Timber Tech Tips

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Forest Service
Technology & Development Program
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Alternatives to Tracer Paint

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BACKGROUND

Tree marking paint has been widely used in timber management in the Forest Service for over 50 years. The performance and safety requirements of the paint are overseen by the National Tree-Marking Paint Committee, which includes representatives from each region, WO Timber and Personnel Management (Safety and Health), LE&I, BLM, and San Dimas Technology and Development Center (SDTDC).

Forest Service tree marking paint (TMP) has contained chemical tracers since 1988. The paint contains a "field" tracer, that can be detected readily with a simple test in the field, and a "lab" tracer that requires sophisticated laboratory analysis to detect. These tracers have been formulated specifically for USDA, and when applied serve as identifiers of federal property. The use of tracer paint requires special storage, handling, and accounting procedures. Security of TMP must be assured, because unauthorized use of tracer paints could jeopardize accountability of federal forest products. General security procedures are outlined in Timber Cruising Handbook 72.6. Units are required to maintain inventory records which are audited regularly, and the paint must be kept locked up separately from other non-tracer paint when not in use. Even the residual paint left in the cans, and the thinner used for cleanup must be protected as carefully as the paint itself until they can be disposed of properly.

These somewhat cumbersome handling requirements have prompted some suggestions to change the current tracer system to one that allows tracer elements to be added in the field, just prior to its use. Hopefully, this would eliminate some of the requirements mentioned above.

The following paragraphs address the alternatives available and provide the users of the product with some current issues facing the Paint Committee regarding the use of tracers.

ADDING TRACER AT THE FIELD UNIT

The objective of adding tracer in the field is to reduce the volume of material that must be subject to special storage, handling, and accounting procedures, thus saving time and money. Further, if the tracer elements could somehow be added inside the gun (see figure 1), or in other secondary containers that were reusable, the original used paint containers would not have tracer in the paint residue and would not require the current special secure storage and disposal procedures. Consequently, only the application guns, and other containers that came in direct contact with the paint after the tracer elements were added would be subject to security guidelines. This would also

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completely eliminate tracer security issues for those who use the paint for non-timber sale marking, as no tracer would be used.

Figure 1. Paint Gun.

Adding the tracer elements in the field, however has disadvantages as well. First, concentrated tracer elements, if stolen, would be easier to conceal, and then could be added to any color paint. A small amount of the tracers could produce a large amount of counterfit paint. Additionally, once the tracers are isolated, a more simple chemical analysis than is currently required could be used to provide the necessary information to reproduce them.

Second, there are currently no paint guns that are capable of metering tracer materials into the paint. Adding tracers to paint in aerosol cans, of course would be nearly impossible; and all containers and equipment having contact with the tracers would require the same, or more severe security precaution procedures than those currently being used for the paint. If the tracer is added to quart or gallon cans, then the cans would have to be disposed of just as they are now.

It would require a good deal of documentation, training and oversight to make sure that the laboratory and field tracers were added to each and every can of paint and that the proper amounts and mixing occurred.This could cause serious problems for timber theft investigation and prosecution. It might be very difficult to prove that the proper tracers in the appropriate amounts were added to every can of paint used. Our current TMP specification requires the manufacturer to certify each batch contains the tracer elements; safeguard the tracer information; keep adequate documentation; and supply expert witnesses in theft prosecution cases.

Currently, the tracer is a very small portion of the paint. Concentrating the tracers could also introduce handling problems from a health and safety standpoint. How would separate chemical tracer elements be labelled, and what information could be disclosed on a MSDS without disclosing the identity of the tracers?

Another problem is that the Forest Service does not own the current tracer systems. They were developed by each paint manufacturer, so another system would have to be developed, and/or we would have to contract for the tracers separately.

As for using the paint without tracer for non-timber sale marking, there is no regulation stating that tracer paint must be used for these activities. However, since the paint specification was developed to provide paint that is both durable and safe for employee use, it is recommend for use. Less expensive paint may not last as long and may contain harmful chemicals, such as lead or chromium.

The bottom line is the time and expense to develop, control, handle, mix, and document the adding of tracer elements appears to more than offset potential savings from reduced security or empty can disposal.

MICROTAGGANTS AS AN ALTERNATIVE TO CHEMICAL TRACERS

Microtaggants are patented, microscopic, color-coded plastic particles that are specifically designed to be used to positively identify a wide variety of substances or objects. These unique identification particles are composed of distinct colored layers whose colors and sequences can be changed making several million codes available. Layers of fluorescent or magnetic material can be added to the particles so they can be found easily. Fluorescent layers can be detected by viewing under long-wave ultraviolet light and particles with magnetic layers can be recovered from loose-flowing or bulk materials by using a magnet. (See figure 2.)

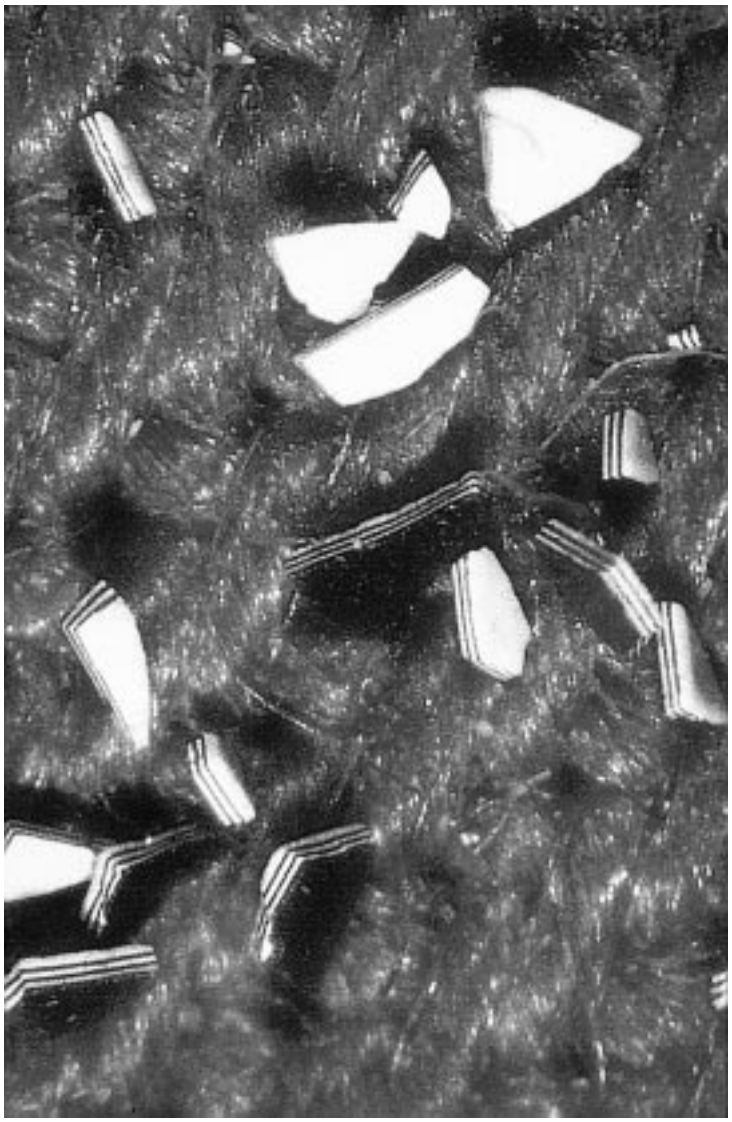

Figure 2. Microtaggants.

Microtaggant particles are available in several sizes ranging from 1.0 mm (16 mesh) to 0.075 mm (200 mesh). Depending on the mesh size, there are from tens of thousands to hundreds of thousands of particles in a gram of Microtaggants. The codes color/number relationship is based upon the electrical resistor color code standard which allows for computerization to simplify record storage and retrieval. The buyer/user of Microtaggants purchases and has registered a code or a number of codes. Microtaggants can be mixed with a bulk product, such as paint, or attached to solid objects with a lacquer or other coating. They can be used to "tag" an object or product by manufacturer, batch, date, or other specifier, providing precise identification in cases of product liability or theft.

The San Dimas Technology Center was asked to investigate using microtaggant particles to replace our current tracer system. Cost reduction was a motivator, but microtaggants would provide a method of tying a marked tree to a specific field unit or timber sale. Current tracers only prove Forest Service origin.

SDTDC tried several different models of microscopes, loupes, and magnifiers, some of which had built-in light sources that made viewing in the woods much easier. While personal preference made selection of the best tool impossible, a $15 30X microscope from Radio Shack was adequate. The Specwell model M820-S microscope (about $150 from Edmond Scientific) has excellent optics and a plastic stand-off piece that allows use of a small dental pick to manipulate and expose the microtaggants so they could be read. The M820-S has telescopic optics which means that, unlike most loupes and microscopes, to view an object that is to the left of the current field of view, you move to the left, and this makes it easier to find the particles.

Limited field trials, with help from marking crews on the Chequamegon NF, were conducted to identify any application or reading problems. Minor concerns with paint-gun nozzle clogging and particles settling in the can were noted but for the most part, adding 50, 100, or 200 mesh sized Microtaggant particles to tree-marking paint posed no problems for markers. (Larger particles, the 16 and 30 mesh sizes, did cause the paint gun nozzles to clog.)

However, reading the codes in the field proved to be difficult due to the relatively small number of particles that could be added at a reasonable cost coupled with the fact that most of the particles are encased in opaque paint. The Microtaggant manufacturer recommended using about one gram of Microtaggants per pint of paint to be sure that enough particles were in each squirt from the paint gun and allow them to be found and read. This would add about $20 to the cost of each quart of paint. Testing showed if the amount of Microtaggants were reduced to one-fourth of the amount recommended by the manufacturer, the microtaggants were still able to be found on most trees in a reasonable amount of time (up to two minutes); but it was still very difficult to read the codes since the particles were covered with opaque paint.

The code can be read by scrapping off a small amount of paint and using a solvent to break it down so the Microtaggants can be found and read. Several solvents recommended by the paint manufacturer were tried, including acetone, methyl ethyl ketone, methylene chloride, and xylene. However, while these solvents softened the dried paint considerably, it was a difficult and time consuming process to separate the microtaggant particles from the paint so they could be read. Because this is a cumbersome process, Microtaggants would not be a good substitute for the field tracer currently used.

Microtaggants could could be used as the lab tracer. They have the benefit of tying a tree or log to a specific FS unit or timber sale. Microtaggants are, however, considerably more expensive than the chemical lab tracers used now.

Microtaggants work well in clear paint and will work best for covert law enforcement investigations. Refer to SDTDC publication 9624-1302 for additional information on this application.

Microtaggants are manufactured and sold by Microtrace, Inc. of Minneapolis, Minnesota. They can be reached at (612) 784-9725.

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 _____

ALTERNATIVES TO TRACER PAINT
#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: