

Fireline Rehabilitation on Donnelly Flats fire (B222)  
Summary: 7/1/99 R.R. Jandt

Assessment- During the suppression effort approximately 20-25 miles of bladed fireline was built using D-8-equivalent dozers. In most places the soil was frozen immediately under the thin organic layer (about 2-5") when the work was done. After two weeks the section of fireline south of the 12-mile crossing on the fire perimeter had melted to a depth of 18", but there was little standing water and no flow. The first bladed line on the fire, south of 12-mile crossing, burned over within the first 2 operational periods; it had melted to 2.5' in spots. Of the total less than 10% fell into a moderately high risk category of permafrost pockets with fine, silty soils or grades > 10% slope which may subside or erode without treatment. The fire is located within interior Alaska lowlands resource area and major soil type is typic cryochrept--very gravelly, nearly level to rolling association (USDA Soil Conservation Service, 1979). This is an ochrept type soil which is characterized by good drainage, thin organic layer, and low acidity. The Nenana series, which occurs locally is described as very gravelly. Therefore, soils are relatively low risk for water erosion.

It was determined that about 12-15 miles of bladed fireline, mainly along the final fire perimeter, required some level of treatment (see Options, Appendix I). Sections of fireline were prioritized based on risk due to water retention, grade, proximity to ponds, fines component to the soil, and proximity to the visual corridor along the Richardson Highway and treated using excavator, bulldozer, or hand crew (see map). Water diversion trenches were placed where grade exceeded 10% or water was flowing on the line. Flat sections of interior (burned-over) fireline in which the soils were stable and well-drained and berm material had mostly been burned, were left untreated. No seeding was prescribed.



Sections of fireline treated with heavy equipment were covered to about 75% with replaced berm material. The excavator was particularly effective where precision work was required, such as leaving winter travel corridor in a trapline trail which was bulldozed, and in moderately wet sections (Figs. 1, 7, 8). Where the line is dry enough for it to work from the middle (person sinks in <2") it effects no additional damage to surrounding vegetation. The bulldozer has long been used to rehabilitate bladed firelines, and works 3 to 4 times faster than the excavator. Resulting cover is similar. One

limitation of the excavator is that its top speed is about 1 mile/hour, so unless transport access is available fairly close to the work, a good deal of time can be spent in reaching the work area.

Only one section of line, approximately 0.25 miles long, required treatment by hand crew (Fig. 2-6). This area had water standing 2' deep in places, and some water flow, although the grade was mild (<3%) (see map). The crew cut tundra blocks from the berms and cut small trees

from the berms and surrounding forest to scatter on the line for shading and silt entrapment, as well as making drainage trenches where possible. Most of the water on the line was flowing from the watershed above the line with seasonal melt and rainwater, and water was flowing out of the burned areas and onto the line. About 25-50% cover was achieved on this section of line. Photopoints were established. A significant reduction in standing or flowing water was noted between the day before treatment and a week later.

Resource Risk- Significant risk of water erosion on bladed firelines has been mitigated. Slight risk of wind erosion on untreated areas exists; not likely to be noticed relative to contributions from glacial river dust prevalent in area and burned areas. Aesthetic values impaired by the suppression effort have been mitigated as much as possible in areas near private lands, visual corridor, and public use areas but less than 100%. Visual impacts will remain on areas treated to the light standard will remain primarily within the military use areas east of the Richardson highway. Lightly treated and untreated (burned-over) sections of fireline will revegetate naturally in 3-5 years, while high standard treatment area will revegetate in 1-3 years. Seed bank surrounding burned over fireline is likely to be intact, (Stoney Wright, DNR Plant Materials Center- Palmer, Alaska, pers. comm.) so the 3-5 year estimate may actually be similar to treated areas (1-3 years). Recreational and subsistence impacts (to traplines, fishing) due to suppression effort have been mitigated. Estimated costs of the rehab, including support costs will be about \$75,000-\$80,000.

Figure 1:  
Section of wet dozer line, south of 12-mile crossing, before and after treatment using excavator.



Figure 2. Comparison of bulldozed fireline rehabilitated using hand crews. Photopoint 1, view south on fireline, before and after treatment (63 52.410 x 145 43.472).



Figure 3. Comparison of bulldozed fireline rehabilitated using hand crews. Photopoint 1, view north on fireline, before and after treatment (63 52.410 x 145 43.472)

Figure 4. Comparison of bulldozed fireline rehabilitated using hand crews. Photopoint 2, view south on fireline, before and after treatment (100m N. of PP1, 63 52.432 x 145 43.423).



Figure 5. Comparison of bulldozed fireline rehabilitated using hand crews. Photopoint 3, view northwest on fireline, before and after treatment.



Figure 6. Comparison of bulldozed fireline rehabilitated using hand crews. Photopoint 4, before and after treatment.

Figure 7. Comparison of section of bulldozed fireline before and after rehabilitation using excavator. This line burned over 2 weeks previously; frost in ground had receded 2.5 ft. The equipment worked off the line from the berm side, so that it would not sink in the mud.



Figure 8. Comparison of section of bulldozed fireline before and after rehabilitation using excavator. This line burned over 2 weeks previously; frost in ground had receded 2.5 ft.



## Appendix I

### SUPPRESSION REHABILITATION OPTIONS FOR B222

Prepared 6/24/99 R. R. Jandt, Alaska Fire Service

#### A. Minimal rehabilitation:

Action- treat only sections of bladed fireline which overlies permafrost pockets with fine, silty soils or grades > 10% slope which will subside or erode without treatment. Minimal waterbarring. No seeding.

Assessment- of approximately 20-25 miles of bladed fireline (both inside the perimeter and on the final fire perimeter), less than 10% falls into this moderately high risk category. The fire is located within interior Alaska lowlands resource area and major soil type is typical cryochrept--very gravelly, nearly level to rolling association (USDA Soil Conservation Service, 1979). This is an ochrept type soil which is characterized by good drainage, thin organic layer, and low acidity. The Nenana series, which occurs locally is described as very gravelly. Therefore, soils are relatively low risk for water erosion.

Cost- Excavator 2 days (12 hrs) @ \$120/hr = \$2,880

Dozer boss 2 days @\$450/day = \$900

Total: \$3,780

Additional support already present due to mop-up effort.

(note: part of this work is already completed, thus only 2 additional days required)

Resource Risk- although subsequent soil erosion would be low, there may be some eroded areas on blades firelines, and a moderate risk of light siltation of ponds in Div. F which are used for sport fishing. Aesthetic values to sections used by or visible to the public near the Richardson hwy would be degraded. Firelines will naturally revegetate over a 3-5 year period.

#### B. Moderate level of rehabilitation:

Action- treat all sections of bladed fireline which can be effectively treated by returning some of the bulldozed vegetative material including trees and organic material. Do a light treatment (approx. 25% cover of replaced material) on gravelly sections of line with little risk of erosion and higher standard of cover (75%) on areas within the visual corridor, which are retaining water, have a grade, are near ponds, or have a significant fines component to the soil. Waterbar any areas where water could flow >300' on a section of fireline. No seeding.

Assessment: see above for soils description. About 12-15 miles of bladed fireline will require some level of treatment. A bulldozer could be used outside the visual corridor for faster completion of low-priority sections (7 miles).

Cost: Dozer for 2 days (12 hrs) @ \$175/hr = \$4,200

Hand crew (type 2) 1 day @ \$3,850 = \$3,850

Excavator for 5 days (12 hrs) @ \$120/hr = \$7,200

Truck for dozer bosses: 7 days @ \$100/day = \$700

Overhead: 1 dozer boss, IC, timekeeper (\$450/day/ea X 5 days) +

STLC X 2 days + dozer boss X 2 days = \$9,000

Support cost, personnel: \$9,000 X 50% = \$4,500

Subtotal: \$29,450

Supply cost- (subtotal X 15%)= \$4,417

Total: \$33,867

Resource Risk- Significant risk of water erosion will be mitigated. Slight risk of wind erosion on untreated areas, not likely to be noticed relative to contributions from glacial river dust prevalent in area and burned areas. Aesthetic values will be mitigated in areas near private lands, visual corridor, and public use areas. Recreational and subsistence impacts (to traplines, fishing) will be mitigated. Visual impacts will remain on areas treated to the light standard will remain primarily within the military use areas east of the Richardson highway. Lightly treated and untreated (burned-over) sections of fireline will revegetate naturally in 3-5 years, while high standard treatment area will revegetate in 1-3 years. Seed bank surrounding burned over fireline is likely to be intact, (Stoney Wright, Plant Materials Center- Palmer AK, per. comm.) so the 3-5 year estimate may actually be similar to treated areas @ 1-3 years.

C. Rehabilitate to full extent possible:

Action- treat all sections of bladed fireline by returning some of the bulldozed vegetative material including trees and organic material, including burned-over fireline. Achieve at least 75% cover of fireline with returned berm material and trees. Waterbar any areas where water could flow on a section of fireline. Seed & fertilize burned-over fireline (approx. 7 miles) with a mixture of arctic red fescue and Bering hairgrass (native grasses) 40#/ac. Fertilize with 20:20:10 fertilizer @ 300#/ac. (approx. 17 ac)

Assessment: see above for soils description. About 20-25 miles of bladed fireline will require treatment. Excavator will do the most complete and aesthetically appealing job. Since treatment time will be extended, recommendation would be for demobing all fire support after mop-up is complete except for equipment boss who could work for I.C. or zone FMO and resource advisor. Rehabilitation effort is more likely to experience weather delays which will extend residence time and cost accordingly.

Cost:

Hand crew (type 2) 3 days @ \$3,850/day = \$11,550 (for seeding/fertilizing)

May be possible to use helicopter instead or contract this work.

Excavator for 14 days (12 hrs) @ \$120/hr = \$20,160

Assuming 2 excavators on incident.

Truck for dozer bosses: 14 days @ \$100/day = \$1,400

Overhead: 2 dozer boss, 1 STLC, IC, timekeeper (\$450/day/ea X 7 days)=

\$15,750

Support cost, personnel: \$15,750 X 50% = \$7,875

Subtotal: \$40,985

Supply cost- (subtotal X 15%)= \$6,148

Seed: 600# X \$10/# = \$4,200\*

\*for 50/50 mix. Red fescue alone is \$1.66/# = \$1,200

Fertilizer: 5,000# = \$1,500

Total: \$52,833

Resource Risk- Least risk of water or wind erosion of fireline. Best aesthetic values preservation on military training areas. Recreational and subsistence impacts (to traplines, fishing) will be mitigated. Fireline treatment area will revegetate in 1-3 years. Slight risk of

additional damage to fragile soil areas due to equipment, truck and personnel traffic on firelines during the rehabilitation effort. Higher risk of degradation of military service roads and access routes due to vehicle usage. Possible conflicts with military training exercises due to longer residence time of fire personnel.

Citations:

USDA, Soil Conservation Service. 1979. Exploratory soil survey of Alaska. USDA 213pp + maps.