United States Department of Agriculture | Forest Service | Washington Office | 14th & Independence SW, P.O. Box 96090, Washington, DC 20090-6090

Reply to: 2520-3/6520 **Date:** October 18, 1996

Subject: Burned Area Emergency Rehabilitation - Supplemental Request #2, Buffalo Creek Fire, Pike National Forest

To: Regional Forester, R-2

We have received your second request for Burned Area Emergency Rehabilitation (BAER) supplemental funding for the Buffalo Creek Fire on the Pike National Forest. The standards for approving emergency actions are found in FSM 2523 and FSH 2509.13.

The unfortunate series of events recorded in the area burned by the Buffalo Creek Fire fall within the instructions in FSM 2523.1a6, which allows approval of supplemental funding as follows: "If unusually severe climatic events cause a project to fail within a year following installation, submit an interim report and request WFSU funds needed to meet prescribed objectives."

Your initial request for $ 105,700 was approved on May 28, 1996. Your initial supplemental request for $ 981,800 was approved on August 2, 1996. We now approve your current request for $ 712,660 in the following treatment categories as described in Part VI of form FS-2500-8. The Fund/Activity codes for this action are WFSU-FW22. This brings your total authorizations for this fire to $ 1,800,160.

Land Treatments	$ 620,160
Channel Treatments	$ 77,500
BAER Survey/Admin.	$ 15,000
Total	$ 712,660

BAER ID Team costs are approved to the extent of actual salary, travel, and per diem incurred. Administrative personnel working in support of rehab survey are considered members of the team. Contracting and administrative costs of implementing treatments should be reflected in treatment costs.

The removal of sediments will require coordination with the US Army Corps of Engineers to comply with Clean Water Act Section 404 provisions, and with the State of Colorado to secure Section 401 water quality certification in conjunction with the 404 permit.

Granting two supplemental funding requests for one BAER project is extremely rare. This office is unable to consider further requests except under the most unusual circumstances. If the Forest is unable to complete full implementation of project work prior to winter weather, we fully expect project completion next spring as soon as the site is accessible.

Also, we strongly encourage the Region and Forest to consider allocation of NFSI funds to these burned watersheds to provide further watershed improvement efforts for FY 1997 and possibly longer.

Russell LaFayette, National BAER Program Manager, will be available to visit the burned area on November 1. Please work with Russ to make arrangements for a site visit.

Send your final 2500-8 describing treatment units completed and their costs within 60 days after completing the treatments. If submitting additional supplemental funding requests, a brief status report of accomplishments to date will aid review of the request.

/s/Arthur R. Bryant
ARTHUR R. BRYANT, Director
Watershed and Air Management

Enclosure

cc: J.Freeouf:R02A
M.Tjarks:R02A
NFCBC:W01C
A.Sartori:W01C
A.Wojtasek:W01C

United States Department of Agriculture | Forest Service | Rocky Mountain Region

P.O. Box 25127
Lakewood, CO 80225-0127
Delivery: 740 Simms St.
Golden, CO 80401

File Code: 2520-3/6520
Route To: 2500

Date: October 3, 1996

Subject: Burned Area Emergency Rehabilitation - Supplement/Buffalo Cr. Fire
Pike National Forest

To: Director Watershed and Air Management, W/O

Enclosed find a supplemental Burn Area Emergency Rehabilitation request for authorization to spend additional funds for burn rehabilitation.

FSM 2523.21a6 authorizes submission for supplemental funds when severe climatic events occur within one year of rehabilitation of a burn area.

/s/Tom L. Thompson for

ELIZABETH ESTILL
Regional Forester

cc: R.LaFayette:W01A

Addendum #2 to initial BAER 2500-8 for Buffalo Creek Fire, fire no. CO-PSF-25888, submitted May 27, 1996.

FS-2500-8 (8/93)

USDA-FOREST SERVICE Date of Report: **October 3, 1996**

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report

[X] 1. Funding request for estimated WFSU-FW22 funds
[ ] 2. Accomplishment Report
[ ] 3. No Treatment Recommendation

B. Type of Action

[ ] 1. Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)

[X] 2. Interim Report
[X] Updating the initial funding request based on more accurate site data and design analysis
[ ] Status of accomplishments to date

[ ] 3. Final report - following completion of work

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: **Buffalo Creek** B. Fire Number: **CO-PSF-25888**

C. State: **Colorado** D. County: **Jefferson**
E. Region: **Rocky Mountain** F. Forest: **Pike**
G. District: **South Platte**

H. Date Fire Started: **May 18, 1996** I. Date Fire Controlled: **May 24, 1996**
J. Suppression Cost: **$2,800,000**

K. Fire Suppression Damages Repaired with EFFS-PF12 Funds:
1. Fireline waterbarred (miles) **35**
2. Fireline seeded (miles) **0**
3. Other (identify) _____

L. Watershed Number: **1019000205 and 1019000213**

M. NFS Acres Burned: **11,320** Total Acres Burned: **11,900**
Ownership type:
(**0**)State (**0**)BLM (**580**)PVT ( )_____

N. Vegetation Types: **PIPO/MUFIL**
PSME/MUMOL
O. Dominant Soils: **Sphinx and Sphinx/Rock Outcrop Complex**
P. Geologic Types: **Pikes Peak batholith (decomposed granite)**

Q. Miles of Stream Channels by Order or Class:
1st - 17.4 2nd - 5.1 3rd - 8.3 _____

R. Transportation System:
Trails: 25.0 miles Roads: 20.2 miles

PART III - WATERSHED CONDITION

A. Fire Intensity (acres): 1100 (low) 3300 (moderate) 7500 (high)

B. Water-Repellent Soil (acres): 2400

C. Soil Erosion Hazard Rating (acres):
146 (low) 4375 (moderate) 7354 (high)

D. Erosion Potential: 8-20 tons/acre
E. Sediment Potential: 810-20000 cubic yards / square mile

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period: 4-5 years
B. Design Chance of Success: 80 percent
C. Equivalent Design Recurrence Interval: 100 years
D. Design Storm Duration: 24 hours
E. Design Storm Magnitude: 2.5 inches
F. Design Flow: 675 cubic feet per second per square mile
G. Estimated Reduction in Infiltration: 4 percent
H. Adjusted Design Flow: 702 cubic feet per second per square mile

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

CHANGES SINCE SUPPLEMENTAL (BAER 2) REQUEST AND REHAB LOSSES

A third significant rainfall event occurred in the Buffalo Creek area on August 23, 1996. This storm had an intensity of 0.95 inches within a one-hour period. Another storm occurred on September 14, 1996. Flooding from these storms caused significant soil erosion to some side slope areas and nearly all untreated drainages within the fire area. The rainfall caused a release of sediment that further impacted water quality and biology of the Buffalo Creek and the South Platte River. Sediment from the flood reached Strontia Springs Reservoir which is the water intake for the City of Denver. The Strontia Springs resevoir has been surveyed to have 18 feet of sediment over the bottom outlet of the reservoir. The city of Denver will be opening the bottom outlet to release sediment from the reservoir. The release of sediment may impact fisheries and water quality downstream. Fire residue and sediment affected the character of the water that was supplied to the residence of the metropolitan area. Color, taste and smell were affected. Although the water was safe to drink the physical character reduced perceived quality. Several tons of sediment and fire residue were transported to the intermittent side channels of Buffalo Cr. and Spring Cr. (perennial streams in area) and deposited, waiting for the next high flow to carry it down to the Reservoir.

A surge of high water in the Buffalo Creek drainage washed out FDR 543 in several places, and destroyed several privately constructed bridges to residences in the area. Application has been made to the Federal Highways Administration for emergency funding to repair the road, but these funds are limited to work within the road right-of-way. The road, and the adjacent riparian area of Buffalo Creek, continue to be vulnerable to further flood events due to the lack of vegetation throughout the drainage.

Emergency rehab practices prior to the August storm included seeding, contour tree felling and soil tillage using the Rotoclear machine. The treated areas effectively minimized soil movement in the Spring Gulch and Sand Draw areas. Most of the damage from this latest storm occurred in areas that have yet to be treated. The treated areas constitute about one-third of the intensively burned area, and treatments have been confined to the most accessible portions of the fire area. There are several thousand acres of moderate and high fire intensity in the Spring Gulch drainage that have received no treatments to date.

Potential damages similar to the previous storms can be expected with future rainstorms without further treatment to the burned areas. The potential for significant runoff is expected for several years if adequate soil stabilization and vegetation establishment does not occur during the recovery period. Native vegetation is sparse to non-existent in many areas following a period of 3 months since the fire. The first frost will begin in 1 1/2 months or less.

The Buffalo Creek fire burned a portion of the South Platte River watershed above Strontia Springs Reservoir. The reservoir serves as storage and intake for water providers of the metropolitan Denver area. The area burned lies between the North Fork of the South Platte and the South Platte River. This triangle piece of forest land is composed of a highly erodible decomposed granitic soil on steep slopes. Runoff and sediment from the burned area equivalent to 11 times the normal annual yield has already been delivered into the reservoir. The sediment reduces the capacity of the reservoir as well as acting as a carrier for burn area residue. This residue in the form of ash and dissolved nutrients reduces the quality of the water delivered to the metro area water users. (Several announcements have already been made through various media by the water providers that the physical and chemical quality of the water may be impaired from the recent flood events, however, the water is safe to drink.)

Large deltas of sand washed out of the side drainages and deposited in the major valley bottom are posing a threat to cause additional flooding and impacts on the down stream water supply systems. These deltas have pushed the streams to sides of the valleys and are acting as temporary dams. The streams are slowly eroding the deltas back but if even a normal runoff occurs there could be the possibility of surges of flood flows down the main rivers. This threat is expected to last several years unless the creek are returned to prefire locations and the deltas removed.

Soil Productivity

Accelerated erosion within the moderate and high intensity burn areas has occurred. The dominant soil is Sphinx series. These soils are gravelly course sandy loams and shallow (hydrologic soil group D). Runoff is rapid and the hazard of water erosion is moderate to severe. The organic layer is inherently shallow (less than 1 inch of predominately undecomposed material) so

maintenance of this layer is critical for long term productivity, erosion control and assimilation of rainfall input. This critical layer was heavily consumed by the fire and has been lost through post fire flooding events. Hydrophobic soils remain in the high burn intensity areas. The hydrophobic layer occurs from 1/4" below the surface to 1-2 inches below the soil surface for a thickness of 3/4"-1 3/4".

Water control and water quality

Because these watersheds are hydrologic soil group D, are heavily dissected, and the organic layer (sponge) has been heavily consumed, watershed response to the design storm is expected to be moderately rapid to rapid. Therefore, there is a high flooding potential in the lower reaches of Spring Creek, Sand Draw, Spring Gulch, Shinglemill Creek, Morrison Creek and Buffalo Creek. These areas have shown significant flooding following the fire. Flooding potential downstream of Spring Creek and Buffalo Creek is moderate to high. The flood debris carried in the North Fork of the South Platte and the South Platte Rivers will be deposited into the Strontia Springs Reservoir and affect the ability of the metro area water providers to supply high quality water to the metro area users.

Perennial streams within the burn contained a popular trout fishery. These fisheries have been decimated following the flooding events. Directly downstream of the burn are reaches of high fishery value (Gold Medal Trout Fishery as designated by the State of Colorado). Additionally, directly downstream of the burn is a proposed Wild and Scenic River segment. Because of these beneficial uses and because the hazard of water erosion is moderate to severe, the continued delivery of sediment and the burned organic layer to the drainage network is of extreme concern. As Road 543 is repaired, the team recommends treatment of all remaining sediment fans.

Threats to life and property on- and off-site

Permanently occupied structures occur within flood-prone areas. Threats to these structures and facilities within flood-prone areas is of extreme concern. Several structures have been destroyed by post fire flooding events in the fire area. Damage estimates of runoff destruction will probably be in the millions of dollars to houses, roads, bridges etc. If prevention work is not accomplished the probability of protecting the downstream improvements will be reduced.

Downstream Improvements needing protection

1) FDR 543 - portions of the road are in the floodprone area, those portions are being rebuilt in the same location because there is no other place to locate the road. Reestablishing Buffalo Cr. in its original channel, in areas where sediment from side draws has pushed the stream against the road, will be necessary to prevent washing out of the road in future design flood events.

2) Buffalo Creek developments - there are power poles and foot bridges within the floodprone area. All bridges, access to homes etc. in Buffalo Creek are gone with recent flooding.

B. Emergency Treatment Objectives:

The major concerns with this fire are soil erosion and resultant loss of long-term soil productivity and flooding. Post fire erosion has been significant in many areas. Sediment has been deposited in the perennial stream channels which will be carried to Strontia Springs Reservoir. The rate at which the sediment is carried to the reservoir will be related to the magnitude of future runoff events and the amount of sediment that can be removed from the channels and the effectiveness and amount of upslope restoration that can be aaccomplished before future precipitation events that equal or exceed the design storm. Additional flooding has the potential to be a threat to lives and property without further treatment.

C. Probability of Completing Treatment Prior to First Major Damage-Producing Storm:

Land **90** % Channel **80** % Roads **NA** % Other **NA** %

D. Probability of Treatment Success

	<----Years after treatment-----> 1	3	5
Land	80	90	95
Channel	70	80	90
Roads	NA	NA	NA
Other	NA	NA	NA

E. Cost of No-Action (Including Loss): **$10-30MM**

F. Cost of Selected Alternative (Including Loss): **$712,660**

G. Skills Represented on Burned-Area Survey Team:

[X] Hydrology	[X] Soils	[ ] Geology	[ ] Range
[X] Timber	[X] Wildlife	[ ] Fire Mgmt.	[X] Engineering
[X] Contracting	[ ] Ecology	[ ] Research	[X] Archaeology
[ ] _____	[ ] _____	[ ] _____	[ ] _____

Team Leader: **Jeff Bruggink**
Phone: **Home unit 719/585-3753** Electronic Address: **Home R02F12A**

H. Treatment Narrative:

Based upon post fire monitoring, post fire watershed degradation, and high existing threats to life, property and water quality, this team recommends an increase in funds to complete planned treatments on the 12,000 acre fire.

The previous supplemental request, dated August 1, 1996, anticipated that funds would be received from the Natural Resources Conservation Service to complete contour felling and sediment removal treatments, and to fund some of the

supervision and administrative support. These funds were not approved, but the work still needs to be done to protect critical soil and water values. In addition, the team has determined the need for additional treatments due to the lack of vegetation establishment and the continuence of the hydrophobic soil conditions of the high burn intensity areas.

Treatments are prescribed below:

1. Aerial seeding of inaccessible terrain - the team recommends aerial seeding of 1800 acres of steep terrain that cannot be effectively or efficiently treated by other methods. White oats were applied by helicopter in the first round of emergency treatments, but most of this effort was neutralized by hydrophobic soil conditions and heavy rains that washed the seed off the hillside. With the passage of time, the risk of heavy rains has diminished, and there is some evidence that the hydrophobic soil conditions are moderating in some places. This treatment is recommended in order to provide some level of protection for areas that cannot be treated by one of the other methods below.

2. Contour felling - The team recommends contour felling on 700 acres of high burn intensity sites. About 1000 acres of this treatment type was identified for NRCS funding in the August 1 supplemental request. The team has reduced this amount to 700 acres in order to focus on the most critical sites. In general, these are sites that are too steep for mechanized equipment and are at high risk of severe erosion. Treatment includes hand felling of trees, and bedding and staking of tree boles perpendicular to the slope.

About 800 acres of this work has been accomplished and has proved successful at limiting overland flow, trapping sediment, and holding seed. However, costs have exceeded planned amounts due to terrain conditions, and the absence of competitive bids. The only available source of labor was Type I fire crews, which increased units costs to $400/acre.

3. Erosion control structures - About 1000 acres of high burn intensity sites require treatment to slow the rate of overland flow of water and to enhance infiltration of water into the ground. This is to include placement of gravel bags along the contour of the slope. Approximately 416,000 linear feet of gravel bags will be required to treat 1000 acres. ↳ 79 miles = $1369/mi .26/ft

4. Path Clearing For Rotoclear Machine - There is a need to clear the path for the Rotoclear machine that is operating under the BAER 2 funding. An additional D-8 dozer is needed to push over trees to improve the efficiency of the Rotoclear machine. This treatment will meet the immediate needs of reducing the hydrophobic soils of the high burn intensity areas. The dozer will be needed on approximately 800 acres.

5. Check Dams - The supplemental request of August 1 planned for 422 dams to be completed. Since the flood of August 23, the team has identified a need for about 500 additional dams, to be constructed of gravel-filled bags. The bags will be filled with soil material from the site or locations to be used. The dams will be placed in the upper reaches of the drainage channels. Experience with the first phase of this treatment has allowed us to lower the expected unit cost (see Part VI).

6. Sediment removal - Additional sediment deposits have occurred due to the August 23 flood event and other rainfall. Most of the sediment will be

stabilized rather than removed (see item (7) below) but the team estimates that 5000 cubic yards need to be excavated and hauled off-site. A total of 5000 cubic yards of sediment removal was planned for NRCS funding in the August 1 supplemental request. This funding request was denied by the NRCS due to lack of available funds.

7. Sediment stabilization and channel restoration - The team recommends that sediment deposits which are not removed be shaped with heavy equipment and stabilized with vegetation. The sediment stabilization is to include D6 dozer work on 5 acres of sediment. This is in addition to the removal of the sediment in item (6) above. This treatment will include relocating stream channels to their original locations, restoring vegetation on sand deltas (including application of hydromulch on 5 acres), and planting willows along the stream banks to hold the sediment in place.

8. Supervision - Technical oversight, evaluation, and administrative support are required for successful completion of the above projects. The August 1 supplemental request identified $15000 for these costs to be provided by NRCS.

just Supplement 2

PART VI - EMERGENCY REHAB TREATMENTS AND SOURCE OF FUNDS BY LAND OWNERSHIP

			NFS Lands			Other Lands			All
Line Items	Units	Unit Cost $	Number of Units	WFSU-FW22 $	Other $ Distri ident.	Number of Units	Fed $ NRCS ident.	Non-Fed $ Privat ident.	Total $
A. LAND TREATMENTS									
Aerial seed[1]	acres	40	1800	72000					72000
Contour felling	acres	400	700	280000					280000
Erosion control struc	feet	0.26	416000	108160					108160
Path clearing	acres	100	800	80000					80000
Contour felling[2]	acres	100	800	80000					80000
B. CHANNEL TREATMENTS									
Check dams	dams	80	500	40000					40000
Sediment remov	cu yd	4	5000	20000					20000
Sediment stab	acres	3500	5	17500					17500
C. ROADS AND TRAILS									
D. STRUCTURES									
E. BAER EVALUATION/ ADMINISTRATIVE SUPPORT									
Supervision	person day	200	75	15000					15000
F. TOTALS				712660					712660

PART VII - APPROVALS

1. /s/RICK CABLES — 10/3/96
   Forest Supervisor — Date

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[1]The first aerial seed application was conducted immediately after the fire was controlled, and fire suppression helicopters were available at reduced cost. In addition, the cost of seed has increased due to high demand.

[2]This request is for an additional $100 per acre to augment the funding received in the supplemental request of August 1. Costs for the 800 acres already accomplished exceeded the planned cost by $100 per acre.

2. /s/**Tom L. Thompson for** **10/3/96**

Regional Forester Date