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Engineering Technical Information System

1985 *Field Notes* Article Awards

Discussion Regarding Policy & Procedures for Economic Analysis of Buildings & Related Facilities

Underbody Blade Truck

Floating Field Camps in Region 10: An Alaskan Solution to an Alaskan Problem

Federal Engineer Liabilities

Bibliography of Engineering & Equipment Development Publications

Engineering Field Notes

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1985 *Field Notes* Article Awards

It's getting close to the end of the year again, which means it is time for our readers to vote on their choice for the best Field Notes articles published during 1985. We will reward the authors of the three articles receiving the most favorable response from our readers.

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Remember, do NOT rate more than three articles.

Cut out the page as indicated, fold and staple it closed, and mail it to the Washington Office. For your selection to be considered, YOUR RATING SHEET MUST BE DELIVERED TO THE WASHINGTON OFFICE BY DECEMBER 31, 1985.

Engineering Field Notes is intended to provide useful information to Engineering personnel in the field, as well as to those who manage or supervise projects from the office.

If you have a new way of accomplishing a job or a better idea for handling problems, why not share it? Write an article for Field Notes, and you may win a 1986 Field Notes Article Award!

1985 FIELD NOTES ARTICLE RATING SHEET

	ARTICLE/AUTHOR	CHOICE (1, 2, 3)
JANUARY/FEBRUARY	TECHNOLOGY TRANSFER & YOU (Dale R. Petersen, WO)	_____
	MAKING A GOOD ROAD SYSTEM BETTER: CREATING A DATA BASE FOR THE SURFACING DESIGN & MANAGEMENT SYSTEM (Adrian Pelzner, WO)	_____
	HOW THE OFF-DUTY ENVIRONMENT AFFECTS ON-DUTY PRODUCTION & SAFETY (Darrell McNenny, R-1)	_____
	CLOSE-RANGE PHOTOGRAMMETRY AT WORK ON TOUGH MEASURING JOBS (W. H. Valentine, R-1; Roger Crystal, R-6; Gerry Salsig, R-5; J. B. Stewart, R-3)	_____
	CROSS-COUNTRY SKI TRAIL PLANNING, DEVELOPMENT, & OPERATION CONSIDERATIONS (Roger Pekuri, R-9)	_____
	TRANSPORTATION ANALYSIS MEMORY: A METHOD OF USING THE TRANSPORTATION INFORMATION SYSTEM FOR REPORTING TIMBER HAUL & ROAD MAINTENANCE COSTS (John Rupe, R-4; Lee Collett, R-4)	_____
	AUTOMATED ROAD DESIGN SYSTEM (Colburn D. Swarthout, WO; Fong L. Ou, WO)	_____
	THE SOFTWARE SPOT: RECON (Gene L. Gibson, R-1)	_____
	THE SOFTWARE SPOT: BUDGET ELECTRONIC SPREADSHEET (Dale R. Petersen, WO)	_____
	THE SOFTWARE SPOT: TECHNOLOGY TRANSFER DATA BASE (Dale R. Petersen, WO)	_____
MARCH/APRIL	LOW-COST DIAGONAL FENCE STRAINER (Dan W. McKenzie, SDEDC; W. F. Currier, R-3)	_____
	GRIDER CREEK AREA PLANNING CONTRACT (Eugene L. Smith, R-5)	_____
	CRIME ANALYSIS, ELECTRONIC SENSORS, & WILDERNESS MANAGEMENT (Jerry D. Greer, NFAP; Joel Johnstone, R-3; Jacquelyn Boaz, R-3)	_____
	PRESTRESSED, TREATED TIMBER BRIDGES (Clyde Weller, WO)	_____
	POTENTIAL USE OF REGRESSION ANALYSIS IN ROAD COST ESTIMATION (Fong L. Ou, WO; Colburn D. Swarthout, WO)	_____
	TOPOGRAPHIC MAPPING USING AIRBORNE LASER & RADAR PROFILE DATA: THREE CASE STUDIES (R. Crystal, R-6; R. Jensen, R-10; J. Peters, NE Station; H. Lachowski, WO; P. Simmons, WO)	_____
	HOW MUCH IS GOOD ENOUGH? (Dale R. Petersen, WO)	_____
	CLARK C. HERITAGE MEMORIAL SERIES ON WOOD (Clyde Weller, WO)	_____
	TRAFFIC: A PROGRAM FOR ANALYZING TRAFFIC SURVEILLANCE DATA (Eugene L. Smith, R-5)	_____
MAY/JUNE	EQUIPMENT DEVELOPMENT FOR A NEW ERA (Lee I. Northcutt, MEDC)	_____
	DEVICE TO MEASURE ROAD DUSTINESS NOW UNDER DEVELOPMENT (Deborah Taylor, WO)	_____
	THE BAUSCH & LOMB RESOURCE MEASUREMENT SYSTEM (RMS) AS AN AID IN AREA MEASUREMENTS (Jerry D. Greer, NFAP)	_____
	AUTOMATED SPECIAL PROJECT SPECIFICATIONS (Lester M. Pense, Jr., R-8)	_____
	GPS SATELLITE CONTROL FOR PHOTOGRAMMETRIC CADASTRAL SURVEYS (Vic Hedman, R-9)	_____
	TECHNIQUES TO BRING NEW LIFE TO TIMBER BRIDGES (Frank W. Muchmore, R-1)	_____
JUL/AUG	REMOVING PROTRUDING ROCKS FROM ROADBEDS & DITCH LINES (Larry Leland, R-9)	_____
	SIDE-LOOKING AIRBORNE RADAR IN NATURAL RESOURCES MANAGEMENT (Jerry D. Greer, NFAP)	_____
	FAMILY CURVES FOR ESTIMATING SINGLE-LANE ROAD CAPACITIES (Fong L. Ou, WO; Ken Tompkins, WO)	_____
	THE SLIDE RULE: A 'POST'-MORTEM (Jerry D. Greer, NFAP)	_____
SEPTEMBER/OCTOBER	THE SOFTWARE SPOT: FLIPS PROCESSING OF CONTRACT PAY ESTIMATES & COST-TO-GOVERNMENT REPORTS (John E. Best, R-5)	_____
	IS THE FOREST SERVICE READY FOR ARTIFICIAL INTELLIGENCE? (Dale R. Petersen, WO)	_____
	SLAVE YOUR OLD DEMAND TERMINAL OR SERIAL PRINTER TO A DATA GENERAL DASHER D410 VIDEO DISPLAY TERMINAL (Wayne T. Beddes, R-4; L. Ray Flinn, R-4)	_____
	AERIAL PHOTOGRAPHY FLIGHT ALTITUDE DETERMINATION (Dave Wolf, R-2)	_____
	METAL OPEN-TOP DRAINAGE STRUCTURE: 'FLYING W' STUDY (Ellen Lafayette, R-6)	_____
	HP-41 ROAD DATA & DESIGN SYSTEM (41-RDADS) (Dan McReynolds, R-8; Randy Warbington, R-8)	_____
	TEMPORAL VARIATIONS IN TRAFFIC VOLUMES (Fong L. Ou, WO; Lonnie Gary, R-6)	_____
	EVALUATION OF COMPUTER-AIDED DRAFTING & DESIGN FOR ARCHITECTURAL/STRUCTURAL ENGINEERING (George J. Lippert, WO)	_____
	COMPUTER-AIDED DESIGN (Bob Swarthout, WO)	_____
	FINAL EVALUATION REPORT--INTERNAL APPLICATION & EVALUATION OF CONTROL DATA CORPORATION'S CD2000 COMPUTER-AIDED DESIGN/DRAFTING SYSTEM (Frank Muchmore, R-1; Robert LeCain, R-1)	_____
	A REVIEW OF MICRO- & MINI-CADD SYSTEMS (George J. Lippert, WO)	_____
NOV/DEC	DISCUSSION REGARDING POLICY & PROCEDURES FOR ECONOMIC ANALYSIS OF BUILDINGS & RELATED FACILITIES (George J. Lippert, WO)	_____
	UNDERBODY BLADE TRUCK (James R. Bassel, San Dimas Equipment Development Center)	_____
	FLOATING FIELD CAMPS IN REGION 10: AN ALASKAN SOLUTION TO AN ALASKAN PROBLEM (Don Garcia, R-10)	_____

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COMMENTS: _____

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Discussion Regarding Policy & Procedures for Economic Analysis of Buildings & Related Facilities

George J. Lippert
Chief Facilities Engineer
Washington Office Engineering

This article was prepared to clarify some concerns about the use of various present-worth economic analysis methods for buildings and related facilities projects. (See FSM 7314.3.)

Based on Handbook 135 of the National Bureau of Standards, we have reviewed certain project reports that have used discount rates of 4 percent, 7 percent, and 10 percent and use both constant and current dollars for comparing project alternatives. "Constant Dollars" are values expressed in terms of general purchasing power at the time the evaluation is being made, that is, the base year. Constant dollars do not reflect price inflation. "Current (or Nominal) Dollars" are values expressed in terms of actual prices of each year. Current dollars reflect price inflation. "Real Rate of Return" are values of investments exclusive of inflation and taxes if applicable.

First, the use of a 4-percentile discount rate for buildings and related facilities is inappropriate. While FSM 1971.71 prescribes the use of 4 percent for Forest Service field operations, the use of other rates also is mentioned. The 4-percentile rate was selected by the Forest Service on the basis of analysis of real rates of return on investment in the U.S. industrial economy between 1950 and 1978. As a matter of interest, the lower discount factor provides more favorable consideration of out-year benefit streams associated with reforestation, stream, land, and other long-term resource improvement measures.

Discount rates are established by the Federal Government as a matter of socioeconomic policy. Key factors are the comparability of investment choices and their benefit streams, as well as the time value of money. Alternative rates of return on investment in other parts of the economy are considered. For

property (both real and personal) and other non-resource program decisions, rates other than the standard Forest Service 4-percent rate are used. The Office of Management and Budget (OMB) Circulars A-94 (1) and A-104 (2) both contain instruction on economic comparability of these decisions. Both circulars were issued in 1972 and are still valid. Both use present value analysis and require that future costs be treated the same.

Circular A-94 is useful for benefit-cost comparability. A 10-percentile discount rate is required, representing OMB's estimate of the average rate of return of private investments before taxes and after inflation constant dollars are used. Thus, calculations are comparable to a current dollar analysis using a 13- to 14-percent discount rate. However, Circular A-94 specifically exempts the 10-percent rate use in decisions concerning the manner of obtaining use of real property (lease vs. purchase).

Circular A-104 was established to compare costs in leasing or purchasing general purpose real property. A 7-percentile discount rate and constant dollar cost analysis is prescribed. All future costs (appreciation/depreciation, imputed taxes and insurance, maintenance, operation, and repair) may be estimated in terms of current dollars. This provides for increased cost resulting from inflation and those costs increasing at rates greater than inflation. This occurred during the energy crisis and may still be present in spot leasing markets. However, all costs must be reduced to constant dollars for comparability. Circular A-104 provides factors and tables to assist in comparing and adjusting future costs. However, the deflation factors provided are out of date; recent rates are higher. Building decay and obsolescence/site appreciation factors are largely offsetting and of limited utility.

OMB advises that Circular A-104 will be revised within the next few months to consider:

(1) The current rates of Government borrowing costs. A 12-percent discount rate is being considered.

(2) The effects of defacto subsidies delivered through the tax system under investment tax credits and the accelerated cost recovery

system. Both are to be treated as costs to the Government. These are both addressed in the current Administration's tax reform plan, and their status and potential inclusion in the revised Circular A-104 is subject to debate.

(3) Current rates of inflation, building depreciation, and site appreciation.

OMB advises that use of Circular A-94 is appropriate for preliminary project alternative analysis because it is more a "benefit/cost" comparison. OMB recommends that budget requests be based on Circular A-104 comparability and that the 12-percent discount factor be used. However, inflation/deflation and other factors are unavailable at this time.

Rates used for water resources project analysis (currently $7\frac{1}{8}$ percent) are not affected by either circular. These are covered in "Water Resources Principles and Standards."

A further condition that OMB provides is that the policies in the circulars are "not withstanding Agency decision criteria." We are particularly concerned about the suggestion to use both Circular A-94 and Circular A-104 in facility development. Circular A-104 would be appropriate if a separate, Federal capital budget were available to the agencies. With all agencies currently using a unified budget (both annual and capital requests), budgeting decisions are, in reality, program tradeoffs. Hence, we believe Circular A-94 practices are more appropriate.

Until further notice, we recommend the continued use of the 10-percent discount rates, constant dollars, and a study period of 25 years for evaluating facility project alternatives. This will provide a fairly comparable analysis for the following reasons:

(1) Facility decisions rarely are made on cost alone. Project alternative analysis considers all tradeoffs, with cost being but one factor. Lowest cost is attractive, but total cost-effectiveness is more appropriate. Although benefits are not computed per se, costs are compared and benefits are subjectively compared in the analysis.

(2) Because the 10-percent rate with constant dollars is comparable to current dollar

analysis at a 13- to 14-percent rate (and close to proposed OMB rates), the time and effort to use Circular A-104 procedures does not appear beneficial. Optional use of Circular A-104 is acceptable if future costs can be supported.

(3) Using discount rates of 10 percent or more, little is gained by continuing the study beyond 25 years. Discounted costs, 20 years hence, have little effect on present values.

We will maintain contact with OMB and advise you of the status and rationale of proposed changes in procedures and policy. Discussion and legislation on tax reform may retard early action by OMB. Chapter FSM 7310 is currently being revised. The Economic Analysis Standards for facility analysis (formerly FSM 7314.3) will be relocated to FSH 7309.11. Both directives will be issued around October 1, 1985. Definitive action by OMB may be incorporated by supplementation later.

REFERENCES

(1) U.S. Department of Commerce, National Bureau of Standards. Handbook 135 - Life-Cycle Costing Manual for the Federal Energy Management Programs. U.S. Department of Commerce, Washington, D.C.

(2) U.S. Office of Management and Budget. Circular A-94, "Discount rate to be used in evaluating time--distributed costs and benefits." U.S. Office of Management and Budget, March 27, 1972, Washington, D.C.

(3) U.S. Office of Management and Budget. Circular A-104, "Comparative cost analysis for decisions to lease or purchase general purpose real property." U.S. Office of Management and Budget, June 14, 1972, Washington, D.C.

EFN

Underbody Blade Truck

James R. Bassel
Staff Engineer, Transportation
San Dimas Equipment Development Center

INTRODUCTION

Aggregate and native-surfaced roads represent a major portion of the total road mileage in the National Forest System. Periodic smoothing and reshaping is the most common and costly maintenance operation for these unpaved surfaces. This maintenance effort produces a smooth riding surface, improves drainage, and aids in extending the life of the road. The motor grader has become the generally accepted piece of equipment for this operation.

A less expensive approach is available for mechanized blading that can supplement the grader operation. The method employs an underbody blade (standard moldboard grading type) mounted beneath a dump truck. The equipment is hydraulically operated from the cab and usually requires large trucks (30,000 to 46,000 gross vehicle weight) for adequate power.

This road maintenance concept is not new to the industry. The blades were developed before the first motorized vehicle and mounted beneath trolley cars and horse-driven wagons. The Forest Service has been using the blades since the 1930's. At present, the blades are used mostly by county and State highway departments in the Northern States, Alaska, and Canada to remove packed snow and ice from roads. In its eastern and southern Regions, the Forest Service uses underbody blades for maintaining gravel and unpaved roads.

EQUIPMENT DESCRIPTION

The underbody blade, manufactured by several companies, is a moldboard type, approximately 15 inches high with lengths varying from 8 to 12 feet. The blade is mounted to the chassis of a heavy-duty dump truck between the front and rear axle. Hydraulics is used to control pitch and horizontal rotation. A more sophisticated blade, manufactured by the Wausau Company of Milwaukee, Wisconsin, incorporates a hoist and tilting

mechanism. The hoist will increase the road clearance, while the tilt can be used in developing a roadway crown. If the blade hits an immovable obstruction, heavy duty springs and hydraulics or pneumatics are used for a trip mechanism.

OPERATION

Similar to a motor grader operation, the underbody blade is angled horizontally so that one end is forward and the other is to the rear. The first passes go along each shoulder so that excess bladed material from each side is brought to the center in a windrow. Little or no road material is lost to the roadside or ditches. Additional passes then are made with a dragging action of the blade to spread the windrowed material back across each side of the roadway. With special care, an experienced operator may be able to provide an acceptable road crown on these last passes (see figures 1 and 2).

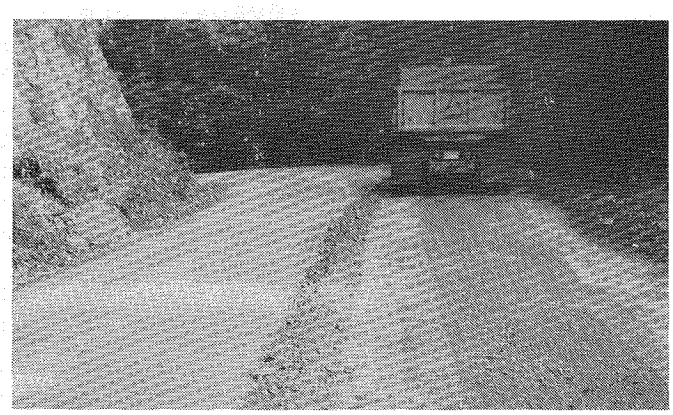


Figure 1.--Results after the first pass.

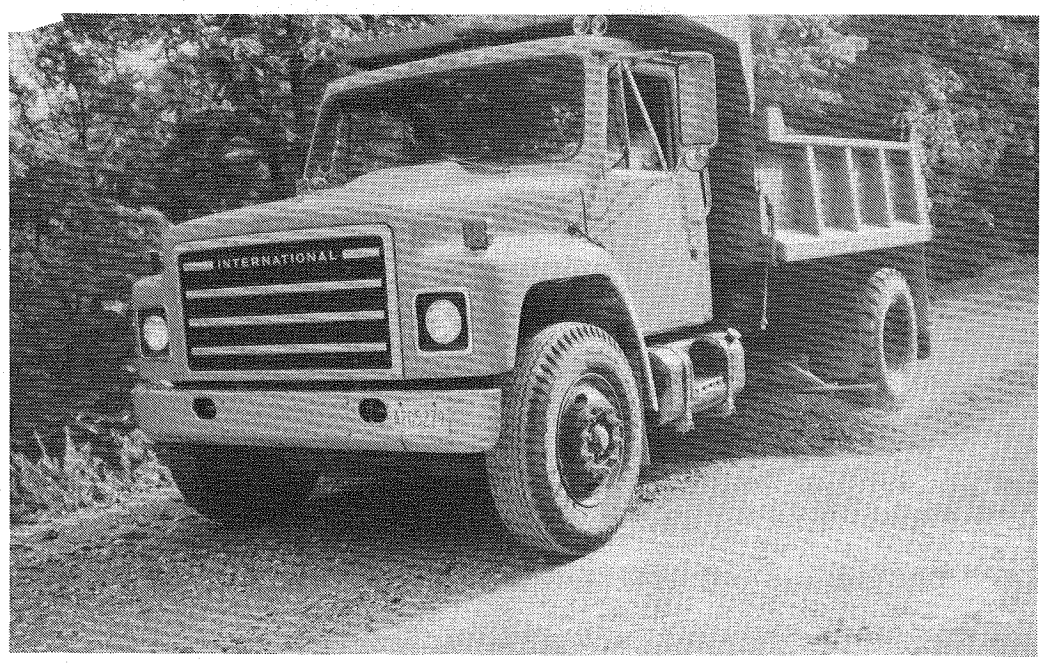


Figure 2.--Blading in a cutting operation.

A typical maintenance prescription in the Forest Service for a level 3 road would be blading one to two times per year with a motor grader for major road deficiency and establishing a road crown, plus supplemental blading with an underbody blade two to three times per year for minor road deficiency surface smoothing. The combination of these operations can be varied, depending on the characteristics of the surface material, climate conditions, and traffic volume. The blade also can be effectively worked on level 2 and level 4 roads.

In addition to surface blading, the underbody blade truck is versatile and has advantages over the motor grader in such jobs as hauling and spreading gravel for reworking road surface deficiency (see figure 3) and hauling trailers and equipment. The underbody blade truck also can be used as a general service truck. Another important aspect is the truck's ability to quickly move from job to job and distant work sites much faster than a motor grader.

GEOGRAPHIC AREAS & ROAD MATERIALS

To date, there are 12 underbody blade trucks operating in the National Forests--Michigan, West Virginia, Tennessee, Florida, Louisiana, and Mississippi. As expected, road conditions and materials vary widely in this large geographical area. Generally, the blades are worked on level three roads, where, except for the mountains of West Virginia and Tennessee, the road grade is relatively flat. Road materials range from crushed aggregate to sandy clay in Louisiana to a fine and loose sand surface found in Florida.

PERFORMANCE

The performance capabilities of the underbody blade for maintaining typical road deficiencies are as follows:

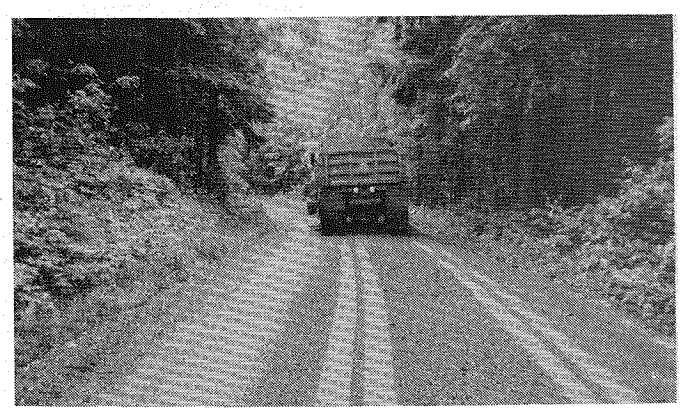


Figure 3.--Aggregate haul and spread operation.

(1) Effectively removes minor traverse corrugations and longitudinal rutting on sandy and crush aggregate surfaces. It is less effective on hard crusty native materials and deep potholes. Under these tougher conditions, a motor grader with a scarifier attachment would be needed. Road moisture content greatly influences the road conditions, hence the difficulty of blading and reshaping.

(2) Effectively redistributes loose surface material (aggregate) from shoulders and center of road.

(3) Inadequate in maintaining proper roadway crown. This violates an important maintenance function of blading and shaping operations.

(4) Incapable of pulling roadway drainage ditches and cutting road banks.

(5) Has had limited exposure to rocky road conditions--specifically, to larger native rocks embedded in the road surface. The truck is able to blade over embedded rocks on occasions, even extracting some of the smaller rocks. How rocky can the road be before the underbody blade truck becomes an ineffective tool or causes structural damage to the equipment is an unanswered question at this time. Further study is required on this subject to determine accurately what road conditions the underbody blade truck can handle.

CONCLUSIONS & RECOMMENDATIONS

The underbody blade is in a class of road maintenance equipment between the motor grader and the rock rake. The rock rake aids the motor grader by raking off large rocks, redistributing gravel, and smoothing the road. Some capabilities of these machines overlap each other. Both the underbody blade truck and the rock rake are less expensive equipment and can effectively supplement the motor grader but definitely do not replace it.

The underbody blade should be considered a feasible road maintenance tool for the Forest Service for light grading needs.

A more detailed project report is being prepared by the San Dimas Equipment Development Center and should be distributed to the Forests and Districts in late 1985. EFN

Floating Field Camps in Region 10: An Alaskan Solution to an Alaskan Problem

Don Garcia
Regional Buildings Engineer
Region 10

The problem seemed immense when viewed from the map! Over 10,000 islands, impossible terrain, and little or no road system to make the Forest accessible for timber and other resource management programs. Coupled with this problem was the large turnover of personnel resulting from employee dissatisfication with extended flying in small float planes and the ever present isolation of the Alaskan locations. Also, the Alaskan Native Indian Lands Claim Act, passed in 1974, made a veritable checkerboard of the available timber areas, thereby relegating work areas to the more remote timber and resource areas. To find an economical and functional solution to the problem of housing field personnel in the remote bush country of Southeast Alaska, Facility Engineers of the Ketchikan Area in the Tongass National Forest, had an idea and a dream to create a floating field camp capable of supporting a large number of personnel for an extended period of time without extensive logistic support. The system should be economically comparable to those crew-quarters being constructed on land at permanent Ranger District or Work Center locations. Spearheading the Area's efforts for the design was Ron Skillings, Supervisory Civil Engineer, Ketchikan Area, and Walt Brooks, Forest Engineer. Don Schultz, Regional Mechanical Engineer, was instrumental in putting the final details together. The Regional Office Engineers provided help, and a prospectus and workable floor plan were developed so that a design and construction contract could be submitted for an invitation for bid.

The basic design requirement called for a floating field camp with a life expectancy of 30 years that was made of building and barge craft materials able to withstand extended exposure to a marine environment with minimal maintenance.

Earlier economic investigations had shown that permanent, land-based crewquarters in Alaska cost approximately $25,000 per employee space. The initial estimate for the proposed floating field camp was $30,000 per employee space. Because of the uniqueness of the undertaking and the competitive market conditions, it soon became apparent that the Forest Service could have two barges built for the initial estimated cost for one unit, thereby accomplishing a 2-year need in a single year.

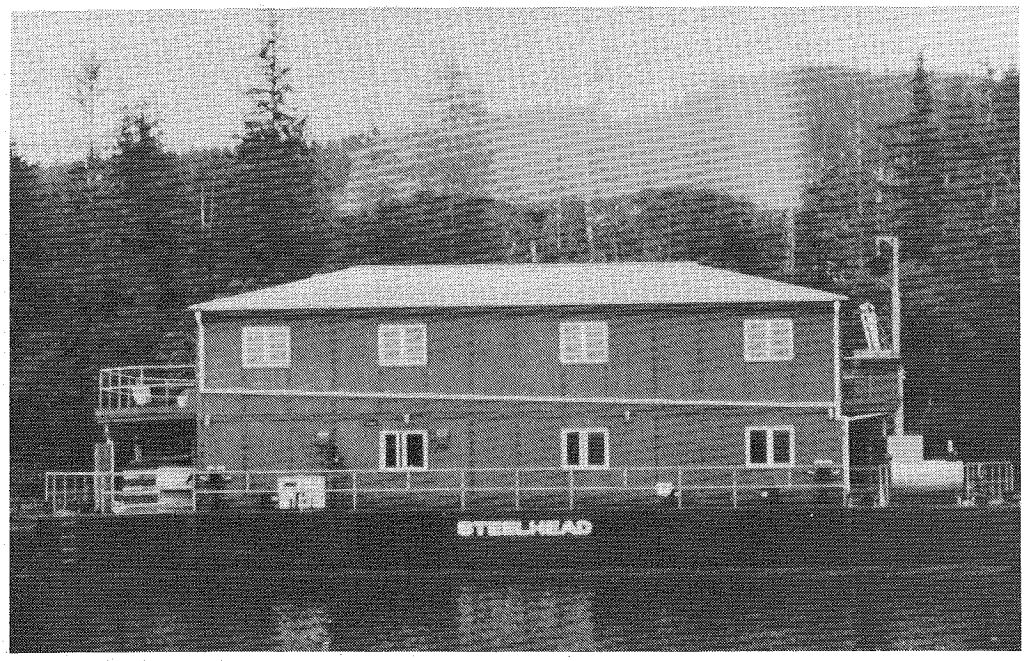
Nineteen contractors made bid proposals. The offers ranged from $732,628 to $2,217,000. The Government's final estimate was $974,000. The contract was awarded in August 1982 to Umpqua Marine Ways, Inc., of Reedsport, Oregon. The contract called for successful sea trials and delivery at Ketchikan, Alaska, within 240 days. J. Cameron McKerman of Portland, Oregon, a naval architect who was a subcontractor to Umpqua Marine, provided design and marine consultation directly to the Forest Service to capitalize on the proposed features that the Forest desired. After the final design had been reviewed and agreed upon, the plans and specifications were turned over to Umpqua Marine Ways for fabrication. Prior arrangements between Regional Offices 10 and 6 allowed for onsite inspection and documentation of the construction procedure by Engineers from Siuslaw National Forest. This assistance proved to be invaluable to the overall success of the venture.

After sea trials at Reedsport, Oregon, the barges were outfitted and prepared for the 800-mile journey by way of the Alaskan Marine Highway--a scenic but hazardous stretch of ocean water between Seattle and Ketchikan that winds among the reefs and islands of Canada and Southeast Alaska. The completed floating field camps were delivered to the Forest Service on April 15, 1983.

The two 85-foot steel barges--Steelhead and Chickamin--are designed to last for 30 years; to generate their own electricity for heating, cooking, and refrigeration; to provide fresh water through a unique rainwater-catching and treatment system; to handle their own sewage waste; and to deploy a mobile floating dock for crew boats and seaplanes. The 31-foot inside hull provides sufficient working space below deck with a depth of 7 feet, 6 inches. The barge has a draft of 2 feet, and the wood frame

structure rises 22 feet above the deck to the peak of the truss roof. (See figure 1.)

The barge-mounted facilities consist of seven two-person staterooms, a large dining and lounge area, a cook and caretaker's quarters, a laundry and mud room with coat and boot racks, and clothes washer/dryer units. There also are two large shower rooms and toilets.



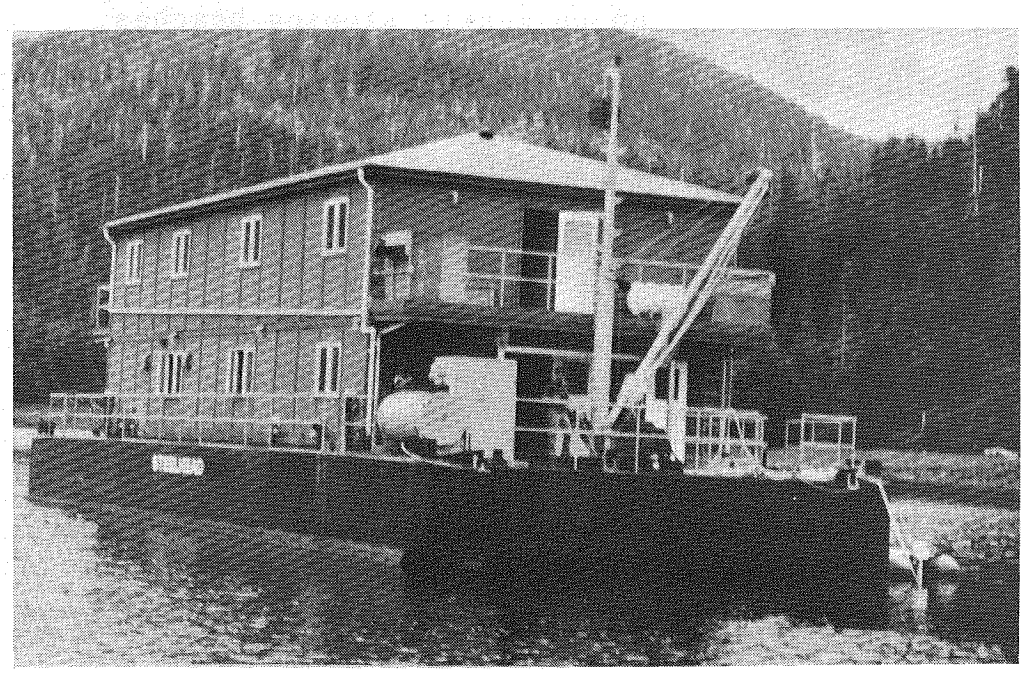


Figure 1.-- Floating field camp Steelhead, which has a 14-person capacity with complete, self-contained utilities and facilities and currently is used on the Craig and Thorne Bay Ranger Districts.

The large galley also serves as an office for the cook, who usually is also the building manager for the barge and has private living quarters. The machinery room with the hot water heater and other equipment is next to the galley. The electrical and control console is situated near the galley where the cook can monitor it. Electricity to power the facility is generated from a matched set of 20-kilowatt diesel generators that provide 120/240 volt single phase power.

Since the floating field camps will be operating in one of the rainiest spots on Earth--with an annual rainfall in excess of 150 inches--Forest Service Engineers reasoned that rainwater could provide an important source of pure fresh water. Roofs were built to serve as nontoxic catchment systems. Water from the roof flows into drain pipes that go to a 300-gallon tank in the hull of the barge. The water is pumped through a sand filter, a chlorinator, and an activated charcoal filter before being stored in the two 1,200-gallon potable water tanks. A pneumatic-pressure water system distributes water throughout the facility.

Each barge carries its own floats, which can be deployed when anchored. These serve as a landing for small shore boats and work boats and also for the seaplanes that are used widely in the Alaskan bush country. Since the barges are designed to run up on gently sloping beaches, sandbars, and mudflats when necessary, the floats can be used as walkways to shore. There are six 250-pound Danforth anchors to secure the barge and floats. The anchors and chains are deployed by two 30-ton windlasses and four electric capstans. The crane consists of a mast and boom.

There are two independent systems for sewage collection: The "gray" waste system handles the effluent from wash basins and sinks. The "black" waste system handles contaminated sewage from toilets. The heads are nonmarine equipment with saltwater flushing. The marine sanitation system, in the hull below deck, discharges treated wastewater overboard. Outfall hoses are deployed when required by water circulation patterns. The sewage system incorporates a chlorinator and holding tanks.

After two seasons of heavy field use at Thorne Bay and Craig Ranger Districts, there has been wide expression of approval of the design and efficiency of these floating camps. The crafts have undergone the demands of being towed and anchored in remote areas. They have stood up well under demanding circumstances with a minimum number of personnel. When managed and operated by trained personnel, the floating field camps have exceeded the design expectations. A detailed operational and maintenance systems plan was necessary for a marinetype environment and has been put into routine use. Any problems that have arisen, resulted from personnel not being familiar with the plan who tried to improvise solutions to temporary problems.

To the field crews, the floating field camps have meant dry sleeping facilities, wholesome food, and hot water for bathing and laundry--this is a far cry from the tents and trailers of days gone by. The turnover of personnel has slowed dramatically. When the fish are running, it is almost impossible to get the employees to come to town! EFN

Federal Engineer Liabilities

INTRODUCTION

The following memorandum was prepared by Kathryn Toffenetti of the Office of the General Counsel (OGC) in response to a number of questions we asked regarding Federal Engineer liabilities. This memorandum pertains to Federal facilities responsibilities and compliance under the Clean Water Act, the Safe Drinking Water Act, and the Resource Conservation and Recovery Act.

We believe the OGC response provides a very straightforward analysis of the responsibilities and liabilities that arise from the three environmental statutes and the possible common law tort liability of Engineers involved with these types of facilities on National Forest Lands.

MAY 23 1985

MEMORANDUM

TO : R. M. Housley
Deputy Chief
National Forest System, FS

FROM : Clarence W. Brizee Clarence W. Brizee
Assistant General Counsel
Natural Resources Division

SUBJECT: Federal Engineer Liabilities

This memorandum is in response to your questions concerning liabilities to which Forest Service engineers might become subject in the performance of their official duties. Your request calls for a wide-ranging inquiry. With the view toward providing as intelligible analysis as possible we do not address your questions seriatim but instead have arranged the memorandum as discussions of the general issues your questions raised. We understand your concerns initially are two. First, there are the responsibilities and liabilities that arise from three environmental statutes, the Federal Water Pollution Control Act, or Clean Water Act (CWA) (33 U.S.C. §§ 1251-1376), the Safe Drinking Water Act (SDWA) (42 U.S.C. §§ 300f-300j-10), and the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §§ 6901-6987 as amended by the Hazardous and Solid Waste Amendments of 1984, Pub. L. No. 98-616, 1984.) Secondly, you request an analysis of possible common law tort liability of engineers who design facilities on national forests. With respect to the potential for tort liability you wish our opinion regarding the effect of state requirements for certification of plans by state registered engineers. You also had questions concerning representation of employees by the Justice Department.

Compliance with the SDWA, CWA and RCRA

Each of the environmental statutes asked about required federal compliance with all federal, interstate, state, and local requirements issued pursuant to the statutes, to the same extent as nongovernmental entities.

The CWA provides that federal employees are subject to any federal, state, or local requirements imposed to carry out its purpose:

Each department, agency, or instrumentality of the

Figure 1.--Memorandum on Federal Engineer liabilities.

> executive legislative and judicial branches of the Federal Government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants, and each officer, agent, or employee thereof in the performance of his official duties, shall be subject to, and comply with, all Federal, State, interstate, and local requirements, administrative authority, and process and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity including the payment of reasonable service charges. The preceding sentence shall apply (A) to any requirement whether substantive or procedural (including any recordkeeping or reporting requirement, any requirement respecting permits and any other requirement, whatsoever), (B) to the exercise of any Federal, State, or local administrative authority, and (C) to any process and sanction, whether enforced in Federal, State, or local courts or in any other manner. (33 U.S.C. § 1323.)

These provisions shall apply "notwithstanding any immunity of such agencies, officers, agents, or employees under any law or rule of law" (33 U.S.C. § 1323). Immunity will be more fully discussed in that part of this memorandum regarding common law tort liability of individual federal employees. Briefly, the United States as sovereign is immune from suit unless it specifically waives its immunity; federal employees in some circumstances may be immune from suit for acts done within the performance of official duties. This provision of the CWA waives the defense of immunity that might otherwise shield an employee from suit. Having waived immunity, however, the Act then provides that federal employees shall not be personally liable for "any civil penalty arising from the performance of his official duties, for which he is not otherwise liable." (33 U.S.C. § 1323.) In other words, the employee will not be personally liable for the civil penalties provided for by the CWA, but the CWA will not protect an employee from personal liability which could arise for reasons other than violation of the Act. An employee is subject to the CWA's provisions for injunctive relief and criminal penalties, however. "Any citizen" may commence a civil action in his own behalf against "any person" who violates an effluent standard or limitation under the Act, or a state or EPA order regarding such standards or limitations (33 U.S.C. § 1365(a)). The term "person" includes an individual (33 U.S.C. § 1362).

The SDWA requires compliance to the same extent as the CWA:

> (a) Each Federal agency (1) having jurisdiction over any federally owned or maintained public water system or (2) engaged in any activity resulting of which may result in underground injection which endangers drinking water (within the meaning of section 300h(d)(2) of this title) shall be subject to and comply with, all Federal, State, and local requirements, administrative authorities, and process and sanctions respecting the provision of safe

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

> drinking water and respecting any underground injection program in the same manner, and to the same extent, as any nongovernmental entity. The preceding sentence shall apply (A) to any requirement whether substantive or procedural (including any recordkeeping or reporting requirement, any requirement respecting permits, and any other requirement whatsoever). (B) to the exercise of any Federal, State, or local administrative authority, and (C) to any process or sanction, whether enforced in Federal, State, or local courts or in any other manner. (42 U.S C. § 300j-6.)

Although this subsection states a requirement of compliance for agencies only, in another portion of the Act is a provision for suit against "any person" who violates any requirement prescribed by or under it (42 U.S.C. § 300j-8). The term "person" includes an individual, and specifically includes an officer or an employee of a federal agency (42 U.S.C. § 300f-12). Suit may be brought against a person who violates any requirement by "any person" on his own behalf (42 U.S.C. § 300j-8).

As in the CWA, under the SDWA a federal employee is not personally liable for civil penalties for acts or omission in the scope of the employee's duties. (As stated earlier, the CWA exempts the employee from personal liability for acts or omissions "for which he is not otherwise liable." The SDWA's provision exempting the employee "for any civil penalty under this subchapter," that is, under the SDWA, is just a simpler way to convey the same meaning.) The SDWA allows even more protection than the CWA, however. The CWA does not permit the defense of immunity to be raised on the part of the government or its employees. The SDWA only waives immunity for federal agencies; federal employees may still assert this defense.

RCRA's compliance section provides as follows:

> Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the federal government (1) having jurisdiction over any solid waste management facility or disposal site, or (2) engaged in any activity resulting, or which may result, in the disposal or management of solid waste or hazardous waste shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural (including any requirement for permits or reporting or any provisions for injunctive relief and such sanctions as may be imposed by a court to enforce such relief), respecting control and abatement of solid waste or hazardous waste disposal in the same manner, and to the same extent, as any person is subject to such requirements, including the payment of reasonable service charges. Neither the United States, nor any agent, employee, or officer thereof, shall be immune or exempt from any process or sanction of any State or Federal Court with respect to the enforcement of any such injunctive relief. (28 U.S.C. § 6961.)

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

As the last sentence quoted indicates, an individual federal employee can be ordered to comply with whatever injunctive relief which is ordered. It was recently held that as against the federal government, injunctive relief is the only remedy under RCRA, there being no waiver of sovereign immunity from suit for any other penalty or payment of damages. (Florida Department of Environmental Regulation v. Silvex Corp., #83-926-Civ-J-14 (M.D. Fla. 1985) in which the Navy was granted dismissal in an action under RCRA for damages brought against it by the State of Florida.) There is no reason why this limitation on RCRA should apply to individuals, however, so it is likely that federal employees may be subject to any of the penalties which can be imposed on individuals. If an immunity defense is applicable to the situation, however, the federal employee may avail himself of its protection. In this RCRA is like the SDWA. Further, RCRA is like the SDWA and the CWA in that it provides for actions to be brought by citizens on their own behalf against "any person[s]" who are in violation of any requirements effective under the Act (42 U.S.C. § 6972). In contrast with the SDWA and the CWA, RCRA does not specifically provide an exemption for the federal employee from personal liability for its civil penalties. It is important to note, too, that RCRA provides for quite stiff criminal penalties for egregious violations. (See 42 U.S.C. § 6928(e) as amended by § 232 of the 1984 amendments, which provides for fines up to $250,000, imprisonment up to 15 years, or both, for knowingly placing other persons in imminent danger from hazardous wastes.)

Although the possible liabilities under the three statutes may vary, it is clear that each requires federal compliance with all requirements, Federal, State, or local, and substantive or procedural, respecting the purposes for which it was enacted. There is thus no question that Forest Service supervising engineers must comply with state requirements to certify plans for projects regulated pursuant to any of these acts.

The next concerns to address are whether in designing facilities, certifying plans, or supervising projects Forest Service engineers are exposed to possible tort liability. Specifically, the issue is whether an engineer can be held liable for work negligently performed.

Tort Liability

Negligence is a breach of a duty of due care owed to another, causing injury (Prosser, Law of Torts, 143 (4th ed. 1971)). Whether a particular action or omission will be held negligent depends upon the law of the state where the injury occurred - even if it occurred on federal land or was caused by a federal employee. Given the variation among state common laws of negligence, the situations where liability will arise cannot be predicted with certainty. However, it has been stated as a general principle that "[i]t is the duty of an engineer . . . to exercise reasonable care . . . for anyone lawfully on the premises whose injuury is reasonably foreseeable as the result of negligent design, plans, orders or directions." Moloso v. State,

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

644 P.2d 205,217 (Alaska, 1982). To provide an example relevant to your concerns it is most likely that an engineer who designs a drinking water system at a public campground will be held to have a duty to provide a supply of potable water. He can be found negligent if instead his design is faulty and polluted water injures the users. It is unlikely that state engineering registration laws would affect this principle.

In addition to the engineer who actually designs the facility, one who oversees the project to ensure conformance with the specifications has been held to have a duty to make his inspection in a non-negligent manner, to prevent injury to those who will use the facility Balagna v. Shawnee County, 668 P.2d 157 (Kan. 1983). When the duty is specifically imposed by statute or regulation a finding of negligence on the part of one who fails to comply is especially compelling. (See, for example, the Washington State requirement that the supervising engineer certify the project is being constructed in accordance with state-approved plans and specifications, WAC 173-240-095) This would be so whether the inspector applies his seal to the form or not (in fact, if he does not, he is not only negligent, but also in violation of the regulation).[1]

Although a federal employee may have been negligent in the performance of his duties, it does not necessarily follow that he will be held personally liable for the damage caused. The employee may be protected from suit by either of two reasons. One is the Federal Tort Claims Act (FTCA) (28 U.S.C. §§ 1346(b), 2671-2680) which gives an injured party the option of suing the United States for certain torts committed by its employees. The other is the less certain protection of the doctrine of immunity of government officials.

The Federal Tort Claims Act is a waiver of the United State's sovereign immunity. It provides that a party injured by a federal employee acting within the scope of his office or employment may seek money damages against the United States, instead of against the individual employee. Except for certain situations which do not concern us here, it does not make suit against the United States the exclusive remedy Henderson v. Bluemink, 511 F.2d 399 (D.C. Cir. 1974), but given the resources of the individual government employee and the "deep pockets" of the federal government the injured party is far more likely to seek compensation from the latter. Further, the plaintiff whose FTCA case has gone to judgment is barred thereafter from suing the employee (28 U.S.C. § 2676). So it would be an uncommon occasion

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[1] You mentioned that some states require certification of plans by the official "in responsible charge" of the project, and asked who that person might be, naming possible officers by title. This question would best be resolved by discussion with the pertinent state, but it would seem that actual duties, not rank, would determine the proper person. Certification should not be required by one whose duties did not include actual oversight of the project.

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

when a federal employee finds himself a defendant in a tort action that could instead have been brought against the United States in an FTCA action.

Though such a situation is not common, it is not unheard of.[2] If sued, however, the federal employee may be able to take advantage of the other shield against personal liability, the court-made doctrine of government officials' immunity from suit.

The concept of immunity arose from the recognition that officials may err in the performance of their duties but that "it is better to risk some error than not to decide or act at all [for fear of a lawsuit]." Scheuer v. Rhodes, 416 U.S. 232,242 (1974). The privilege of immunity of course benefits the individual government employee, but its rationale is "to aid in the effective functioning of government." Barr v. Matteo, 360 U.S. 564,572-573 (1959). Government officials must be "free to exercise their duties unembarrassed by the fear of damage suits in respect of acts done in the course of those duties - suits which would consume time and energies which would be devoted to governmental service and the threat of which might appreciably inhibit the fearless, vigorous, and effective administration of policies of government." (360 U.S. 564,571.)

Immunity must be pleaded and proved by the party asserting its protection. Butz v. Economou, 438 U.S. 478 (1978). A ruling that immunity applies requires dismissal of the action. (Barr v. Matteo, 360 U.S. 564 (1959).

It is the position of the Department of Justice that federal employees enjoy absolute immunity in common law tort cases such as negligence actions (U.S. Department of Justice, "Torts Branch Representation Monograph I: Representation Practice and Procedure" 30 (1984)). This would mean that an employee would be held immune from suit simply upon proof that the allegedly tortious conduct occurred while the employee was acting "within the outer perimeter of [his] line of duty." Barr v. Matteo, 360 U.S. 564,575. Apparently, courts will

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[2]There are a number of possible reasons for bringing suit against the individual instead of the United States. The two year statute of limitations under the FTCA may have run out, but suit against the employee may still be possible under the applicable state's statute of limitations; or, a plaintiff may feel it important to the success of his claim to have a jury trial, which is unavailable under the FTCA (28 U.S.C. § 2402); or, simply for emotional or vindictive reasons a plaintiff wishes to sue the individual personally responsible for the injury Martinez v. Schrock, 537 F.2d 765 (3d. Cir.1976); in addition a plaintiff may seek punitive damages (damages in excess of the amount which would compensate for the injury imposed as a punishment for egregious wrong doing), which cannot be awarded in an FTCA action (28 U.S.C. § 2674).

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

generally accept that argument. Sometimes, however, they do not. Some courts reason that the rationale for the privilege requires an inquiry into the nature of the allegedly wrongful acts and the scope of the accused official's duties Jackson v. Kelly, 557 F.2d 735 (10th Cir. 1977). These courts rule that immunity may be recognized only for government employees whose allegedly tortious conduct occurred in the exercise of discretionary duties. Coleman v. Federal Intermediate Credit Bank, 600 F. Supp. 97 (D. Ore. 1984). Of course, many federal employees exercise some discretion in the performance of their duties. Forest Service engineers undoubtedly exercise discretion in designing facilities. But some courts, mindful that the reasons for immunity is the effective administration of government policy specifically hold that only actions done in the exercise of government policy should qualify the employee for immunity. Henderson v. Bluemink, 511 F.2d 399 (D.C. Cir. 1974). In Henderson v. Bluemink the District of Columbia Circuit Court elaborated upon the distinction which allows immunity with respect to the performance of some duties but which would not permit it with respect to the performance of others. The case involved the allegedly negligent treatment of a civilian patient by an Army doctor. Considering the rationale for the immunity doctrine the court reasoned that the basis for the doctor's action respecting his treatment of the patient determined whether he had immunity in this situation. The court pointed out that many decisions of government employees are made not for government policy reasons but for reasons no different than those which move their private sector counterparts to act. The court saw no reason why the status as a government employee should shield the doctor from suit if the reason for his action was purely medical. The functioning of government would not be hindered by thus limiting the immunity privilege, the court concluded. "Holding government medical personnel to the same standards of care which they would face outside of government service in no way burdens their public responsibility or deters entry into government service or the vigorous exercise of public responsibility having once entered the service." (511 F.2d 399,403.)

In other words, all other things being equal, there is no reason to protect a government employee from suit just because his paycheck comes from the federal treasury. Not all courts agree with this analysis (e.g., Martinez v. Schrock, 573 F.2d 765 (3d. Cir. 1976)) but Forest Service engineers should be aware that immunity defense may not be available to them for acts grounded not upon government policy decisions but simply upon engineering decisions such as his private sector counterpart would make. With respect to the design of facilities regulated under the CWA, SDWA or RCRA the nongovernmental nature of the engineer's work is particularly apparent. To the extent a design is dictated by state or other requirements the work of a government engineer must be performed in the same manner as that of a nongovernment engineer. Similarly, state requirements of supervision, inspections, and certification govern Forest Service engineers just like they govern private engineers. So if the analysis applied in Henderson were applied to a situation involving conduct in connection with a CWA, SDWA or RCRA project, the engineer would not have the protection of immunity, and the case would proceed to trial.

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

An important point to remember, given the hierarchical nature of the Forest Service, is that the negligence of a government employee will not be imputed to his supervisor. Robertson v. Sichel, 127 U.S. 507 (1888); Tucker v. Duke, 276 F.2d 499 (D.C. Cir. 1960) (Bazelon, J., concurring). Each employee is only responsible for the discharge of his own duty of due care. Therefore, a supervisor can not be held vicariously liable for the negligence of his subordinates. But of course if the superior had a duty to supervise his subordinates in order to prevent or correct any negligent work a failure to do so may be found to be a breach of that duty and a cause of ensuing injury, and therefore he would be liable for his own negligence.

To summarize: should a person be injured through the negligent action or omission of a government engineer, in all likelihood it is the United States, not the individual employee, who will be sued. In the rare circumstance that the engineer designing the facility or supervising the project is sued he may be shielded from suit by the doctrine of immunity. If the engineer is held not to be immune the case would go to trial for a determination of whether an act or ommission on the engineer's part was the proximate cause of an injury suffered by one to whom he owed a duty of care.

Representation of the Government Employee

The final matter to address concerns legal representation of the individual employee defendant.[3] An employee sued in his official capacity is represented by the Justice Department as a matter of course, for the real defendant is the United States (DOJ "Torts Branch Representation Monograph I: Representation Practice and Procedure," 2). One sued in his or her individual capacity, as for negligence in the performance of his or her employment, may request representation by the Justice Department (28 C.F.R. § 50 50.15(a)). Representation may also be requested by an employee charged in state criminal proceedings.[4] The Justice Department's authority to represent an employee in his individual capacity is based in its responsibility to "attend to the interests of the United States" in any court proceeding (28 U.S.C. § 517) and "to supervise all litigation in which the United States, an agency, or officer thereof is a party." (28 U.S.C. § 519.) It is considered in the interest of the United States to provide

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[3]The principal sources used in preparation of this section were two Justice Department monographs, "Torts Branch Representation Monograph I: Representation Practice and Procedure," and "Torts Branch Representation Monograph II: Personal and Jurisdictional Defenses," and the oral advice of Mr. Timothy Garren, trial attorney, Department of Justice.

[4]The Justice Department cannot provide representation in federal criminal proceedings (28 C.F.R. § 50.15(a)(4)).

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

representation for its employees who are sued for acting within the scope of employment. Barr v. Matteo, 360 U.S. 564,591; Booth v. Fletcher, 101 F.2d 676 (D.C. Cir.) cert. denied, 307 U.S. 628 (1938).

Government representation of the employee serves the United State's interest both in the defense of a program within which the employee was engaged, and as a means of upholding employee morale. There are some situations in which it is definitely not in the United State's interest to defend the employee. One such instance where defense would not be provided would be where an employee apparently did not tell the truth or otherwise covered up wrongdoing in the course of an official investigation of the incident involved in the suit. There may also be situations where it is not in the United States' interest to take a particular position or raise an argument available to the employee. The employee can choose to waive the argument or position, or to release government counsel and employ private counsel. In the common occurrence where a number of government employees are co-defendants and their defenses require accusations of wrongdoing against each other, the government will withdraw from participating in their defense, and will hire the number of private attorneys necessary to represent the differing factions.

We cannot venture an opinion on the advisability of obtaining liability insurance. We can offer some points to consider. First, it is the individual employee, not the United States, who must pay any judgment entered against him or settlement arrived at in a tort case. It should also be kept in mind, however, that the Department of Justice has an excellent win-loss record in its defense of suits against individual employees. Since 1971, out of over 10,000 tort actions (involving actions for intentional torts and constitutional torts as well as for negligence) only seventeen resulted in verdicts against the employee and only five of these resulted in payment of damages (DOJ "Torts Branch Representation Monograph I: Representation Practice and Procedure," 30). Further, if the United States and the employee are both sued for the employee's allegedly tortious conduct and judgment is entered against both, the United States alone pays the judgment (28 U.S.C. § 1676; Aetna Casualty and Surety Company v. United States, 570 F.2d 1197 (4th Cir. 1971)). Similarly, the government alone would pay any settlement arrived at (28 U.S.C.§ 2672).

Kathryn Toffenetti of this office has been working on these issues and will be happy to discuss any of your concerns in greater detail. She can be reached at FTS-447-2651.

cc:
R. Fowler
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Chron file

Figure 1. (cont.)--Memorandum on Federal Engineer liabilities.

Bibliography of Engineering & Equipment Development Publications

This bibliography contains information on publications produced by

(1) The Washington Office Engineering Publications Unit (Engineering Field Notes and Engineering Management Series).

(2) The Equipment Development Centers (Project Reports, Equip Tips, and Special and Other Reports).

The listing is arranged by the publication series, title, author/source, document number, and date.

This issue lists material published from November 1984 through October 1985 with the exception of some publications published by the Equipment Development Centers that were inadvertently excluded from last year's Bibliography. For a listing of previously published material, refer to Engineering Field Notes, Volume 16, November-December 1984. Copies of the publications listed herein are available to Forest Service personnel through the Engineering Staff Technical Information Center (TIC) or through the Equipment Development Center listed as the source.

Forest Service--USDA
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Development Center
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Forest Service--USDA
Missoula Equipment
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Engineering Field Notes

This publication is a bimonthly periodical that supplies the latest technical and administrative engineering information and ideas related to forestry and provides a forum for the exchange of such information among Forest Service personnel.

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"Topographic Mapping Using Airborne Laser and Radar Profile Data: Three Case Studies."	Simmons, Paul. Field Notes 17 (March-April 1985): 39-48.
"TRAFFIC: A Program for Analyzing Traffic Surveillance Data."	Smith, Eugene L. Field Notes 17 (March-April 1985): 61-65.
"Transportation Analysis Memory: A Method of Using the Transportation Information System for Reporting Timber Haul and Road Maintenance Costs."	Collett, Lee. Field Notes 17 (January-February 1985): 53-63.

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Best, John E. Field Notes 17 (September-October 1985): 1-4.	"Software Spot (The): FLIPS Processing of Contract Pay Estimates and Cost-to-Government Reports."
Boaz, Jacquelyn. Field Notes 17 (March-April 1985): 17-26.	"Crime Analysis, Electronic Sensors, and Wilderness Management."
Carmichael, Frank. Field Notes 17 (January-February 1985): 5-13.	"Making a Good Road System Better: Creating a Data Base for the Surfacing Design and Management System."
Collett, Lee. Field Notes 17 (January-February 1985): 53-63.	"Transportation Analysis Memory: A Method of Using the Transportation Information System for Reporting Timber Haul and Road Maintenance Costs."

Crystal, Roger. Field Notes 17 (January-February 1985): 23-33.	"Close-Range Photogrammetry at Work on Tough Measuring Jobs."
Crystal, Roger. Field Notes 17 (March-April 1985): 39-48.	"Topographic Mapping Using Airborne Laser and Radar Profile Data: Three Case Studies."
Currier, W. F. (Bill). Field Notes 17 (March-April 1985): 1-12.	"Low-Cost Diagonal Fence Strainer."
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Flinn, L. Ray. Field Notes 17 (September-October 1985): 9-12.	"Slave Your Old Demand Terminal or Serial Printer to a Data General Dasher D410 Video Display Terminal."
Gary, Lonnie. Field Notes 17 (September-October 1985): 41-56.	"Temporal Variations in Traffic Volumes."
Gibson, Gene L. Field Notes 17 (January-February 1985): 79.	"Software Spot (The): Recon."
Greer, Jerry D. Field Notes 17 (May-June 1985): 19-27.	"Bausch and Lomb Resource Measurement System (RMS) as an Aid in Area Measurements (The)."
Greer, Jerry D. Field Notes 17 (March-April 1985): 17-26.	"Crime Analysis, Electronic Sensors, and Wilderness Management."
Greer, Jerry D. Field Notes 17 (July-August 1985): 11-15.	"Side-Looking Airborne Radar in Natural Resources Management."
Greer, Jerry D. Field Notes 17 (July-August 1985): 27-28.	"Slide Rule (The): A 'Post'-Mortem."
Hedman, Vic. Field Notes 17" May-June 1985): 39-54.	"GPS Satellite Control for Photogrammetric Cadestral Survey."
Irwin, L. H., Prof. Field Notes 17 (May-June 1985): 15-18.	"Device to Measure Road Dustiness Now Under Development."
Jensen, Ray. Field Notes 17 (March-April 1985): 39-48.	"Topographic Mapping Using Airborne Laser and Radar Profile Data: Three Case Studies."
Johnstone, Joel. Field Notes 17 (March-April 1985): 17-26.	"Crime Analysis, Electronic Sensors, and Wilderness Management."
Lachowski, Henry. Field Notes 17 (March-April 1985): 39-48.	"Topographic Mapping Using Airborne Laser and Radar Profile Data: Three Case Studies."
Lafayette, Ellen. Field Notes 17 (September-October 1985): 23-30.	"Metal Open-Top Drainage Structure: 'Flying W' Study."

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Leland, Larry. Field Notes 17 (July-August 1985): 5-10.	"Removing Protruding Rocks from Roadbeds and Ditch Lines."
Lippert, George J. Field Notes 17 (September-October 1985): 57-59.	"Evaluation of Computer-Aided Drafting and Design for Architectural and Structural Engineering."
Lippert, George J. Field Notes 17 (September-October 1985): 81-90.	"Review of Micro- and Mini-CADD Systems (A)."
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McNenny, Darrell. Field Notes 17 (January-February 1985): 15-21.	"How the Off-Duty Environment Affects On-Duty Production and Safety."
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Muchmore, Frank W. Field Notes 17 (May-June 1985): 55-73.	"Techniques to Bring New Life to Timber Bridges."
Myslicki, Andrea. Field Notes 17 (January-February 1985): 5-13.	"Making a Good Road System Better: Creating a Data Base for the Surfacing Design and Management System."
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Ou, Fong L. Field Notes 17 (January-February 1985): 65-78.	"Automated Road Design System."
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Pelzner, Adrian. Field Notes 17 (January-February 1985): 5-13.	"Making a Good Road System Better: Creating a Data Base for the Surfacing Design and Management System."
Pence, Lester M., Jr. Field Notes 17 (May-June 1985): 29-38.	"Automated Special Project Specifications."

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Petersen, Dale R. Field Notes 17 (March-April 1985): 49-55.	"How Much Is Good Enough?"
Petersen, Dale R. Field Notes 17 (September-October 1985): 5-7.	"Is the Forest Service Ready for Artificial Intelligence?"
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Petersen, Dale R. Field Notes 17 (January-February 1985): 81-82.	"Software Spot (The): Technology Transfer Data Base."
Petersen, Dale R. Field Notes 17 (January-February 1985): 1-4.	"Technology Transfer and You."
Rupe, John. Field Notes 17 (January-February 1985): 53-63.	"Transportation Analysis Memory: A Method of Using the Transportation Information System for Reporting Timber Haul and Road Maintenance Costs."
Salsig, Gerry. Field Notes 17 (January-February 1985): 23-33.	"Close-Range Photogrammetry at Work on Tough Measuring Jobs."
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Smith, Eugene L. Field Notes 17 (March-April 1985): 13-16.	"Grider Creek Area Planning Contract."
Smith, Eugene L. Field Notes 17 (March-April 1985): 61-65.	"TRAFFIC: A Program for Analyzing Traffic Surveillance Data."
Stewart, J. B. Field Notes 17 (January-February 1985): 23-33.	"Close-Range Photogrammetry at Work on Tough Measuring Jobs."
Swarthout, Bob. Field Notes 17 (September-October 1985): 61-73.	"Computer-Aided Design."
Swarthout, Colburn D. Field Notes 17 (January-February 1985): 65-78.	"Automated Road Design System."
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Warbington, Randy. Field Notes 17 (September-October 1985): 31-40.	"HP-41 Road Data and Design System (41-RDADS)."
Weller, Clyde. Field Notes 17 (March-April 1985): 57-59.	"Clark C. Heritage Memorial Series on Wood."

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38th Annual Report--Vegetative Rehabilitation and Equipment Workshop	MEDC	8422 2806	11/84

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	Developing Equipment to Harvest Cones in Wildlands	MEDC	8324	2205	10/83
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	Evaluation of Compost Toilets	SDEDC	8123	1202	4/81
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NOTES

NOTES

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November-December 1985

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