Logging Systems and Logging Economics Resource Report

General

Within the Fire Recovery project area, the Tool Box and Silver fires affected approximately 47,027 acres of National Forest System land. The Tool Box portion contains 26,990 acres and The Silver portion contains 20,037. An overall logging plan for the project area was made for the commercial forest land remaining after previously reforested units and non commercial ecotypes were removed. Recommended logging systems were assigned regardless of land status. For example, logging systems were assigned to RHCAs, Old Growth areas, and other resource concern areas. even though the areas may not be available for harvest. The overall logging plan for the remaining commercial forest land in the project area indicates approximately 90 percent is recommended for ground-based logging and approximately 10 percent is recommended for helicopter logging.

Logging system planning was based on local field knowledge, aerial photo interpretation, review of contour maps, and utilization of the GIS slope layer. Logging system boundaries would be further refined during project implementation. Logging system recommendations were primarily based on topography, access, and expected management constraints.

Ground-based logging is generally acceptable on areas with slopes less than 35 percent, with external yarding distances of less than 1000 feet, and where management constraints allow ground-based equipment operations. Occasionally during logging system planning, exceptions occurred, such as: 1) areas with minor inclusions of slope greater than 35 percent where the equipment can operate around the inclusions; 2) areas with external yarding distances up to ¼ mile instead of constructing new roads; and 3) areas where winch line pulling could remove the timber while keeping equipment out of the areas that exclude ground-based equipment.

Helicopter logging was recommended on areas with continuous slopes greater than 35 percent, where excessive road construction would be required to reach isolated areas, where management requirements were expected to prohibit ground-based equipment, and where winch line pulling would not achieve desired results. Proposed helicopter logging areas may contain some inclusions that meet ground-based characteristics but were too small to identify during project planning.

Logging Systems

Ground-Based Logging—The ground-based logging group includes various machines such as crawler tractors, rubber tired skidders, and forwarders. Also in this generic group are mechanical feller bunchers that fell and bunch trees for skidding by a separate machine. Ground-based machines can be equipped with grapples or winches. Winches hold approximately 75 feet of cable. Operators of equipment with winches can pull line 50 to 70 feet to minimize ground disturbance or to reach logs in equipment exclusion areas. Machines with grapples must back to each log or bunch of logs. One end suspension of logs is be achieved by machines equipped with integrated arches that lift the leading ends of the logs free of the ground. This increases the speed of logging and minimizes ground disturbance. Downhill skidding is preferred over uphill skidding to reduce yarding cycle time and also reduce ground disturbance. The existing classified road system is designed for ground-based logging. Previously used unclassified roads, landings, and skid trails in the project area facilitate ground-based systems. Approximately one landing per ten acres is the historic average for landing density.

Horse Logging—Horse logging was suggested by a member of the public during scoping for logging sensitive areas such as RHCAs. The system has limited application in fire salvage because of low production rates and the limited numbers of horse loggers that are available near the project area. The need to remove fire-killed timber rapidly does not lend itself to horse logging. Therefore, specific areas would not be recommended for horse logging at this time. If credible interest is shown for horse logging, suitable land included as tractor logging ground could be made available during implementation of any of the action alternatives.

Horses are harnessed singly, or in teams, and, through brute strength, logs are skidded to the landing. All aspects of planning for horse logging must be in favor of the animals. Since both ends of the log are on the ground, the only advantage for the horse is favorable grade or possibly skidding over snow. Downhill skidding is recommended. Skid trails must be cleared of all brush and stumps. The average turn should be about 1/3 of the animal's weight. Production is about 2 ½ to 3 Mbf per day per team.

Skyline Logging—Skyline logging includes a variety of cable logging systems that employ steel cables operated by a "yarder" equipped with of several stationary winches. The cables run through a tower to provide lift to the logs being yarded. Compared to basic cable systems that provide limited lift on logs, skyline yarders have an additional cable or "skyline" that is used to lift the logs being yarded. Depending on various factors, especially favorable topography, the logs can be partially or fully suspended above the ground.

Skyline yarding is not a feasible system for the vast majority of the land in the project area. Existing roads were located in the past for tractor logging and most are not conducive to skyline yarding. Many miles of new road construction would be required to place log landings in the proper location for skyline yarding. Steep topography with concave slopes is best to help cable systems provide lift on the logs. Unfortunately, many of the slopes in the project area are relatively flat or are convex slopes that reduce or eliminate log suspension. Finally, suitable stump anchors, lift trees, or both are needed at the far end of the area being logged to support or anchor the cables. Rocky areas, grass flats, or plantations are located where the anchors and lift trees are needed in the few areas where existing roads could provide suitable landing locations. Because the existing road network was constructed to facilitate tractor logging, the topography is usually unfavorable, and adequate anchors and lift trees are not available, skyline yarding systems were not considered during logging system planning.

Helicopter Logging—During helicopter logging, logs are flown fully suspended from the stump to the landing. Adverse effects to resources, such as soil and water, are minimized. Since yarding distances are often longer than ground-based and skyline systems, the need for new road construction is reduced. Larger landings, typically one acre in size, are usually required for efficient log processing and helicopter maintenance and servicing. Where large areas of helicopter logging are proposed, fewer landings are required compared to ground-based and cable systems.

Helicopter logging is sensitive to economic conditions. Helicopter logging is the most expensive system in use in the Pacific Northwest. The economic feasibility of a helicopter logging proposal is primarily affected by three factors: 1) delivered log prices; 2) the ability to maximize the weight of each "turn" (load) of logs by having the log weight approach the load carrying capacity of the helicopter; and 3) minimizing "cycle" (round trip) time by reducing factors such as flight distance, canopy closure over the logs, and search time required to collect a turn of logs.

The Regional Logging Engineer visited the project area early in the planning process. A Boeing 107 Vertol class machine was recommended for the project. The following parameters for logging system planning were provided:

- The minimum volume necessary for a helicopter sale is approximately 1.0 MMbf.
- Units need to contain 6 to 8 Mbf per acre that is available for removal.
- At the altitude of the project, a turn should weigh 6,500 to 7,000 pounds and should consist of no more than seven pieces.
- A turn of logs needs to be available in an area 100 to 150 feet in diameter.
- Average flight distance to log landings should be between ½ to 1 mile. The shorter the distance the better.
- Flight distance to service landings for refueling and inspections should be as short as possible (4 to 5 miles).
- No yarding over high voltage power lines.

Depending on the theme of the alternative, a coarse filter of 7 Mbf per acre would be used before a unit is included in the alternative. Once the potential helicopter volume is calculated a second filter of a minimum volume of 1.0 Mbf would help determine if helicopter logging units would remain in the alternative. Exceptions to the coarse filters may be acceptable but they would be considered on a case-by-case basis. The Helipace computer program will be utilized to analyze the economic feasibility of alternatives with helicopter logging units that passed through the coarse filters.

Transportation Systems

Transportation system planning for logging projects usually includes temporary roads, unclassified roads, and classified roads. Since the project area contains numerous classified roads and additional classified roads are not expected to be necessary, the planning for logging systems and associated roads concentrated on new temporary and existing unclassified roads. A separate Roads Analysis process was conducted to make recommendations for the long-term management of existing classified roads.

Temporary roads are defined in FSM 7700 as, "Roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long term resource management (36CFR 212.1).

Unclassified roads are defined in FSM 7700 as, "Roads on National Forest System lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization (36 CFR 212.1)."

Temporary Roads—Temporary roads as they relate to this project are new temporary roads that would be authorized by Timber Sale Contract(s). Proposed temporary roads were planned into land without classified and unclassified roads to reduce tractor logging skid distances and to provide access to helicopter landings to reduce helicopter flight distances. If all of the commercial forest land not in existing plantations in the project area were harvested at one time, approximately 15 miles of new temporary road would be constructed. Approximately 7 miles are in the Silver Fire and 8 miles are in the Tool Box Fire. Temporary road construction and associated activities are governed by Timber Sale Contract provisions B 5.1 and 6.62—Temporary Roads. Upon completion of harvest activities all temporary roads would be decommissioned as required by the Timber Sale Contract.

Proposed new temporary road locations were planned to avoid stream crossings as much as possible. No Class 1, 2, or 3 stream crossings are proposed. The overall logging plan includes two crossings of Welker Creek (Class 4) in the Tool Box portion of the project.

Temporary road construction is relatively inexpensive because of the dominance of gentle topography in the project area. A crawler tractor could construct one mile of temporary road in average conditions for approximately $100.00. Temporary road construction is a cheap method for reducing tractor and helicopter yarding costs.

Unclassified Roads—Unclassified roads were utilized as often as possible in the overall logging plan to reduce temporary road construction. Approximately 30 miles of existing wheel tracks are included in the overall logging plan for the project. The Tool Box fire has 8 miles and the Silver fire has 21 miles. Approximately 1 mile of the 30 mile total is outside the perimeters of the fires. The roads are needed to connect temporary or unclassified roads inside the fires to classified roads outside of the fires.

Unclassified roads can be refurbished at about $75.00 per mile. The fires consumed much of the trees and brush on existing wheel tracks that would have required clearing and grubbing. Unclassified roads not recommended for conversion to classified status following the roads analysis will be treated the same as temporary roads. Upon completion of harvest activities the existing wheel tracks would be decommissioned as required by the Timber Sale Contract.

Landings—Landing construction costs are included in stump-to-truck costs. Past experience on the District indicates that ground-based logging averages one landing per ten acres. Since most of the area that was burned is on land that was previously logged, very little new landing construction would be required. Some of the existing landings would require minor refurbishing. Construction or refurbishing costs plus move in and move out costs are included in the comparison costs that were calculated for typical projects in the local working circle during the development of Alternative E.

Helicopter log landings were located on all of the types of road to reduce average flight distance from the units to ½ mile or less where possible. Helicopter service landings were located to keep the flight distance from units and log landings for fuel and maintenance to an average of five miles or less. Service landings were located near main line classified roads to facilitate access by large fuel trucks and maintenance vans. Some of the service landings can perform double-duty as log landings.

Approximately 44 helicopter log landings and 4 service landings are proposed in the overall logging plan to log all of the helicopter ground in the plan. Half of each type is in each fire area. Because of resource restrictions, each alternative would have considerably fewer helicopter landings. For planning purposes, construction of helicopter log landings is estimated to cost about $500.00 each and service landings are estimated at $1000.00 each. Combination service/log landings are estimated to cost $1500.00. A cap of crushed rock is proposed at the service landings to aid in dust abatement and to support fuel and maintenance vehicles.

The amount of landing activity on or adjacent to a classified road primarily depends on the type of surfacing on the road. For roads with an asphalt or chip-seal surface, logs would be skidded away and landing activity would not typically occur on the road surface. In unusual circumstances, such as hazard tree removal along roads in RHCAs, the logging equipment is likely to be required to remain on the road. Measures would be taken to protect the road surfacing. In visual corridors that coincide with higher standard roads (i.e. roads 27 and 28), the landings would be as far away from the road as possible. However, some situations may require landings adjacent to the roads. Terrain and the location of existing lower standard roads would be factors in locating landings to meet visual quality objectives. On classified roads with cinder, crushed rock, or both, step landings or landings with short stub spurs would be used, where possible, to keep skidding activities off the road surface. Where roads have a native surface the logs would be decked at the edge of the road. Ground-based machines would often be on the road and activities such as loading logs could also occur on the road. Traffic delays of up to 30 minutes are expected where landings are on or adjacent to roads. Warning signs or flaggers would alert the public to safety hazards. Area closures may be necessary to separate the public from industrial hazards.

Upon completion of logging activities all landings could be scarified or sub-soiled, natural drainage patterns would be restored, and slash accumulations would likely be treated. Depending on the silviculture prescription, landings may be planted along with the rest of the harvest unit.

Mill Capacity

Some concerns from within the Forest Service were expressed about mill capacity in the local area. The thought was that stumpage prices may be depressed if all of the timber from restoration projects resulting from the large fires of 2002 (Grizzly, Skunk, Winter Rim, Tool Box, and Eyerly) was sold in a short time frame. In reality timber from the 2002 fires, regardless of ownership, would probably become available over a 1 to 3 year time frame (2002 to 2005). Salvage of timber from private land began immediately after the fires were controlled in 2002. Almost all of the private land salvage logging will be completed by the spring of 2003. Forest Service National Environmental Policy Act (NEPA) decisions are scheduled in 2003 to 2004 so Forest Service sales would more than likely be spread out from 2003 to 2005 barring significant delays.

Based on past harvest, the timber salvaged from the 2002 fire areas could be processed at mills in Gilchrist, Prineville, Lakeview, Klamath Falls, Medford, Roseburg, White City, Central Point, Prairie City, and John Day. The mills have ample capacity to process the timber that may be available from the 2002 fires. Because of its proximity to the project area, the Crown Pacific mill at Gilchrist would be the appraisal point.

Temporary and Unclassified Road Comparisons

The following table provides comparisons based on the amount of temporary and unclassified road proposed for use in each alternative. The costs are insignificant on a $/MBF basis. The costs are included in truck-to-mill costs described later in this document.

Comparison Factor	Alternative A	Alternative C	Alternative D	Alternative E	Alternative G	Alternative H
Temporary Road Construction (Miles)	0	16.0	0.0	13.3	16.0	14.9
Unclassified Road Refurbishing (Miles)	0	21.4	5.7	15.8	21.4	19.7
Temporary Road Construction Cost	$0.00	$1600	$0.00	$1330	$1600	$1490
Unclassified Road Refurbishing Cost	$0.00	$1605	$428	$1185	$1605	$1478
Combined Cost	$0.00	$3205	$428	$2515	$3205	$2968
Total Per MBF Cost (Based on Total Volume)	$0.00	$0.04	$0.01	$0.03	$0.04	$0.05

Logging System Comparisons

Ground-based Logging—Ground-based stump-to-mill costs for the various harvestable volume classes were calculated during the development of Alternative E. The costs were based on a comparison with a recent appraisal in the Klamath Basin Working Circle. Logging costs per thousand board foot ($/MBF) were separated into stump-to-truck and truck-to mill costs. Stump-to-truck includes costs such as felling, limbing, bucking, skidding, loading, and branding. The costs also include moving equipment to and from the sale area, equipment moves between landings, landing preparation, and landing restoration. Truck-to-mill costs include log haul, road maintenance, constructing temporary roads, refurbishing unclassified roads, closing both types of road, surface rock replacement, and other miscellaneous costs typical in the working circle. Truck-to-mill costs on a $/MBF basis were assumed to be relatively constant at $64/MBF since the volume classes and units are dispersed throughout the project area. The costs do not include slash disposal and road reconstruction. Those costs are documented elsewhere in the EIS. The primary variable was volume per acre. Low volume per acre results in higher stump-to-truck costs since the timber is more widely scattered than the higher volume per acre stands.

The following table summarizes the ground-based logging costs developed by the comparison appraisal.

Harvestable Volume MBF/Acre	Stump-to-truck $/MBF	Truck-to-mill $/MBF	Stump-to-mill Total $/MBF
1	386	64	450
2	251	64	315
4	151	64	215
8	107	64	171
9	95	64	159

For ground-based logging, a rough weighted average stump-to-mill cost was determined for each alternative. The rough weighted average costs were based on the total harvestable volume of each volume class in the alternative and the stump-to-mill cost of the harvestable volume in each volume class.

Two adjustments were made to the rough weighted average ground-based stump-to-mill costs. The first was to recognize that Alternative D has a noticeably shorter average yarding distance than the other action alternatives (approximately 370 feet vs. 475 feet). The Mechanized Yarding Appraisal program was utilized to determine that Alternative D would cost approximately $5.00/MBF less than the other action alternatives. The second adjustment was made to account for the need to hand fall large trees. Commonly used mechanical feller bunchers are limited to trees approximately 21 inches in diameter at the stump. For each alternative the number of trees to hand fell was multiplied by an average experienced cost of $10.00 per tree. The total cost for hand felling was divided by total volume to determine the $/MBF adjustment. Although Alternative E had the highest number of large trees per acre, the $/MBF adjustment was the least due to the higher volume per acre of the units in the alternative. The ground-based stump-to-mill costs are listed in the next table.

Helicopter Logging—Helicopter logging stump-to-truck costs were calculated for each unit by the Helipace computer program. The program also calculated a weighted average stump-to-truck cost for each alternative. Factors in the project area that primarily affected the results of the Helipace program calculations include:

- average piece size; type of helicopter
- flight distance between units and landings (both log and service)
- equipment move in and move out distance; landing construction costs
- the percentage of the helicopter design load available for each turn of logs
- residual tree height; additional turn time to search for logs to maximize payload
- woods and landing crew size; and the number of loaders with operators.

Numerous other factors are considered by the program, but the ones listed above had the greatest affect on costs between the alternatives.

For Alternatives C, D, and G, the average truck-to-mill cost of $64/MBF was added to determine the stump-to-mill cost. The cost was kept constant since the units are scattered similarly to the ground-based units. The most obvious exception was Alternative E where units are concentrated in the northeast corner of the project area. To account for the shorter haul distance and lower related costs, the truck-to-mill costs were estimated to be $8/MBF less. Alternative H proposes no helicopter yarding. The helicopter stump-to-mill costs are also listed in the next table.

The following table provides comparisons of alternatives based on quantifiable logging system factors.

Table 3: Comparison of Logging Systems, by Alternative

Comparison Factor	Alternative A	Alternative C	Alternative D	Alternative E	Alternative G	Alternative H
Helicopter Acres	0	470	360	307	449	0
Ground-Based Acres	0	13971	6007	11183	13970	13031
Helicopter Volume (MMBF)	0.0	4.1	3.2	2.7	3.9	0.0
Ground-Based Volume (MMBF)	0.0	69.2	30.5	63.4	69.3	63.8
Helicopter Costs (Stump-to-mill)	$0.00	$253.47	$251.60	$239.36	$252.54	$0.00
Ground-Based Costs (Stump-to-mill)	$0.00	$213.35	$206.05	$203.18	$213.30	$214.19

Delivered Log Price—To determine the delivered log prices to use to compare against projected logging costs, the available stand examination plot data was converted to simulated timber cruises. The simulated timber cruises were used to determine the volume by species for each stand.

Past experience with fire salvage projects indicates that by the time NEPA compliance and sale preparation is achieved, small trees less than 13 inches diameter breast height and logs (16 foot) on the tops of larger trees that are less than 10 inches diameter inside the bark on the small end would be dried and blue stained sufficiently to prevent their use as sawlogs. The small diameter material could be chipped but currently there is no local market for chips. Therefore, the volumes by species used later in the Product Quality Adjustment spreadsheet are based on 16 foot saw logs 10 inches diameter inside the bark on the small end and larger. Also, because of normal delays in preparing salvage sales, the delivered log prices in the Oregon Log Market Report, February 25, 2003, were devalued by 35 percent compared to green timber (25 percent for the first year after the fire and 10 percent for the second).

For each simulated cruise a Product Quality Adjustment-Oregon Eastside spreadsheet was prepared. The spreadsheets reflected the projected loss in both volume and value from “normal” delays for NEPA compliance and sale preparation time. The weighted average delivered log prices in stands recommended for ground-based logging systems were in all volume classes and ranged from $256 to $318/MBF. The average for ground-based systems was approximately $300/MBF. Helicopter logging areas were in high and very high volume classes and averaged approximately $315/MBF.

Financial Efficiency Comparisons

For the following Financial Efficiency Comparison, the delivered log prices for ground-based and helicopter systems were weighted by the volume of each system in the alternative to produce a $/MBF delivered log price for each alternative. Stump-to-mill costs for each logging system were also weighted by volume to produce a cost for each alternative. As noted previously, slash disposal and road reconstruction costs are not included here. Those costs are documented elsewhere in the EIS.

The following table provides comparisons of alternatives based on delivered log prices, stump-to-mill costs, and potential returns. Math differences in the estimated returns are the result of using spreadsheets that do not round off values during calculations.

Table 4: Comparison of Delivered Log Prices, Stump-to-Mill Costs, and Potential Returns, by Alternative

Economic Factor	Alternative A	Alternative C	Alternative D	Alternative E	Alternative G	Alternative H
Delivered Log Price ($ Per MBF)	$0.00	$300.83	$301.41	$300.62	$300.80	$300.00
Stump-to-Mill Cost ($ Per MBF)	$0.00	$215.58	$210.32	$204.67	$215.40	$214.19
Net Stumpage ($ Per MBF)	$0.00	$85.25	$91.09	$95.95	$85.40	$85.81
Volume (MBF)	0	73,276	33,762	66,118	73,157	63,842
Estimated Return* (Total Dollars)	$0	$6,247,102	$3,075,310	$6,344,062	$6,247,788	$5,478,282

*Without subtractions for slash disposal, road reconstruction, reforestation, etc.

Potential Timber Sales

For planning purposes, potential sales were developed by the Timber department at the Silver Lake Ranger District to get an idea about the size of timber sales in each alternative. The potential sales were based on geographic locations, log haul routes, logging systems, expected sale preparation and sale administration budgets, and the need to remove dead timber as quickly as possible. The project area breaks down into eight logical sales. Seven utilize ground-based logging systems while number eight contains the entire helicopter logging volume in the alternative. As more is learned throughout the NEPA process potential sales are likely to be adjusted. However, sale preparation and sale administration costs tend to increase as the number of sales increase and sale size decreases.

The following table displays the proposed breakdown of sales by alternative and the range of sale sizes within the alternatives.

Table 5: Breakdown of Sales and Range of Sale Sizes by Alternative

Sale Number	Alternative A	Alternative C	Alternative D	Alternative E	Alternative G	Alternative H
1 (Ground-based)	0	11.4	3.6	10.0	11.4	10.0
2 (Ground-based)	0	7.6	5.1	6.8	7.6	6.9
3 (Ground-based)	0	8.3	3.5	7.9	8.4	6.8
4 (Ground-based)	0	9.2	3.1	8.4	9.2	9.1
5 (Ground-based)	0	5.2	1.8	3.9	5.2	4.8
6 (Ground-based)	0	16.3	10.0	15.7	16.3	15.4
7 (Ground-based)	0	11.2	3.4	10.7	11.2	10.8
8 (Helicopter)	0	4.1	3.2	2.7	3.9	0.0
Total Volume (MMBF)	0.0	73.3	33.7	66.1	73.2	63.8
Range of Sale Sizes (MMBF)	n/a	4.1 – 16.3	1.8 – 10.0	2.7 – 15.7	3.9 – 16.3	4.8 – 15.4

Summary and Conclusions

1. Logging systems were recommended to meet resource management objectives of the Forest Plan. Soil productivity and water quality influenced the choice of logging systems the most.
2. Residual values per mbf and per acre do not include slash disposal cost, road reconstruction cost, and reforestation cost. These are included elsewhere in the EIS. However, residual costs appear to be sufficient to cover "normal" slash and road reconstruction costs. There also may be some money for reforestation, salvage sale fund collections, or both.
3. Per acre residual timber values range from $0 to $665 for helicopter; $420 to $549 for ground-based; and $420 to $552 for the weighted average of the logging systems.
4. Alternative E has the highest residual value per acre for all categories, while Alternative H has the lowest.
5. Alternative E has the highest potential return to the government.
6. Alternative E has the lowest cost per mbf, including alternatives that have helicopter yarding in them.
7. Alternative D benefits from having the shortest average ground-based skid distance compared to the other action alternatives.
8. Alternative E benefits from logging higher volume stands compared to the other action alternatives.
9. Adjustments were made for hand felling trees greater than 21 inches at the stump in ground-based harvest units.
10. To account for volume loss due to normal delay for NEPA clearance and sale preparation, small diameter trees and tops of large trees are not included in volume estimates. Trees less than 13 inches dbh and tops less than 10 inches dib on the small end are not in the volume estimates.
11. To account for assumed value reductions, 35 percent of the green timber value was removed when estimating potential dollar returns.
12. Additional delays beyond those assumed to be "normal" are likely to further reduce the volume and value of the alternatives.

This Toolbox Fire Recovery Project specialist report was prepared during March, April and May of 2003. It will be used, along with specialist reports from multiple resource areas, to prepare a Draft Environmental Impact Statement (DEIS) for the Toolbox Fire Recovery project. This specialist report will become a part of the planning record for the project, filed under:

"Toolbx/ Planning Record/ E_Specialists_reports_data_inventory_and_collection"

This report will be filed both in the 'hard-copy' planning record binders, on file at the Silver Lake Ranger District, and on the Fremont National Forest "K-Drive". In the interest of planning process efficiency, particularly in light of time and budget constraints, editing that occurs to the content of this report during the preparation of the DEIS will be reflected in the DEIS and will not necessarily be entered back into the content of this report. To insure the accuracy of such edits, I will review the content of both the DEIS and the (Final) FEIS and certify that their content is consistent with the analytical conclusions in this report. If during DEIS or FEIS editing, substantially different conclusions or interpretations are reached or substantial additional analysis is prepared from that displayed in this report, an addendum to this report will be prepared.

Specialist: /S/ *Glenn L. Pierce* Discipline: Forester, Logging Systems Planning Date: May 12, 2003

Glenn L. Pierce