sand, gravel and rock, within the 8 foot-wide ORV trail to prevent the loss of, and damage to, soils and substrates.
- Holder may, but is not required to implement the Little Eldorado Trail Prescription, presented in Exhibits C&D, unless so directed by the superintendent to avoid or reduce impacts to park resources
- Holder may undertake the following trail maintenance operations with hand tools within the Shamrock Trail authorized by this RWCA, including drainage ditches, drain dips, placement of gravel and installation of synthetic materials.
- Holder may utilize the Chicken Airstrip to tie-down and/or park aircraft.

SPECIAL STIPULATIONS:

GENERAL

- Holder shall recognize that the claimants of record for the unpatented mining claims on Little Eldorado Creek (AA027046 – AA027051) and on Bonanza Creek (AA029712 - AA029717) may also be authorized by the NPS to use and maintain the Little Eldorado Trail and Chicken Airstrip.

MAINTENANCE:

- Holder shall confine motor vehicle operations to the travel surface of the ORV trail and the airstrip.
- Maintenance operations shall be confined to the area authorized for use by this RWCA.
- Holder shall not blade the ground surface or place fill in the vegetation control areas.
- Holder shall contact the superintendent prior to the start of all non-routine maintenance activities (such as grading the runway surface) to inform the NPS of the nature, extent and schedule of the work to be performed.
- Any change in surface material shall require prior written authorization by the superintendent.

- Holder shall not maintain or grade the runway in a manner that disturbs the adjacent natural soil or vegetation in the vegetation control area.
- Holder shall remove any temporary stakes and/or flagging upon completion of construction or maintenance activities.
- Holder shall take all precautions necessary to prevent wildfires. No burning of debris on parklands will be allowed without specific authorization of the superintendent.
- Holder shall not use or place dust suppressant chemicals within the area authorized for use by this RWCA unless authorized by the superintendent or his/her designee.
- Holder shall obtain and maintain any required Army Corps of Engineer permits.
- Holder shall not disturb or damage any survey monuments.

FUELING:

- All spills of oil, petroleum products, and hazardous substances shall be reported to the Alaska Department of Environmental Conservation (ADEC) in accordance with Alaska law. Concurrent spill notification shall be provided to the superintendent at (907) 822-5234 at the time notification is provided to ADEC.

HYDROLOGY:

- Holder shall maintain water control features to accommodate flood events and to avoid damage to the facility or environment.
- Holder shall insure that installation and replacement of surface water control features, such as culverts, small bridges, French drains, ditches, grade dips, crowning, out-sloping, or depressions with permeable gravels, cobble, or rock, will preserve natural hydrological functions within and adjacent to access facilities.

AQUATIC HABITAT AND FISH:

- Access facility drainages shall be routed away from potentially unstable stream channels, fills, and hill slopes.
- Side-casting of materials from an access facility is prohibited on segments within or abutting areas essential for riparian and aquatic protection.

WATER RESOURCES:

- Holder shall not measurably alter the water quality and/or the banks of streams, rivers, or lakes.
- Holder shall not measurably alter the floodplain of Little Eldorado or Bonanza Creek.
- Holder shall not block or change the character or course of, or cause measurable siltation or pollution in any stream, river, pond, pothole, lake, and lagoon or drainage system.

NATIVE PLANTS:

- Prior to any importing fill material (such as borrow and gravel) for use on the access facility, Holder shall obtain approval by the superintendent or his/her designee that these materials are free of exotic or invasive plant species.
- When transporting any livestock forage and bedding materials with non-native plant species and their seed across parklands, Holder shall prevent the loss of these materials onto parklands. These materials must be covered with tarps or enclosed in containers to prevent the introduction of exotic or invasive species on NPS lands.

WETLANDS:

- Established access in wetland areas shall be reduced in width within the area authorized by this RWCA, where practical and feasible, to allow for restoration of wetlands functions within and/or mitigation of wetlands impacts.
- Holder shall notify the Superintendent if he sees any non-native plants growing in areas authorized by this RWCA.

WILDLIFE:

- Holder shall attempt to avoid clearing of vegetation or construction during bird nesting seasons. If Holder conducts vegetation clearing, grubbing, and other site preparation and construction activities during bird nesting seasons, such activities shall be conducted in a manner that shall not result in the destruction of active bird nests, eggs, or nestlings. If an active nest is encountered at any time, it must be protected from disturbance or destruction.
- Food, garbage and other bear attractants will be stored in bear resistant containers until those materials can be transported to the mining claims or flown out of the area.

EXHIBIT B ANILCA 1110(b) Right-of-Way Certificate of Access (RWCA) #9865-13-001
Wrangell St. Elias National Park & Preserve



Legend

- RWCA
- Mining Claims



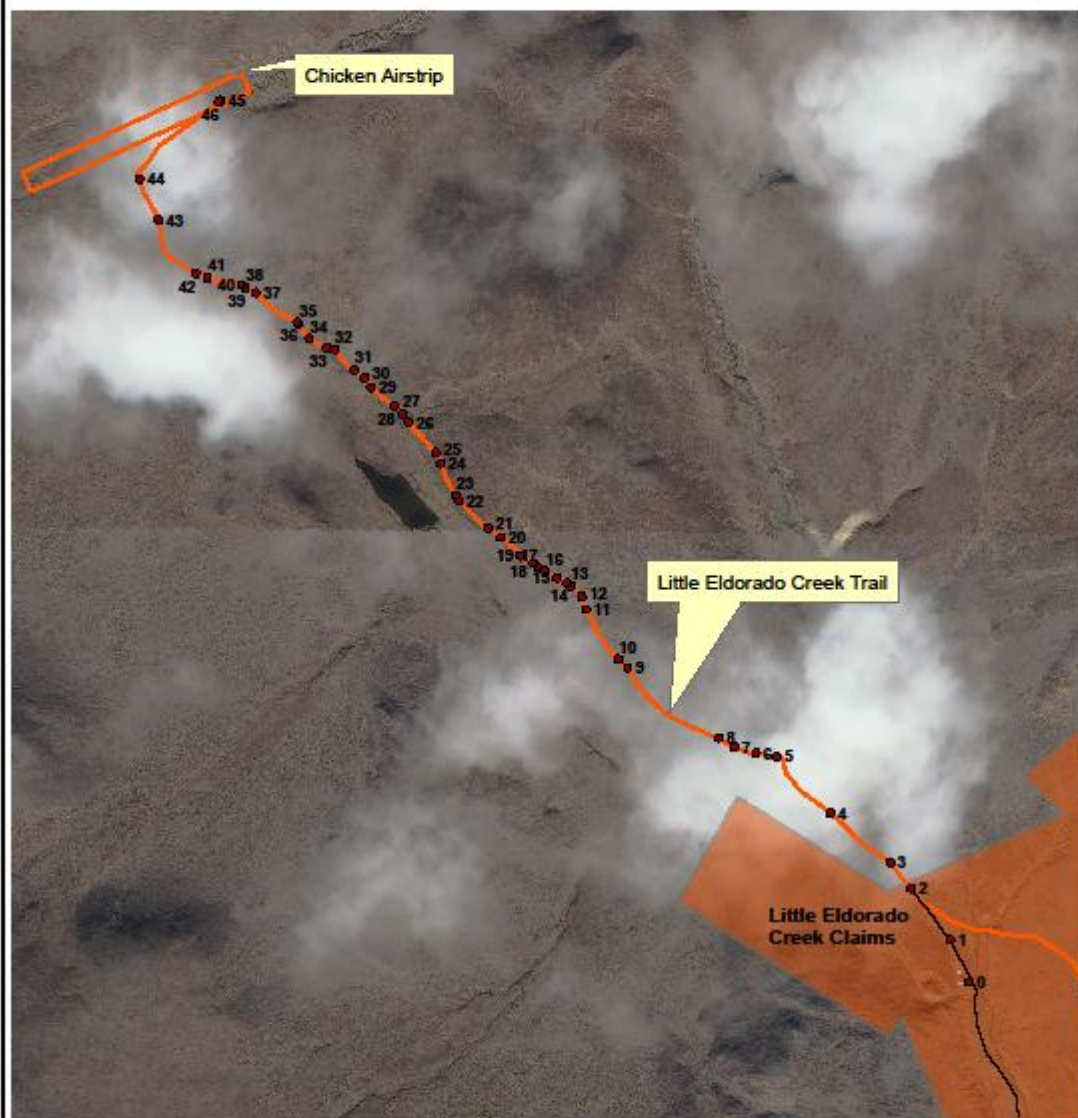
0 0.25 0.5 Miles

National Park Service
Alaska Regional Office
Land Resources Program Center and
Wrangell St. Elias National Park & Preserve

RWCA 9865-13-001 EXHIBIT C

Point	Longitude	Elevation	Note/prescription
0	-141.8378336	1446	Little El Cabin/Camp
1	-141.8383914	1449	Slope out of Little Eldorado Creek
2	-141.8395421	1461	Drain dip
3	-141.8401735	1471	Drain dip
4	-141.8419334	1477	Drain dip
5	-141.8435204	1483	Drain dip
6	-141.8441327	1485	Start gravel cap in wheel ruts 4-6' lift culvert area with drainage ditch continue to WP08
7	-141.8447759	1490	Drain to south side
8	-141.8452123	1494	West end of gravel cap in wheel ruts
9	-141.847908	1502	Drain dip
10	-141.8481944	1500	20-25 feet cobbles, gravel cap in low points total length approx 65 feet
11	-141.849147	1507	West end of section
12	-141.8492749	1509	Paver or gravel 10 foot section
13	-141.8496021	1506	Start of section pavers, drainage & gravel as needed, drain to lower side, gravel cap & paver cobbles, drains flagged, section ends at WP217
14	-141.8497049	1505	Drainage ditch
15	-141.8500229	1502	Drainage ditch & cobble/gravel
16	-141.8503559	1501	Drainage ditch
17	-141.8505775	1500	Drainage ditch, cobbles & gravel
18	-141.8507119	1499	Drainage ditch, cobbles & gravel
19	-141.8510792	1499	Drainage ditch, cobbles & gravel
20	-141.8516649	1498	Drainage ditch only
21	-141.8520365	1499	Starting point, section WP21-22 pavers or geotrack grub to level surface fabric & pavers or Geoblock in geotrack on configuration light grubbing to level no geo textile necessary
22	-141.8529031	1495	West end of 83 feet long section starting at WP21. Starting point for section WP22-24 gravel cap 4-6 inches in wheel tracks
23	-141.8530008	1496	Drainage ditch at low point
24	-141.8534482	1495	Continue to WP 24 (west end) with gravel cap in wheel ruts, photo looking east
25	-141.8535868	1497	Start 75 foot section with gravel/paver fill in track
26	-141.8543925	1495	West end of 75 foot section
26	-141.8543925	1495	Starting point Geoblock track along old lower alignment, center line flagged, continues to WP29, 350 foot section
27	-141.8545741	1494	Drainage crossing, use 4"x10" planking as a bridge over a 5 foot section with 8-10 foot long planks
28	-141.8548198	1492	Drainage crossing, 8-10 treated 2x4 before placing geoblock track for support
29	-141.8555087	1489	Ending point for Geo block section starting at WP26
29	3/25/2013	1489	Section of gravel/pavers in tracks as needed, photo looking east
30	-141.855707	1491	West end of section starting at WP29
31	-141.8560128	1490	Start paver section to WP33,
32	-141.8565866	1487	2-3 drains develop at a low point, drain across wheel track lower center trail, place drainage ditch 25 foot east of WP33, do not use lower trail
33	-141.8568201	1486	End of section starting at WP31. Start section to WP34, 35 foot section, grub to level, geotextile, light gravel & pavers, photo looking east
34	-141.857327	1488	End of section. Starting section with light gravel good substrate multiple drainage ditches, continue to WP37
35	-141.8576414	1487	Drainage ditch
36	-141.8576887	1488	Drain dips
37	-141.8589128	1491	Start section to WP38 of Geoblock in geotrack configuration along old alignment, length 275 feet, one 15 foot section needs 2x4 cordory support with 6 inch spacing

EXHIBIT D ANILCA 1110(b) Right-of-Way Certificate of Access (RWCA) #9865-13-001
 Wrangell St. Elias National Park & Preserve



Legend

- RWCA
- Mining Claims



0 500 1,000 Feet

National Park Service
 Alaska Regional Office
 Land Resources Program Center and
 Wrangell St. Elias National Park & Preserve

APPENDIX H: WETLANDS (EXECUTIVE ORDER 11990)

Executive Order 11990 directs each federal agency to "provide leadership and . . . take action to minimize the destruction, loss or degradation of wetlands" (42 FR 26951, May 25, 1977). The NPS has developed agency guidance for compliance with this executive order.

According to the Environmental Protection Agency (40 CFR 230.0(t)) and the Army Corps of Engineers (33 CFR 328.3(f)) wetlands are defined as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The NPS, in reviewing mining operations in national park units in Alaska according to 36 CFR Subpart 9A (Minerals Management in National Park Service Units), finds that there is no practicable alternative to certain operations disturbing wetland areas.

The suction dredge mining operation described in this environmental assessment would add to impacts in previously disturbed wetland areas along the existing access route. Operation stipulations would restrict access in a manner which confines and minimizes impacts to wetlands.

APPENDIX I: GOLD HILL WATER QUALITY DATA

Table I-1a: All Water Data available for Bonanza Creek (part 1 of 4). Note ID-NO stays the same throughout parts.

ID-NO	DRAINAGE	LOCALE	DATE	ELEV	TEMP	TURBID	CONDOC	PH	DO	ALKA	HARD	WIDTH	DEPTH
					13.0	5;10%;25	520.0000	6.5-8.5	>7	<20;>400	150+hd		
					C	NTU	uS/cm		mg/l	mg/l	mg/l	ft	ft
BC-001	Bonanza Creek	mouth	24-Jun-87	4000	7.0	4.45	170	7.80	11.09	73.0	78.0	19.90	0.504
BC-002	Bonanza Creek	head	24-Jun-87	5000	5.0	1.60	240	8.00	11.76	183.0	165.0	6.00	0.251
BC-003	Bonanza Creek	100 ft. below operating 2" dredge	25-Jun-87	4400	8.5	11.00	230	7.90	.	.	.	.	.
BC-004	Bonanza Creek	20 ft. below operating 2" dredge	25-Jun-87	4400	8.5	16.00	230	7.90	.	.	.	.	.
BC-005	Bonanza Creek	mouth	25-Jul-88	4000	6.0	42.00	250	7.60	14.00	96.2	135.0	38.00	0.471
BC-006	Bonanza Creek	below confluence w/ Little El.	25-Jul-88	4600	5.0	3.30	260	8.02	14.00	108.1	161.0	20.00	0.718
BC-007	Bonanza Creek	mouth/dredge operating on claim 6	25-Aug-88	4000	5.5	1.70	.	7.59	.	120.3	150.0	.	.
BC-008	Bonanza Creek	100 ft. below operating dredge	25-Aug-88	4500	5.5	6.50	.	7.60	.	134.5	172.0	.	.
BC-009	Bonanza Creek	10 ft. below operating dredge	25-Aug-88	4500	5.5	35.00	325	7.68	.	133.7	154.0	.	.
BC-010	Bonanza Creek	below confluence w/ Little El.	25-Aug-88	4600	5.5	1.00	325	7.63	11.00	135.8	186.0	10.00	0.550
BC-011	Bonanza Creek	mouth	29-Sep-88	4000	.	1.60	.	7.20	.	125.1	171.0	.	.
BC-012	Bonanza Creek	below confluence w/ Little El.	29-Sep-88	4600	1.0	1.04	225	7.40	.	149.1	178.0	8.69	0.131
BC-013	Bonanza Creek	mouth	7-Jul-89	4000	12.0	0.95	310	8.00	9.00	176.0	186.0	29.20	0.240
BC-014	Bonanza Creek	below confluence w/ Little El.	7-Jul-89	4600	14.0	0.95	345	8.00	10.00	188.0	204.0	13.12	0.400
BC-015	Bonanza Creek	head, above claims	10-Jul-89	5000	9.0	0.25	355	8.00	10.00	168.5	270.0	8.53	0.240
BC-016	Bonanza Creek	mouth (dredge oper)	26-Jul-89	4000	11.5	2.80	355	8.40	.	.	.	.	.
BC-	Bonanza	claim 4 - 100 ft. below oper.	26-Jul-	4400	11.0	17.00	340	8.70	.	.	.	.	.

017	Creek	dredge	89										
BC-018	Bonanza Creek	claim 4 - 22.5 ft below oper dredge	26-Jul-89	4400	11.0	47.00	375	8.80	.	.	.	.	.
BC-019	Bonanza Creek	mouth	20-Sep-89	4000	4.0	0.60	460	8.35	.	.	.	23.40	0.182
BC-020	Bonanza Creek	claim 4 - 20 ft. below not oper dredge	20-Sep-89	4400	3.0	1.00	460	8.38	.	.	.	11.30	0.305
BC-021	Bonanza Creek	claim 5 - 100 ft. below dredge	9-Jul-90	4000	7.0	5.50	330	8.23	.	.	.	.	.
BC-022	Bonanza Creek	claim 5 - 22 ft. below dredge	9-Jul-90	4000	7.0	9.50	340	8.26	.	.	.	.	.
BC-023	Bonanza Creek	mouth during dredging claim 5	9-Jul-90	4000	9.4	2.50	320	8.37	8.00	168.0	191.0	30.05	0.286
BC-024	Bonanza Creek	below confluence w/ Little El.	9-Jul-90	4600	7.0	0.80	420	8.37	5.00	158.0	372.0	15.61	0.278
BC-025	Bonanza Creek	head	11-Jul-90	5000	5.7	0.70	420	8.07	6.00	168.0	277.0	2.79	0.722
BC-026	Bonanza Creek	claim 4, 30 m below Canyon Crk	15-Sep-90	4400	6.0	0.40	540	8.46	.	143.0	279.0	3.45	0.412
BC-027	Bonanza Creek	mouth	16-Sep-90	4000	4.4	0.50	490	8.48	.	137.0	238.0	5.60	0.353
BC-028	Bonanza Creek	confluence with Little El	16-Sep-90	4600	2.8	0.43	638	8.28	.	151.0	315.0	3.50	0.243
BC-029	Bonanza Creek	mouth	11-Jun-91	4000	4.5	0.94	260	7.92	11.00	181.0	190.5	21.00	0.640
BC-030	Bonanza Creek	confluence w/ Little Eldorado	11-Jun-91	4600	3.0	0.44	300	8.01	11.00	145.0	153.5	16.00	0.505
BC-031	Bonanza Creek	claim 5 - 100 ft. below oper. dredge	13-Jun-91	4000	8.7	3.00	.	8.18	.	.	.	.	.
BC-032	Bonanza Creek	claim 5 - 20 ft. below oper. dredge	13-Jun-91	4000	9.0	12.00	290	8.17	11.00	92.0	144.0	.	.
BC-033	Bonanza Creek	claim 5 - 100 ft. below dredge	25-Jul-91	4000	7.5	19.00	400	8.43	11.00	146.0	185.0	.	.
BC-034	Bonanza Creek	claim 5 - 20 ft. below dredge	25-Jul-91	.	7.5	34.00	380	8.41	10.50	140.0	202.0	.	.
BC-035	Bonanza Creek	mouth	25-Jul-91	4000	5.0	2.20	420	8.35	10.00	206.0	183.5	21.00	0.418
BC-036	Bonanza Creek	confluence w/ Little Eldorado	25-Jul-91	4600	7.5	1.10	440	8.14	9.00	157.0	201.0	16.50	0.443
BC-037	Bonanza Creek	head, above claims, 12 pass	25-Jul-91	5000	4.5	3.80	520	8.42	11.00	201.0	340.0	5.50	0.160
BC-038	Bonanza Creek	claim 5, dredging done for seas.	24-Sep-91	4000	3.0	3.20	520	8.49	.	170.5	268.0	.	.

BC-039	Bonanza Creek	mouth	24-Sep-91	4000	2.5	1.00	460	8.46	.	189.0	243.0	.	.
BC-040	Bonanza Creek	below confluence w/ Little El.	24-Sep-91	4600	2.0	0.50	550	8.45	.	244.5	284.0	14.30	0.313
BC-041	Bonanza Creek	Mouth	27-Jun-92	4000	5.4	5.95	270	7.98	9.50	111.0	167.0	21.00	0.690
BC-042	Bonanza Creek	claim 4 - 100' below	27-Jun-92	4400	9.7	15.00	280	8.28	.	108.9	127.0	.	.
BC-043	Bonanza Creek	claim 4 - 20' below	27-Jun-92	4400	10.0	32.50	270	8.19	8.50	121.5	162.0	12.50	0.556
BC-044	Bonanza Creek	confluence w/Little Eldorado	27-Jun-92	4600	9.7	1.60	315	8.13	8.50	149.0	199.0	18.30	0.630
BC-045	Bonanza Creek	claim 5 - 100' below oper dredge	11-Jul-92	4400	.	.	.	.	.	.	.	.	.
BC-046	Bonanza Creek	claim 5 - 20' below oper dredge	11-Jul-92	4400	10.5	16.00	400	8.36	10.00	171.0	269.0	.	.
BC-047	Bonanza Creek	Mouth/dredge operating	11-Jul-92	4000	9.7	2.00	.	8.37	10.00	188.0	203.0	12.30	0.426
BC-048	Bonanza Creek	confluence w/Little Eldorado	11-Jul-92	4600	9.3	1.50	420	8.37	9.00	173.0	216.5	12.00	0.322
BC-049	Bonanza Creek	Mouth/ ? dredge operating	19-Aug-92	4000	7.6	5.30	330	8.44	9.00	190.0	245.0	26.00	0.639
BC-050	Bonanza Creek	confluence w/Little Eldorado	19-Aug-92	4600	5.1	1.60	380	8.48	10.00	180.0	280.0	20.00	0.645
BC-051	Bonanza Creek	claim 6 - 100' below oper dredge	20-Aug-92	4400	.	.	.	.	.	.	.	.	.
BC-052	Bonanza Creek	claim 6 - 20' below oper dredge	20-Aug-92	4400	5.5	2.20	350	8.42	9.00	186.0	197.0	.	.
BC-053	Bonanza Creek	Mouth	17-Aug-93	4000	7.9	1.10	374	8.42	5.50	151.0	222.0	14.00	0.375
BC-054	Bonanza Creek	confluence w/Little Eldorado	17-Aug-93	4600	8.8	0.60	39	7.84	12.00	151.0	222.0	10.00	0.500

Table I-1b: All Water Data available for Bonanza Creek (part 2 of 4). Note ID-NO stays the same throughout parts.

ID-NO	DEPT H	VE L	DSCH G	METHO D	SS	TSS	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Cr	Co
					0.2ml/hr	500?	0.0500								0.0100	0.0500	
	ft	ft/sec	cfs		mg/l/hr	mg/l	Silver	aluminum	arsenic	boron	barium	beryllium	bismuth	calcium	cadmium	chromium	cobalt
BC-001	0.504	2.120	21.260	B	tr	<2.00	<0.03	<0.15	<0.001	0.0470	0.0140	<0.003	<0.5	23.7000	<0.025	<0.030	<0.02
BC-002	0.251	1.670	2.520	B	0.00	<2.00	<0.03	<0.15	<0.0001	0.0700	0.0240	<0.003	<0.5	29.5000	<0.025	<0.030	<0.02
BC-003	.	.	14.000	E	.	7.0	<0.03	<0.15	<0.001	0.0590	0.0190	<0.003	<0.5	30.6000	<0.025	<0.030	<0.02
BC-004	.	.	14.000	E	tr	12.0	<0.03	<0.15	<0.001	0.0590	0.0180	<0.003	<0.5	30.6000	<0.025	<0.030	<0.02
BC-005	0.471	2.298	52.784	P	.	33.0			0.0120	<10.00							
BC-006	0.718	2.020	45.263	P	.	4.0			0.0120	<10.000							
BC-007	.	.	.		.	<1.00			<0.001	0.2000							
BC-008	.	.	.		.	36.5			0.0020	0.2000							
BC-009	.	.	.		0.10	54.5			0.0040	0.2000							
BC-010	0.550	1.243	9.661	P	0.00	<1.00			0.0020	0.2000							
BC-011	.	.	.		.	1.5			0.0100								
BC-012	0.131	0.598	0.311	P	0.00	1.0			0.0070								
BC-013	0.240	0.598	10.395	P	0.00	2.0			0.0029								
BC-014	0.400	0.779	5.942	P	0.00	<1.0			0.0036								
BC-015	0.240	0.623	2.376	P	0.10	6.0			0.0059								
BC-016	.	.	.		.	2.0			<0.020								
BC-017	.	.	.		.	18.0			<0.020								
BC-	.	.	.		tr	56.0			<0.020								

018																	
BC-019	0.182	1.73 9	8.863	S	0.00	1.4			0.0070								
BC-020	0.305	1.62 1	5.680	S	0.00	<1.0 0			0.0060								
BC-021	.	.	.		tr	18.0			0.0030								
BC-022	.	.	.		tr	17.0			0.0040								
BC-023	0.286	1.44 2	15.216	P	tr	1.6			0.0040								
BC-024	0.278	1.39 7	9.927	P	tr	<1			0.0010								
BC-025	0.722	0.26 6	0.221	P	0.00	1.6			0.0050								
BC-026	0.412	1.49 5	8.049	P	0.00	<1.0			<0.001								
BC-027	0.353	0.96 0	4.347	p	0.00	<1.0			<0.001								
BC-028	0.243	1.60 3	4.779	p	0.00	1.2			<0.001								
BC-029	0.640	1.73 9	21.195	P	0.00	3.0			0.0010								
BC-030	0.505	1.60 1	16.812	P	0.00	1.5			<0.001								
BC-031	.	.	.		.	22.0			<0.001								
BC-032	.	.	.		tr	41.0			0.0010								
BC-033	.	.	.		.	30.0			<0.001								
BC-034	.	.	.		0.05	70.0			0.0110								
BC-035	0.418	0.96 7	12.510	P	tr	<1.0			<0.001								
BC-036	0.443	1.23 7	13.689	P	tr	1.0			<0.001								
BC-037	0.160	0.29 4	0.355	P	tr	2.0			<0.001								
BC-038	.	.	.			2.6			0.0050								
BC-039	.	.	.			<1.0			<0.001								

BC-040	0.313	0.95 1	5.641	P		<1.0 0			<0.001								
BC-041	0.690	1.48 9	25.835	P	.	4.0			<0.001								
BC-042	.	.	.	N	.	25.0			<0.001								
BC-043	0.556	2.04 3	18.270	P	0.05	56.0			0.0030								
BC-044	0.630	1.53 8	22.137	P	tr	<1.0 0			<0.001								
BC-045	.	.	.	N	.	8.0			<0.001								
BC-046	.	.	.	N	tr	30.0			<0.001								
BC-047	0.426	1.96 8	11.251	P	tr	<1.0			<0.001								
BC-048	0.322	3.79 1	11.315	P	tr	<1.0 0			<0.001								
BC-049	0.639	4.19 0	69.613	S	0.10	3.0			<0.001								
BC-050	0.645	2.45 0	38.373	P	tr	<1.0 0			<0.001								
BC-051	.	.	.	N	.	4.0			<0.001								
BC-052	.	.	.	N	tr	2.0			<0.001								
BC-053	0.375	2.90 0	12.940	S	0.00	<1.0			<.003								
BC-054	0.500	1.80 0	7.640	S	tr	<1.0 0			0.0070								

Table I-1c: All Water Data available for Bonanza Creek (part 3 of 4). Note ID-NO stays the same throughout parts.

ID-NO	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	PO 4	Pb	Sb	SiO2	Sn	Sr	Ti
	1.0000	0.0500	0.0020			0.0500					0.0500					
	coppe r	iron	mercur y	potassiu m	magnesi um	manganes e	molybden um	sodiu m	nickel		lead	antimon y		Tin	strontiu m	Titanu m
BC-001	<0.015	0.0640		0.5800	5.6700	0.0580	<0.04	3.4700	<0.025	<0.04	<0.08	<0.15	8.3400	<0.03	0.1100	<0.006
BC-002	<0.015	<0.030		0.5800	9.9600	<0.003	<0.04	3.3900	<0.025	<0.04	<0.08	<0.15	4.9400	<0.03	0.1500	<0.006
BC-003	<0.015	<0.030		0.6300	7.7100	<0.003	<0.04	4.2800	<0.025	<0.04	<0.080	<0.15	7.2100	<0.03	0.1400	<0.006
BC-004	<0.015	<0.030		0.7400	7.6800	<0.003	<0.04	4.3900	<0.025	<0.04	<0.080	<0.15	7.2000	<0.03	0.1400	<0.006
BC-005			<0.0003			<0.050					0.0040					
BC-006			<0.0003			<0.050					0.0010					
BC-007			<0.0002			<0.100					0.0010					
BC-008			<0.0002			0.0400					0.0020					
BC-009			<0.0002			0.1100					0.0020					
BC-010			<0.0002			<0.010					<0.001					
BC-011			<0.0002			<0.001					<0.001					
BC-012			0.0002			<0.010					0.0010					
BC-013			0.0009			0.0350					0.0010					
BC-014			0.0011			0.0210					<0.005					
BC-015			0.0020			<0.005					0.0101					
BC-016			0.0010			0.0120					<0.001					
BC-017			0.0011			0.0740					0.0020					
BC-			0.0012			0.2060					<0.00					

018											1					
BC-019			0.0012			0.0190					<0.001					
BC-020			0.0000			0.0300					<0.001					
BC-021			0.0012			0.0300					0.0260					
BC-022			0.0014			0.0200					0.0130					
BC-023			0.0016			<0.01					0.0040					
BC-024			0.0014			<0.01					0.0060					
BC-025			0.0012			<.01					0.0110					
BC-026			0.0004			0.0040					<0.001					
BC-027			0.0005			0.0040					<0.001					
BC-028			0.0003			0.0040					<0.001					
BC-029			0.0007			0.0020					<0.001					
BC-030			0.0008			<0.002					<0.001					
BC-031			0.0008			0.0240					0.0200					
BC-032			0.0007			0.0510					<0.001					
BC-033			0.0004			<0.033					<0.042					
BC-034			0.0005			0.1740					<0.042					
BC-035			0.0004			<0.033					<0.042					
BC-036			0.0005			0.0330					<0.042					
BC-037			0.0005			<0.033					<0.042					
BC-038			<0.0002			<0.033					<0.001					
BC-039			<0.0002			<0.033					<0.001					

BC-040			<0.002			<0.033					0.001 0					
BC-041			<0.000 2			0.0060					<0.00 1					
BC-042			<0.000 2			0.0470					<0.00 1					
BC-043			<0.000 2			0.2950					0.002 0					
BC-044			<0.000 2			0.0050					<0.00 1					
BC-045			<0.000 2			0.0280					<0.00 1					
BC-046			<0.000 2			0.0750					<0.00 1					
BC-047			<0.000 2			0.0040					<0.00 1					
BC-048			<0.000 2			<0.002					0.002 0					
BC-049			<0.000 2			0.0110					0.002 0					
BC-050			<0.000 2			0.0040					0.040 0					
BC-051			<0.000 2			0.0080					0.052 0					
BC-052			<0.000 2			0.0070					0.021 0					
BC-053			<0.000 2			0.0040					<0.00 2					
BC-054			<0.000 2			0.1060					<0.00 2					

Table I-1d: All Water Data available for Bonanza Creek (part 4 of 4). Note ID-NO stays the same throughout parts.

ID-NO	V	Zn	NOTES
		5.0000	
	vanadium	zinc	
BC-001	<0.01	<0.015	10' below 1986 sample site (? if dredge operating)
BC-002	<0.01	<0.015	site 1/4 mi below 1986 site
BC-003	<0.01	<0.015	silt plume from dredge spread over whole creek. Sed. dissipating quickly. Cleared as soon as dredge shut down
BC-004	<0.01	<0.015	mineral examiner 2" dredge operating 300' above canyon creek. Sluice was on bank, emptied into 5 gal bucket, then into stream. Dredge ran 10 min. before sampling
BC-005			
BC-006			
BC-007			dredge operating on claim 6
BC-008			dredge operating on claim 6
BC-009			dredge operating on claim 6
BC-010			
BC-011			
BC-012			
BC-013			
BC-014			
BC-015			turbid from lab; site 200' upstream of despair claims
BC-016			
BC-017			
BC-018			
BC-019			

BC-020			
BC-021			
BC-022			
BC-023			
BC-024			
BC-025			
BC-026			
BC-027			
BC-028			
BC-029			turbid done in lab/value low
BC-030			turbid done in lab/value low
BC-031			turbid done in lab/value low
BC-032			turbid done in lab/value low
BC-033			
BC-034			
BC-035			
BC-036			
BC-037			
BC-038			
BC-039			
BC-040			
BC-041			

BC-042			
BC-043			
BC-044			
BC-045			
BC-046			
BC-047			
BC-048			
BC-049			
BC-050			
BC-051			
BC-052			
BC-053			
BC-054			

APPENDIX_1b _Water-Tables_130321(dft)**Table I-2 Water quality attributes from Bonanza Creek (NPS, 1995).**

Attribute	Bonanza Upstream	Bonanza Mouth
Discharge (CFS)	11.60 (6.81)	17.87 (8.84)
Temperature (C)	5.60 (2.03)	6.90 (1.41)
Ph	8.00 (0.149)	8.11 (0.17)
Conductivity (UM/mS/cm)	403.6 (81.34)	387.5 (39.58)
Alkalinity (mg/l)	165.3 (18.91)	145.7 (13.87)
Hardness (mg/l)	227.3 (24.70)	199.2 (17.35)
Dissolved Oxygen (mg/l)	12.00 (1.54)	9.50 (2.47)
Turbidity (NTU)	1.14 (0.44)	6.32 (5.10)
Settleable Solids (ml/l/hr)	0.00	0.00 (0.00)
Total Suspended Solids (mg/l)	1.50 (0.84)	5.84 (4.53)
Arsenic (mg/l)	0.0058 (0.0020)	0.0058 (0.0025)
Lead (mg/l)	0.0010 (0.0003)	0.0020 (0.0020)
Manganese (mg/l)	0.0265 (0.0265)	0.0013 (0.0013)
Mercury (mg/l)	0.0003 (0.0003)	0.0005 (0.0002)

Mean and standard error of baseline. Values are from balanced samples when the dredge was not in operation (NPS, 1995)

Table I-3: Effects of suction dredge operations on water quality attributes in Bonanza Creek (NPS, 1995)

Attribute	Above Claims	20' below dredge	100' below dredge
Discharge (CFS)	17.42 (3.87)	16.13 (2.13)	14.00 (.)
Temperature (C)	6.73 (0.90)	7.94 (0.67)	7.82 (0.60)
Ph	8.16 (0.109)	8.17 (0.092)	8.10 (0.123)
Conductivity (UM/mS/cm)	371.43 (21.79)	323.12 (20.15) ^b	310.0 (36.29)
Alkalinity (mg/l)	156.8 (5.86)	140.7 (13.86)	129.8 (10.96)
Hardness (mg/l)	229.7 (27.79)	188.0 (18.80)	161.3 (17.57)
Dissolved Oxygen (mg/l)	9.07 (0.775)	9.80 (0.464)	11.00 (.)
Turbidity (NTU)	1.15 (0.167)	19.65 (4.431) ^{a*}	10.00 (2.507) ^{a*}
Settleable Solids (ml/l/hr)	0.00 (0.00)	0.025 (0.016)	.
Total Suspended Solids (mg/l)	0.71 (0.101)	35.31 (8.503) ^a	18.81 (4.147) ^a
Arsenic (mg/l)	0.0007 (0.0003)	0.0028 (0.0013)	0.0009 (0.0004)
Lead (mg/l)	0.0130 (0.0073)	0.0116 (0.0059)	0.0203 (0.0080)
Manganese (mg/l)	0.0022 (0.0010)	0.0943 (0.0069) [*]	0.0208 (0.0105)
Mercury (mg/l)	0.0004 (0.0002)	0.0005 (0.0003)	0.0005 (0.0002)

Data are mean values from balanced samples gathered during operation of the dredge (1987-1992), (NPS, 1995).

^aValue is greater than at above the claims, $P < 0.05$, paired T Test

^bValue is less than above the claims, $P < 0.05$, paired T Test.

^{*}Value is greater than the regulatory maximum; 18 AAC 70, 80.5

