Date of Report: **28 April 2003**

BURNED-AREA REPORT
(Reference FSH 2509.13)

PART I - TYPE OF REQUEST

A. Type of Report:
[X] 1. Funding request for estimated WFSU-SULT funds
[X] 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 or design analysis
[X] Status of accomplishments to date

[ ] 3. Final Report (Following completion of work)

PART II - BURNED-AREA DESCRIPTION

A. Fire Name: Springville Fire

B. Fire Number: UT-UIF-18027

C. State: Utah

D. County: Utah

E. Region: R4

F. Forest: Uinta

G. District: Pleasant Grove RD

H. Date Fire Started: 6/30/2002

I. Date Fire Contained: 7/16/2002 (est)

J. Suppression Cost: $1,190,000 (est)

K. Fire Suppression Damages Repaired with Suppression Funds:
1. Fireline waterbarred (miles): 0
2. Fireline seeded (miles): 0
3. Other (identify):

L. Watershed Number: 16020203030060 and 16020202050040

M. Total Acres Burned: 2,259
NFS Acres(2,207) Other Federal ( ) State ( ) Private (52)

N. Vegetation Types: Much of the terrain on the upland foothills consumed by the Springville fire consisted of combinations of Gambel oak and big tooth maple (49%). The vegetation at the base of the burned area was primarily composed of perennial grasses and sagebrush (18%). The upper slopes were occupied by spruce and fir with other species usually associated with mixed conifer forests (15%). Mountain mahogany (14%) and other mountain brush types (3%) occupied the remainder of the vegetated area within the burn. The remainder consisted of areas with rock outcrops and canyon cliffs.

O. Dominant Soils: (Soils and Geology are combined in this section.) The burned-area is in an area of complex geology on the rugged western slope of the Wasatch Range, to the northwest of the Springville Thrust, west of the West Aspen Grove Fault, and (mostly) northeast of the 5,200' high stand level of ancient (Pleistocene) Lake Bonneville. Elevations range from 4,680 feet in the valley along the southwestern boundary to 9,502 feet at the summit of Buckley Mountain, a horizontal distance of approximately 1.8 miles. Slopes range from 0 percent to >100 percent, with slopes of >50 percent predominating (more than 80 percent of the area). Slopes of less than 50 percent occur mostly along the lower-elevation southwestern edge of the area and, elsewhere, along drainages and on ridges at all elevations.

Soils within the burned-area formed primarily in residuum or colluvium derived from sedimentary and metamorphic rocks. Soils that formed in alluvium or mixed alluvium-colluvium from such rocks or in the Lake Bonneville sand and gravel deposits make up a lesser portion of the burned-area, occurring mostly along its southwestern perimeter. More specifically, more than half of the burned-area (the eastern and southernmost portions) is limestone and/or dolomite--sedimentary rocks that have a high calcium content (limestone) or that are high in both calcium and magnesium (dolomite). About forty percent of the area (the northwestern portion, and extending well to the south) is predominantly quartzite (metamorphosed sandstone) with interbeds of conglomerate, shale, and/or siltstone. The Lake Bonneville sand and gravel deposits make up less than ten percent of the area--a relatively narrow NW/SE-trending terrace-escarpment "fringe", along its southwestern perimeter.

P. Geologic Types: See Above.

Q. Miles of Stream Channels by Order or Class: 0th Order - 21.5 miles, 1st Order - 19.2 miles, 2nd Order - 5 miles, 3rd Order - 3.2 miles

R. Transportation System

Trails: 7.0 miles Roads: 3.0 miles

PART III - WATERSHED CONDITION

A. Mapping of the Fire Severity Zones (2259 total acres occurring within the perimeter of the Springville Fire Incident):

915 Low (40%) 853 Moderate (38 %) 491 High (22 %)

B. Water-Repellent Soil (acres): Approximately 800 acres

C. Rating Soils for Potential Erosion Hazards within the Fire Perimeter : (2259 total acres)

(This is an estimate because limited soils data, steep terrain, and limited time prevented soil samples from being taken for more accurate results)

103 Low (5%) 447 Moderate (20%) 1709 High (75%)

D. Erosion Potential :

1st Year	2nd Year	3rd Year	4th Year
46 tons/acre/year	26 tons/acre/year	9 tons/acre/year	1 tons/acre/year

E. Total Sediment Potential:

1st Year	2nd Year	3rd Year	4thYear
7626 tons/mile^2	4307 tons/mile^2	1569 tons/mile^2	198 tons/mile^2

PART IV - HYDROLOGIC DESIGN FACTORS

A. Estimated Vegetative Recovery Period: 3 - 5 years

B. Design Chance of Success: 90 percent

C. Equivalent Design Recurrence Interval: 50 years

D. Design Storm Duration: 1 hour

E. Design Storm Magnitude: 1.35 inches

F. Design Flow: 26.1 $ft^3/sec/mi^2$

G. Estimated Reduction in Infiltration: 29 percent

H. Adjusted Design Flow: 249 $ft^3/sec/mi^2$

PART V - SUMMARY OF ANALYSIS

A. Describe Watershed Emergency:

Threats to Human Life and Property: The Springville Fire burned the steep west facing front of the Wasatch range, located directly above the communities of Provo and Springville, Utah. Several watersheds received a moderate to high intensity burn over a major portion of their drainage area. The moderate to strong degree of soil hydrophobicity caused by the fire, particularly prominent in the high burn severity areas, has resulted in the potential of significantly increased soil erosion, storm flows and debris flows. These affected drainages flow directly towards several areas of concern near the Provo and Springville communities. At both the north and south ends of the drainage area, housing developments exist across the natural drainage paths of these watersheds. Of primary concern are those residences located below Buckley Draw that are now threatened by the increased potential for debris flows. The Buckley drainage incurred high severity burns over most of its headwaters and there is very little area between the houses and the mouth of the drainage to act as a runout during a high intensity storm. Also, in the same area there are several developments including a water tank, an underground gas line and above ground valves, and an electrical substation. The BAER Team estimates that approximately $10,000,000 dollars worth of property is potentially at risk. If no action is taken to reduce the risk from these events, unacceptable amounts of soil loss could occur on the slopes of these watersheds and flooding, debris, and sediment could damage portions of the above mentioned areas.

Loss of Soil Productivity: Soils within the high and moderate fire severity zones exhibit a moderate to strong degree of water-repellency at depth of approximately one-half to 2 inches. This condition has modified the existing site hydrologic function to the point that infiltration will be restricted or, in some cases, actually prevented at the soil surface -- resulting in a greatly increased potential for sheet, rill and gully erosion. Hydrophobic conditions may persist for a period of 3-years or more following the burn. All high fire severity areas are recognized as potential flood source areas. The severely burned areas have a maximum threshold for soil loss tolerance at about 1 to 3 tons/acre/year. Accelerated rates of erosion that exceed this listed threshold, will result in adverse impacts to long-term soil productivity -- which is not consistent with the R4 / Soil Quality Standards (FSH 2509.18) under the guidelines of 1) SEVERELY BURNED SITES and 2) INSUFFICIENT PROTECTION with respect to existing ground cover.

In addition, other resource values at risk such as deer, bighorn sheep and elk are threatened due to loss of vegetation and loss of a wildlife guzzler critical to supplying water for the area.

B. Emergency Treatment Objectives: The primary objective of the proposed emergency rehabilitation is to take prompt actions deemed reasonable and necessary to effectively protect, reduce or minimize significant threats to human life and property, and prevent unacceptable resource degradation. Those emergency treatments recommended by the Springville Fire BAER Team are specifically designed to achieve the following results.

- Encourage soil stabilization and recovery of hydrophobic soil conditions and reduce storm flow amounts through vegetative regeneration, grass seeding and straw mulching.
- Provide for early warning of potential flooding hazards to the Springville Community.

- Reduce the potential for significant resource damage to and from roads as a result of increased fire related runoff.
- Encourage recovery of critical habitat for wildlife species (deer, elk and big horn sheep).
- Provide for public safety and promote fire recovery by communicating the post-fire hazards to the public, most noticeably debris flows and flood hazard.
- Limit colonization and/or expansion of noxious weeds and invasive plant species onto National Forest System lands.

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

Land **75**% Channel **75**% Roads **75**% Other – RAWS **85**%

D. Probability of Treatment Success:

	Years after Treatment		
	1	**3**	**5**
Land	**60%** [1/]	**70%** [1/]	90%
Channel	50%	70%	80%
Roads	80%	70%	60%
Other	85%	85%	85%

[1/] **Adjusted based on experience on Uinta NF with similar burns. 4 of 9 recent large burns have experienced significant debris flow events, and an additional 2 of the 9 have experienced minor debris flow events. Many of these debris flow events occurred in years 2 or 3 and following treatment.**

E. Cost of No-Action (Including Loss): $10,000,000

F. Cost of Selected Alternative (Including Loss): $4,381,946

G. Skills Represented on INTERIM Burned-Area Survey Team (see Initial 2500-8 for team that drafted Initial Report):

[ ] Hydrology	[X] Soils	[ ] Geology	[ ] Range	[X] **Lands**
[X] Forestry	[ ] Wildlife	[ ] Fire Mgmt.	[ ] Engineering	[X] **Recreation**
[ ] Contracting	[ ] Ecology	[ ] Botany	[ ] Archaeology	[X] **Fiscal Management**
[ ] Fisheries	[ ] Research	[ ] Landscape Arch	[ ] GIS	

Team Leader: **Wm. Reese Pope**

Email: **rpope@fs.fed.us** Phone: **801-342-5100** FAX: **(801) 342-5144**

H. Treatment Narrative:

Land Treatments:

Seeding: Conduct aerial broadcast seeding using a common cereal barley and two native seed mixes on a total of 491 acres applied in the high severity burn area in upper Buckley Draw, Pit Creeks, and the unnamed tributaries to the south of Pit Creeks. ($66,790) Cereal barley, which is a non-persistent non-invasive annual, was chosen for its ability to provide a quick cover for erosion control and help stabilize the upper watersheds of the fire. The two perennial seed mixes were developed specifically for emergency rehabilitation treatments within the context of Forest Service Manual Amendment No. 2500-2000-2 (5/25/2000): "Seeding or planting of grass, forbs, shrubs, or trees when needed to prevent unacceptable erosion, to prevent permanent impairment to ecosystem structure and function, or to prevent detrimental invasion by non-native plants." The two perennial seed mixtures proposed are designed for mid precipitation (22 to 26") below 7,200' elevation, and high precipitation (26 to 30") above 7,200' elevation ranges. Many portions of the high fire intensity areas, especially the southerly and westerly exposures, have rocky soils with reduced water holding capacities. Thus, it is not uncommon for these areas to take on drought-like conditions, 2 to 4 inches drier than precipitation charts would otherwise indicate. These are seed mixes "of species known to be effective for erosion control, adapted to the target area and compatible with future management objectives" (FSH 2509.13,20 p. 13). The mixes will provide structural diversity and help to restore ecosystem function. Mixes #1 (55.98 pls/sq.ft.) and #2 (54.74 pls/sq.ft.) contain only native species. In light of Executive Order 13112 (2/3/1999) on invasive species, we considered and determined that the introduced species in these three mixes (including barley which is not native) will not be "likely to cause economic or environmental harm or harm to human health."

Specific rationale and ecological attributes valued for the recommended species include the following: Mountain bromegrass—provides quick ground cover, recommended for open areas and timber burns; Slender wheatgrass—"valuable in erosion control because of its rapid development"; Sandberg bluegrass—"important range grass for soil stabilization and forage for wildlife"; Blue wildrye— high elevation shade tolerant species that is compatible with woody plants. Thick spike wheatgrass - "drought resistant…competes well with weeds and native grasses" Bluebunch wheatgrass -" A long lived, drought tolerant…adapted to dry mountain slopes, sagebrush, mountain brush…" Silverleaf lupine—Legume found in generally dry slopes or open, high elevation sagebrush flats, with low to moderate water requirements; used as nitrogen fixing plant.

All seed used will be certified to the variety claimed. Also, the mixes will be certified weed free; no noxious weed seeds are present.

V-Mesh Silt/Boulder Retention Fencing: Construct three 100' long V-mesh boulder-retarding fences across slope (on contour) above the water tank near lower edge of burned-area. Fences are to be installed as three parallel ranks, perpendicular to the direction of the slope, with each successive rank about 30-50' upslope from the previous one. ($2,464)

Helicopter mulching: Straw mulching by helicopter will be implemented on the high intensity burn areas located in the upper basin of Buckley Draw, Pit Creeks, and the unnamed tributaries to the south of Pit Creeks. This includes 491 acres. Due to the extreme slope and downstream values at risk, 1.5 tons per acre will be applied to the Buckley Draw area (178 acres). With the current drought condition in Utah **and recent experiences on other similar nearby burns**, it was felt that mulch will also be necessary on the remaining 313 acres should all seeding take place in the hot summer months. This will **also** be applied at a rate of **1.5** tons per acre[2/]. Monitoring of past fires indicates that the seed/mulch combination has the best chance for success. ($837,060) Base on performance, payload and safety a Type II helicopter is being recommended with associated cost in all treatments.

[2/] **The Initial Report called for 1.0 tons/acre on the 313 acres, but recent experiences with debris flows on other similar areas with mulch treatments suggested a need for heavier mulch rates. In addition, due to the availability of the Forest's fire suppression helicopter for BAER work, the helicopter costs for treatment were cheaper than planned and the additional costs associated with increasing the mulching rate could be covered within originally planned costs for this treatment. Supervisor Karp noted this in a 9/12/02 2520-3 memo to the Regional Forester requesting approval for this modification. Jeff Bruggink, Regional BAER Coordinator, orally approved of this change.**

Hand Planting/Seeding: Plant and/or hand seed 3-acres of native shrub, **grass and forb** species for wildlife and ecosystem enhancement. This is a volunteer Boy Scout project and overhead costs involved will be picked up by the Forest. It is un-funded through BAER funds.

Channel Treatments:

V-Mesh Boulder Retention Fences: Install 15-20 v-mesh wire structures in Buckley Draw beginning near the Forest boundary to ¼ mile upslope ($5,240).

Roads and Trail Treatments:

Waterbarring/Reconditioning Roads and Trails: Recondition about 5 miles of roads and trails near the western edge of the fire by building drain dips, waterbars (trails), and removing upslope or downslope berms that would impede drainage. ($8,040)

Structures:

Wildlife Guzzler: Replace a wildlife guzzler (**$7404**) This item IS UNFUNDED hrough BAER but could be picked up as a District or cooperative project.

Remote Automatic Weather Station (RAWS): Install one RAWS to activate an early warning system which links to the National Weather Service and Provo City Dispatch ($ 27,404).

Closure Signs: Place 6 watershed restoration area closure signs near the western edge of the fire ($1,800).

Other Treatments being considered by Others (e.g. NRCS using EWP funds and cost/share):

Land Treatments:

Jersey Barriers: Install jersey barriers upslope of hwy 89 and possibly on some subdivision streets to deflect or reroute debris flow material (about $200,000).

Silt Fences: Install hog wire or v-mesh reinforced silt fences on private land above residences to capture debris (about $60,000)

Channel Treatments:

Diversion Channel/Structure: Possibility of diverting Buckley Draw drainage to the north or to the south near the mouth of the drainage ($700,000).

Structures:

Early Alert Siren: Install an early warning siren system near the base of Buckley Draw ($10,000).

***Snotel Station*: Install a snotel station to monitor snow depths for potential avalanche hazard ($40,000). (NOTE: this item was listed in Table IV in the initial but not in the narrative.)**

I. Monitoring Narrative: (total = $23,917) Year 1 = $9,995; Year 2 = $6,961; Year 3 = $6,961

Photo points will be established to tract before and after evidence of storm flows in Buckley Draw and Pit Drainage, and to document vegetative condition and ground cover after the first, second and third years of treatment in high severity burn areas. Photo points will be taken of v-mesh rock retarding fences immediately after installation and after runoff events to assess their successfulness. Land treatments which received both the seed and straw mulch and those that received only the seed treatment will be monitored. Silt fences along with tipping rain gauge recorders will be installed both above and below 2-4 treatment areas to quantify the amount of soil movement on treatments of seeding, seeding and straw mulching and areas receiving no treatment. Noxious

weeds and other invasive species will be monitored for new infestations near the west boundary of the fire over the next 3-years and sites mapped using GPS. If new infestations warrant, eradication will be considered using herbicides and an updated BAER request may be made to cover those expenses if the cost is substantial. Road and trail treatments and area closure signing will be monitored for cross drainage effectiveness and for compliance. Interim monitoring reports documenting these findings will be made in 2003 and 2004 and a final report completed in 2005. ($9,995 in year 1; $6,961 in year 2; and $6,961 in year 3. Total expenditure = $23,917)

Part VI – Emergency Rehabilitation Treatments and Source of Funds by Land Ownership

Table IV-A: Treatments, Activities and Costs From Initial Report

		NFS Lands				Other Lands				All
		Unit	# of	WFSU	Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT $	$	units	$	Units	$	$
A. Land Treatments										
seeding-natives w/ barley	acres	136	491	$66,790			$0			$66,790
straw mulching (1.5Tons/ac)	acres	2388	178	$415,080			$0		$0	$415,080
straw mulching (1Tons/ac)	acres	1345	313	$421,080			$0		$0	$421,080
jersey barriers	each					1000	$200	1000	$200	$200,000
W/L shrub planting BSA	acres	$333	3		1,000					$1,000
V-mesh silt fence	lin ft	8.21	300	$2,464		9000	$60,000	3000	$15,000	$75,000
Subtotal Land Treatments				$905,414			$60,200		$15,200	$1,178,950
B. Channel Treatments										
V-mesh rock detention 20	each	262	20	$5,240			$0		$0	$5,240
divert Buckley drainage1	1 job					1	$525,000		$175,000	$700,000
Subtotal Channel Treat.				$5,240			$525,000		$175,000	$705,240
C. Road and Trails										
waterbars,dips,berms	miles	1608	5	$8,040			$0		$0	$8,040
Subtotal Road & Trails				$8,040			$0		$0	$8,040
D. Structures										
wildlife guzzler	each	7404	1		7,404		$0		$0	$6,904
RAWS station	each	$27,000	1	$27,000			$0		$0	$27,000
SNO-TEL station	each					1	$40,000	1	$0	$40,000
early warning siren	each						$7,500		$2,500	$10,000
closure signs	each	300	6	$1,800			$0		$0	$1,800
V-mesh silt fence	lin ft	8.21	300	$2,464		9000	$60,000	3000	$24,630	$87,094
Subtotal Structures				$31,264			$107,500		$27,130	$172,798
E. BAER Evaluation										
baer team salary	1 team	24000	1	$24,000			$0		$0	$24,000
motel, pd, travel	1 team	6000	1	$6,000			$0		$0	$6,000
office supplies	1 team	600	1	$600						$600
F. Monitoring	1 plan	23917	1	$23,917			$0		$0	$23,917
G. Totals				**$1,003,875**	**$8,404**		**$692,700**		**$217,330**	**$2,119,545**

Table IV-B: Revised/Corrected Activities, Treatments and Costs

		NFS Lands				Other Lands				All
		Unit	# of	WFSU	Other	# of	Fed	# of	Non Fed	Total
Line Items	Units	Cost	Units	SULT $	$	units	$	Units	$	$
A. Land Treatments										
seeding-natives w/ barley	acres	$136.03	491	$66,790	$0	0	$0	0	$0	$66,790
straw mulching	acres	$1,704.81	491	$837,060	$0	0	$0	0	$0	$837,060
jersey barriers	each	$100	0	$0	$0	1000	$100,000	1000	$100,000	$200,000
W/L shrub planting BSA	acres	$333	3	$0	$1,000	0	$0	0	$0	$1,000
V-mesh silt fence	lin ft	$8.21	300	$2,464	$0	9000	$60,000	3000	$15,000	$75,000
Subtotal Land Treatments				$906,314	$1,000		$160,000		$115,000	$1,179,850
B. Channel Treatments										
V-mesh rock detention 20	each	$262	20	$5,240	$0	0	$0	0	$0	$5,240
divert Buckley drainage1	1 job	$700,000	0.1	$0	$2,500	0.75	$525,000	0.25	$175,000	$702,500
Subtotal Channel Treatmt				$5,240	$2,500		$525,000		$175,000	$707,740
C. Road and Trails										
waterbars,dips,berms	miles	$1,608	5	$8,040	0	0	$0	0	$0	$8,040
Subtotal Road & Trails				$8,040	$0		$0		$0	$8,040
D. Structures										
wildlife guzzler	each	$7,404	1	$0	$2,500	0	$0	0	$4,904	$6,904
RAWS station	each	$27,000	1	$27,000	$1,500	0	$0	0	$0	$28,500
SNO-TEL station	each	$40,000	0	$0	$500	1	$40,000	0	$0	$40,500
early warning siren	each	$2,500	0	$0	$0	3	$7,500	1	$2,500	$10,000
closure signs	each	$300	6	$1,800	$0	0	$0	0	$0	$1,800
Subtotal Structures				$28,800	$4,500		$47,500		$7,404	$87,704
E. BAER Evaluation										
Initial & Revised Initial Survey	2 Rpts	$36,980	1	$36,980	$500	0	$1,000	0	$0	$37,980
Interim 1/Progress Rpt	1 Rpt	$1,500	1	$1,500	$0	0	$0	0	$0	$1,500
Interim 2/Progress Rpt	1 Rpt	$1,500	1	$1,500	$0	0	$0	0	$0	$1,500
Subtotal Evaluations				$39,980	$500		$1,000		$0	$40,980
F. Monitoring										
Fire year 1 (8/02-7/03)	2 Rpts	$9,995	1	$9,995	$0	0	$0	0	$0	$9,995
Fire Year 2 (8/03-7/04)	1 Rpt	$6,961	1	$6,961	$0	0	$0	0	$0	$6,961
Fire Year 3 (8/04-7/05)	1 Rpt	$6,961	1	$6,961	$0	0	$0	0	$0	$6,961
Subtotal Monitoring				$23,917	$0		$0		$0	$23,917
G. Totals				**$1,012,291**	**$8,500**		**$733,500**		**$297,404**	**$2,048,231**

Note- Quantities and locations of EWP work will be determined by a survey conducted by the USDA-NRCS in cooperation with State, Utah County, and the communities of Springville and Provo, UT.

PART VII - APPROVALS

1. */s/ Peter W. Karp* *5/1/03*
   Forest Supervisor (signature) Date

2. _____ _____
   Regional Forester (signature) Date