Timber
Tech Tips

United States Department of Agriculture
Forest Service
Technology & Development Program
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2400 9724 1301—SDTDC

Tree Marking Tricks of the Trade

by Eric Shilling, Mechanical Engineering Technician

INTRODUCTION

This Tech Tip is a collection of helpful hints, information and ideas. SDTDC requested each Regional Representative on the National Tree Marking Paint Committee solicit their region for subjects to include in this publication.

TRACER PAINT—WHY USE IT?

Why use tracer paint? It's required! The Timber Cruising Handbook states: "Purchase only approved tracer paint through the normal procurement channels." Also, the prosecution of theft cases is jepordized if tracer paint is not used, or if tracer and non-tracer paint is mixed within the same area. Additionally, Forest Service Tree Marking Paint has been developed with health and safety as the number one priority; lead and other harmful compounds have been specifically excluded from the Tree Marking Paint formula.

FIELD TRACERS

To check for the presence of field tracer, put a drop or two of reagent on the paint and let the reagent sit for about 30 seconds. Use a white tissue to soak up the reagent. A red or pink color on the tissue is a positive indication of tracer in the paint.

Some false-negative indications have occurred using tracer reagent kits that have been in storage for long periods of time. Shaking the reagent bottle prior to use may solve the problem.

In 1991 the field tracer formulation was changed to the current system causing paint purchased prior to that year to give a false-negative indication if the reagent kit for the current formulation is used.

TRANSPORTING PAINT

One manufacturer suggested carrying the cases of paint upside-down in the back of a pickup truck while driving to the marking site.

Transporting the paint in this manner allows the solids that tend to settle to the bottom of the can to be stirred up by the motion of the truck as it travels over rough terrain. All lids must be tightly secured to prevent leakage.

Larry Mellstrom, Region 9 Representative, suggests that when transporting paint in vehicles that have enclosed cargo compartments such as Suburbans, Broncos, Cherokees, Vans, etc., store the paint and guns in an air-tight container such as the Rubbermaid Action Packer with sealing top as shown in Figure 1. These are inexpensive and are available in a variety of sizes and shapes, and will contain the solvent vapors for safe transport.

For additional Information contact: *Timber Program Leader, San Dimas Technology & Development Center; 444 East Bonita Avenue, San Dimas, CA 91773-3198; Phone: 909-599-1267; FTS: 700-793-8000; FAX: 909-592-2309; DG—SDTDC: WO7A.*

Figure 1. Rubbermaid Tub with paint cans, guns, etc.

PAINT CLEANUP

Use a good hand cleaner followed by soap and water to remove paint from your hands. 'Scrubs' is one product that works well. Scrubs are towels that are pre-moistened with waterless hand cleaner and come in a plastic dispenser.

John Holmes, Region 9, suggests using a coating of Rainex on eyeglasses before using paint. Paint will not adhere to Rainex's protective film when used on the glasses. This product is available at most auto parts and supply stores. Another suggestion from Region 9 is to use Uvex polycarbonate goggles made for fire use. These goggles fit over most glasses, and Rainex can be used to protect the goggles as well. The Uvex goggles are inexpensive enough to be considered disposable should they get too much paint on them.

GUN NOZZLE SIZE

Having trouble spraying Type III paint? Check the orifice size on the nozzle tip of your marking gun. Use the 0.029 inch (0.7 mm) diameter orifice nozzle from either Nelson or Trecoder for Type III paint. Also, experiment using larger size nozzles. Start with a #66 drill (0.0330 inch/0.8 mm), test spray the gun and keep increasing the orifice size by one or two drill sizes until you get the best results. Keep in mind, however, that as you increase the size of the orifice, the velocity of the paint stream, and thus the effective range, will decrease.

HAZARDS

Like most field work, there are some hazards associated with tree marking. When discussing hazards, it's important to be aware of the difference between hazard and risk as quoted by Jon W. Kindschy, instructor, Principles of Hazardous Materials Management, University of California Extension, Spring 1994.

"Hazard is an inherent property of a material or situation. The hazard potential of one gallon of gasoline, both in terms of flammability and toxicity, is the same whether the material is stored in an approved safety can or it is spilled across the garage floor. However, the risk of each condition is considerably different. Gasoline in the safety can poses less risk than the spilled gasoline because the probability of ignition or inhalation of fumes is far less than when the material is spilled. The broadest objective of hazardous materials management is to reduce risk. Can risk be reduced to zero? Yes, but only by eliminating the hazardous material from use. As long as the material is present, no matter how safely it is managed, risk is present. The management of risk employs preventative activities which reduce probability, mitigative activities which reduce the severity of the consequences, or both prevention and mitigation."

"Many forces contribute to society's inconsistent approach to risky situations or conditions. Human nature, media emphasis, and other factors cause public outrage at relatively low-risk conditions, yet higher-risk conditions are tolerated daily with little apparent concern. Publicity surrounding high-risk conditions relating to hazardous materials has contributed to a perception that any condition involving these materials is one of high-risk. We too often fail to differentiate between hazard and risk."

THE FOLLOWING FOUR BASIC POINTS WILL HELP YOU REDUCE YOUR RISK WHEN MARKING TREES:

- √ Refer to Material Safety Data Sheets (MSDS) before using any paint or solvent.
- √ Read the applicable Job Hazard Analysis (JHA) before starting work and review it at regular intervals.
- √ When marking, work your way upwind as you mark so vapors are carried away from you as move along.
- √ Spray efficiently; stand close enough to the tree so that more paint ends up on the tree and less is suspended in the air. Use common sense.

POURING FROM LARGE CANS:

To avoid or minimize spillage when pouring from large cans (one to five gallon/3.8 to 19L), tilt the can so that the opening is at the top. (See figure 2.) This might seem upside-down, but it really is the most effective way to pour from a large, full container.

There are also pour spout extensions available that will fit 5-gallon (19L) bulk paint containers. The Spill Saver gas can on/off spout, available from K-Mart is one example. (See figure 3.) It consists of a clear plastic hose attached to a threaded spout that screws onto the mouth of the can. The spout can be opened and closed with a twist, and comes with three different sized adapters, the largest of which is applicable for five-gallon (19L) cans.

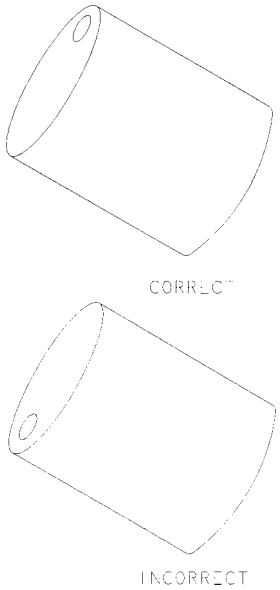

Figure 2. Correct methods to pour from large can.

MARKING TECHNIQUE

David Reisner, Region 3, suggests that marking should be coordinated with the wind. Always position yourself for breast blazes upwind to keep splash and mist from blowing your way. This means the direction of the strips being marked should allow sight of the breast blazes from previous strips down wind. Some jobs require a breast blaze on both sides of the tree. This technique causes problems and is not recommended. An alternative suggestion is to butt blaze both sides with lots of paint. The butt blaze is the most important, but an opposite breast blaze with a slightly taller butt blaze can be substituted. Also, paint and bark will not flake off as easily if butt blazes are placed into fissures of trees. This suggestion seems basic but it is amazing how many markers from other districts not aware of this basic rule or technique.

Charlie Caughlan, Region 8, suggests when using aerosol cans for marking reserve trees, use the bottom of the spray can to scrape off loose bark before marking. This helps to extend the life of the mark.

Figure 3. Pour spout

TIPS ON SNOWSHOE USE FOR TREE MARKERS

Larry Mellstrom, Region 9, suggests these tips on snowshoe use:

Learn the proper use of snowshoes before having to use them in the field. Training should include: binding adjustments and maintenance; techniques for walking on slopes; hazardous snow conditions; and field repairs to snowshoes and bindings.

For emergency field repairs, carry at least a pocket knife, and a short length of nylon cord or extra long boot laces.

Larry recommends anyone going into the field with snowshoes be physically fit because this activity can be very strenuous. He cautions not to try sliding down hills, and that "snowshoes are not skis and are very hard to control going down steep slopes". You can break the shoe or worse, your leg if the shoe catches a snag.

TRACER PAINT SECURITY

The Office of Inspector General (OIG) Audit Report of March 1996 found that improvements are needed to ensure compliance with established agency policies on timber theft prevention.

The following direction for the management, security, and accountability of tracer paint was taken from a letter dated July 18, 1996 from the Chief to Regional Foresters and the Director of Law Enforcement and Investigations:

Paint Storage

- √ Store all tracer paint in a locked area away from other paints. Do not use a Forest Service lock.
- √ All tracer paint carried to the field will be kept in a locked tool box when not in use. Do not use a Forest Service lock.
- √ Tracer paint will be stored separately from any non-tracer marking paint. Non-tracer marking paint should be disposed of, since it does not meet safety requirements.
- √ Organize paint in the storage area by color, brand, batch number, and container size for easy counting and accountability.
- √ Paint thinner in marking paint cans in the tracer paint storage area will be stored on a separate shelf and each can will be properly labeled.
- √ Keep all empty containers in the storage area until they can be disposed of properly.
- √ Solvent that has been used to wash cans of tracer paint must be labeled and protected as carefully as tracer paint.
- √ Follow all safety requirements.

Tracer Paint Accountability

- √ Accountability will be by paint color, brand name, batch number, container size, and for full, partially full, and empty containers.
- √ Each District Ranger will designate a Property Custodian(s) to issue paint and maintain the paint inventory. Each District Ranger will designate an Accountable Property Officer to be responsible for quantity audits. These will be separate individuals. There may be one primary Property Custodian and one backup. The intent is to ensure that only a minimum number of personnel have access to the tracer paint storage area.
- √ Maintain paint inventory on a paint inventory form. If the Region or Forest does not currently have a form, one should be prepared.
- √ Property Custodian will reconcile inventory at least once per-month.

- √ District Accountable Property Officer will audit tracer paint inventory once per quarter and report results to the Forest Supervisor. This audit should include implementation of policy for storage and disposal of containers.
- √ Shortages will be reported to the Forest Supervisor after each quarterly audit on Form AD 112.
- √ The Forest Supervisor will audit each District annually. This audit will be scheduled with the District Ranger, but the date and time will be unannounced to the District Accountable Property Officerand or Property Custodian.

Disposal of Containers

- √ All tracer paint containers will be disposed of and accounted for.
- √ Store all empty cans in the tracer paint storage building, or other suitable area until disposal is complete.
- √ Monthly (at a minimum) dispose of the used containers in a proper, safe method to assure all paint has hardened. Forest Supervisors must provide procedures for disposal.

TRECODER® GUN-USE & MAINTENANCE

John Holmes, Region 9, Kenton Marking Crew Foreman, offers the following tips for using and maintaining the Trecoder Spot Gun, (see figure 4):

Before using the Trecoder Gun, remove the screen from the foot valve. The screen is designed for use with ink and will clog if left in place while using paint.

Some Trecoder guns have one-way nozzles that are difficult to clean and maintain in the field. These can be replaced with a reversible nozzle.

Parts List
Call for Current Prices

Stock No.	Ref. No.	Description
55587	1	Jet Discharge Nozzle
55588	2	Discharge Tube
55589	3	7/8" Trigger Pivot Bolt
55592	4	Trigger
55593	5	7/8" Handle Bolt
55594	6	3/4" Piston Rod Bolt
55595	7	5/8" Handle Bolt
55596	8	Piston Rod Cap
55597	9	Cylinder
55598	10	5/16" O-Ring
55599	11	3/4" O-Ring
55611	12	Piston
55612	13	Cylinder
55613	14L	Handle–Left
55614	14R	Handle–Right
55615	15	Foot Valve
55616	16	Screen
55617	17	Ball Valve
55618	18	Ball Valve Spring
55619	19	Piston Spring
55621	20	Suction Tube
55622	21	Cylinder Cap Gasket
55586	22	Reversible Nozzle (required when using tree paint instead of ink.)
55623	23	Container Gasket

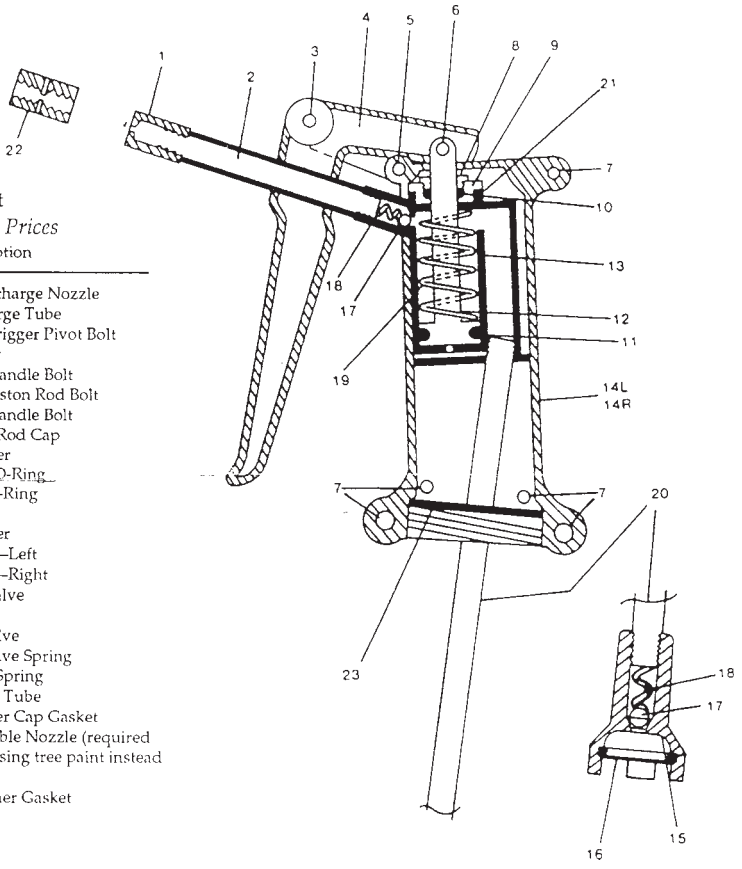

Figure 4. Trecoder Spot Gun.

Lubricate the piston shaft at the top of the gun with WD-40 this should be done with the trigger pulled to expose as much of the shaft as possible. Do this at least once at the start of the day and again at mid day if possible.

If the trigger becomes hard to pull, don't force the gun to pump. The first place to check if the gun doesn't pump is the foot valve. Most of the time the problem will be caused by a needle or something stuck in the valve. If that doesn't work, try reversing the nozzle and/or use a wire garbage bag tie-wrap to clear it.

A small inventory of replacement parts carried to the field in a zip-lock bag should include a reversible nozzle, one set of O-rings, a spare foot valve with ball and spring. Each marker also carries a small pair of Vice-Grip pliers and a small screwdriver.
The District maintains the following inventory of parts:

10 small O-rings	10 medium O-rings	10 large O-rings
10 piston springs	10 ball springs	1 piston
1 trigger	2 foot valves	1 cylinder
10 balls	10 can gaskets	A number of reversible nozzles

The guns are flushed at the end of the week with solvent, then replaced and stored in paint over the weekend, leaving solvent in the guns.

The Kenton Crew gets four to six months of use from their Trecoder guns before more extensive maintenance is performed including: replace the O-rings; clean the vent hole at the bottom of the cylinder; flush and clean the check valve balls and springs; check the inside of the cylinder for wear— replace if there is a lot of brass color or scratches; replace the piston spring if necessary; and lubricate the piston O-ring before reassemblying.

PAINT DISPOSAL

The Hebo Ranger District on the Siuslaw National Forest has a small shed used for paint disposal. Inside the shed is a paint disposal rack consisting of a shelf made from expanded steel. Empty paint cans are set upside-down on the shelf and allowed to drip dry. The excess paint is collected in a tub made from a cut-off 55-gallon (208L) drum lined with a plastic trash bag. The paint dries to form a "cake" which is then disposed of at a safe hazardous waste station, see figure 5.

The shed's external dimensions are approximately 4 foot (1.2m) wide by 8 foot (2.4m) long, with a locking door on one end and a locking tilt-up access window on one side. The rack will hold approximately 20 cases of quart (0.9L) size cans, and is a real space saver away from the paint shed.

For further information contact :
Mo Jeffries at 503-392-3161 DG:R06F12D01A
or Frank Duran at
541-750-7194 DG:R06F12A

Figure 5. Paint disposal system.

Plans for several tools for puncturing empty aerosol cans are available from SDTDC. Mike Bathen's (region 3) design for the aerosol can popper is shown below, see figure 6.

Place a can in the 3-inch (76mm)pipe right side up, slide 4-inch (102mm) pipe over top, then force down rapidly. The can will be punctured near the rim on the bottom and any pressurized paint is contained inside the unit. The paint can then be be disposed of properly or reused in quart cans.

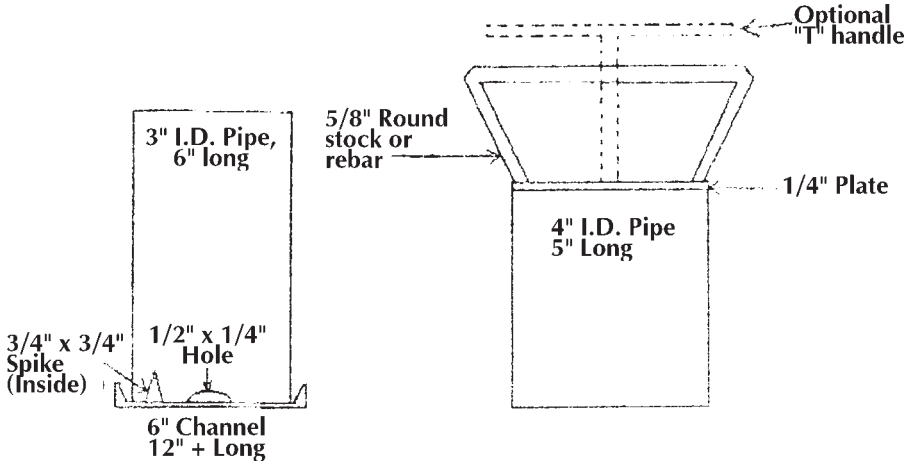

Figure 6. Aerosol Can Popper

COLOR COMBINATIONS

The colors you choose when marking trees can make a difference. It is important to choose contrasting colors. This avoids confusion and problems with timber theft prosecution. Color combinations can also be optimized to save money.

Decision-makers can find significant savings by making careful selections when purchasing tree-marking paint. Each year the Forest Service buys more than 100,000 gallons (378KL) of unique tracer paint at a cost exceeding $1 million. Blue and orange are the biggest sellers by far, followed by yellow, green, white, black, and red. However, orange, yellow, and red are much more costly, at least 30% more, than any of the other colors so significant savings can be achieved simply by choosing the less expensive colors. Another area of potential savings is purchasing paint in larger containers. While quart (0.9L) cans are very convenient, the cost of four quart (0.9L) cans greatly increases the cost over the same amount of paint in a gallon (3.78L) can. (Some Forests have gone to backpack guns due to this cost difference. While backpack users must take the time to transfer paint, they save the time and effort involved in tracking and disposing of the quart (0.9L) cans.)

PAINT GUN SURVEY

Information on paint gun use in the Forest Service was gathered using a simple survey questionnaire and over 170 Ranger Districts responded. The results are shown in Table 1. The most popular models in use are Nel-Spot (64% of those surveyed), Trecoder (25%), and Panama Backpack (5%). The most common problems associated with gun use were: nozzle clogging (61%), hand/wrist pain (26%), poor cold weather performance (11%) and hard trigger pull (8%).

Table 1. Paint Gun Survey

USDA FOREST SERVICE
PAINT GUN SURVEY

PAINT GUNS CURRENTLY IN USE

	NEL-SPOT	TRECODER	PANAMA BACKPACK	IDICO	OTHER OR AEROSOL	TOTAL
NUMBER IN USE	786	309	59	37	30	1221

GUN PROBLEMS BY GUN TYPE

NOZZLE CLOGGING	490	185	41	27	1	744
WRIST/HAND PAIN	320	0	2	0	1	323
POOR PERFORMANCE COLD WEATHER	99	21	1	13	0	134
TRIGGER WEARS OUT	52	54	0	0	0	106
LEAKS	43	59	0	2	0	104
TRIGGER HARD TO PULL	90	4	1	5	0	100
SCREEN CLOGS	4	77	0	0	0	81
SPRINGS GO BAD	7	62	0	0	0	69
LEATHER CUPS GO BAD	63	0	2	0	0	65
PUMPING PROBLEMS	31	0	0	0	0	31
GUNS	NEL-SPOT	TRECODER	PANAMA BACKPACK	IDICO	OTHER OR AEROSOL	TOTAL

WORKFORCE COMPOSITION OF TREE-MARKING CREWS

WEIGHT (LB)	MALE	%	FEMALE	%
<125	5	0.7%	58	30 %
125-150	65	10 %	93	49 %
150-175	233	35 %	26	14 %
175-200	264	39 %	13	7 %
200>	106	16 %	1	0.5%
TOTAL	673	78 %	191	22 %

Brion Drought, from the Coconino National Forest uses the Panama backpack-style gun, and is convinced its the way to go for large amounts of marking. The Panamas were selected for both health and performance reasons. Brion says that the Panama gun eliminates the problem of hand fatigue, and reduces the chance of carpal tunnel syndrome, especially for older markers. There is also less chance of contact from spilling the paint on oneself in the field. Regarding performance, Brion gets better quality stump and breast marks, and a slight increase in production, especially with new markers. The paint transfer and handling is only necessary two or three times a day and this allows more attention to be paid to tree selection and less time is spent on the gun.

Jim Churchill in Region 9 also uses the Panama system. They use a modified "alice pack" frame to hold the tank and use CO_2 to pressurize it, see figure 7. The CO_2 is stored in a high-pressure (1800 psi/12.4MPa) tank on the pickup truck. The tank has a regulator with two pressure gages (one for tank pressure and the other for regulated fill pressure).
The advantage of CO_2 over air is that the it will provide significantly more fills than an air tank of the same size and pressure. The special physical properties of CO_2 are what gives it this advantage. In the high pressure tank, the CO_2 is in both the gaseous and liquid phases, with the liquid at the bottom. If temperature is held constant, the pressure of the gas will be constant as the gas is removed until all of the liquid has changed to gas. Compressed air at the same pressure is only in the gaseous phase, with no liquid present, and the pressure will drop as air is removed from the tank.

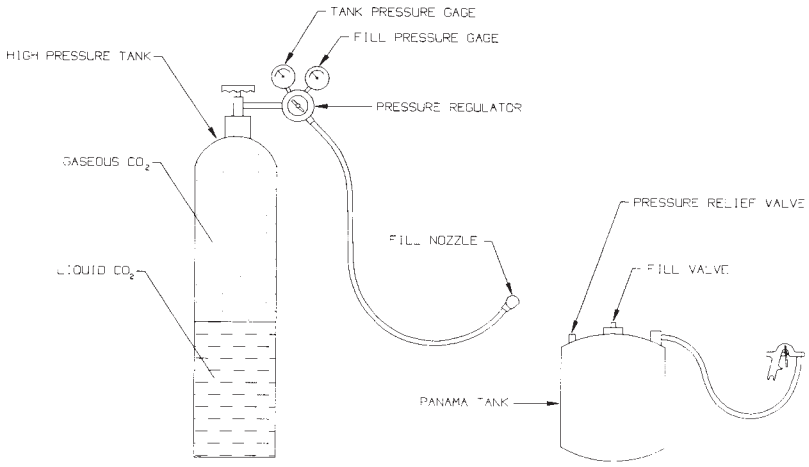

Figure 7. Modified "alice pack" frame and tank

REGIONAL REPRESENTATIVES

Each Region has a Representative on the National Tree Marking Paint Committee, and they are listed below. The Regional Rep is the key contact for all paint related questions and is available to help solve problems with paint quality and procurement.

Region	Representative	Phone
1	Tom Threlkeld	406-329-3218
2	George Broyles	605-642-4622
3	Richard Stephens	520-527-3650
4	Bob Helmer	208-364-4241
5	Karen Jones	916-587-5405
6	Frank Duran	541-750-7194
8	Charles Caughlan	352-669-3153
9	Larry Mellstrom	906-852-3500
10	Jim Pierce	907-586-7905

PROJECT PROPOSAL
USDA Forest Service
Technology and Development Program

SDTDC solicits input from the field for suggestions for future projects. Your suggestions are important to us, so please take a few moments to complete this form and return to the address provided.

Project Originator: Name _____ Date _____

Title _____

Unit _____

Mailing address _____

DG address _____ Telephone _____

Project Title: _____

Current Problem/Need
Describe how work is currently being done; current problem/need, location; why improvement is needed.

Proposed Solution
Describe your concept of the end product, i.e., new equipment design, video production, handbook, etc.

Potential Benefits
Describe how this product will improve safety, resource management; increase efficiency, customer satisfaction, productivity; reduce cost, time.

_____

_____

_____

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USDA, Forest Service
SDTDC
Attn: Timber Program Leader
444 E. Bonita Avenue
San Dimas, CA 91773-3198

User Feedback Survey

User Name (optional) _____
Title _____
Unit _____

Tree Marking Tricks of the Trade
9724 1302

Benefits	YES	NO	Amount
Improves safety	_____	_____	_____
Saves money	_____	_____	_____
Saves time	_____	_____	_____
Increases efficiency	_____	_____	_____
Other	_____	_____	_____

How effective or relevant is this information?

What would you change?

General comments: