4. INSPECTION AND SAFETY

Industrial operations of any kind in the wildland are potential sources of wildfire. As such, they require inspection to ensure protection of the operator, the public, and neighboring property owners. In addition to fire laws and regulations, such operations are governed by numerous safety rules. It is important that personnel required to make fire prevention inspections comply with the safety rules. Safety rules are designed to protect workers. It is often difficult to make inspections and at the same time comply with all safety rules.

For their own welfare inspectors must not violate safety rules. They should always wear hard hats and other appropriate personal protective equipment such as gloves, safety glasses or goggles, air filter masks, or hearing protection when required. Always avoid slick-soled boots.

This chapter will discuss various types of inspection procedures, safety rules, reporting procedures, legal actions that may result from inspections, and methods of identifying items inspected.

4.1 Inspection Responsibilities

Both the operating companies and the fire protection agencies make industrial operation fire prevention inspections. The reasons for, and the timing of, these inspections may differ. There are significant advantages for both parties when joint inspections are made.

4.2 Company Inspections

Operating companies hold exclusive responsibility for inspecting their operating areas and equipment in compliance with all laws and regulations. They are also solely responsible for the maintenance of uninterrupted production and avoidance of civil liability. When equipment owned by one company is being operated by another under a lease or rental agreement, or when work is being performed by a subcontractor, the ultimate responsibility and liability may be established in the contract. In spite of this, the operating company is the one usually held responsible for compliance with the law by the protection agency. It is the responsibility of the owner or management personnel of each company to determine how, when, and by whom its inspections will be done.

There is no criteria regarding how often inspections should be made. This is because the sizes of companies and the types of operations vary widely. Each company must determine its own appropriate inspection schedules. Some company rules establish inspection schedules and procedures either more frequent or more intensive than those required by federal or state laws and regulations. A good inspection schedule is: a) daily by operation supervisors, and b) every 10 days by fire prevention or safety specialists.

4.3 Fire Protection Agency Inspections

Law charges the fire protection agencies with the responsibility of protecting the public from the loss of life, property and resources by fire. They are also charged with enforcing the forest and fire laws. To accomplish these missions they inspect industrial operations in order to prevent wildland fires. Public fire protection agencies have a duty to make known to operating companies those violations and defects they observe during their inspections. Protection agency inspections do not, however, relieve operating companies of the responsibility of making their own inspections.

Fire agency inspections are generally of two types: a) routine, and b) fire emergency. Routine inspections will usually be general surveys of operating areas and spot checks, or sampling, of mechanical equipment. These may be original inspections or compliance checks following prior notification of violations. The inspector should make every effort not to interfere with production.

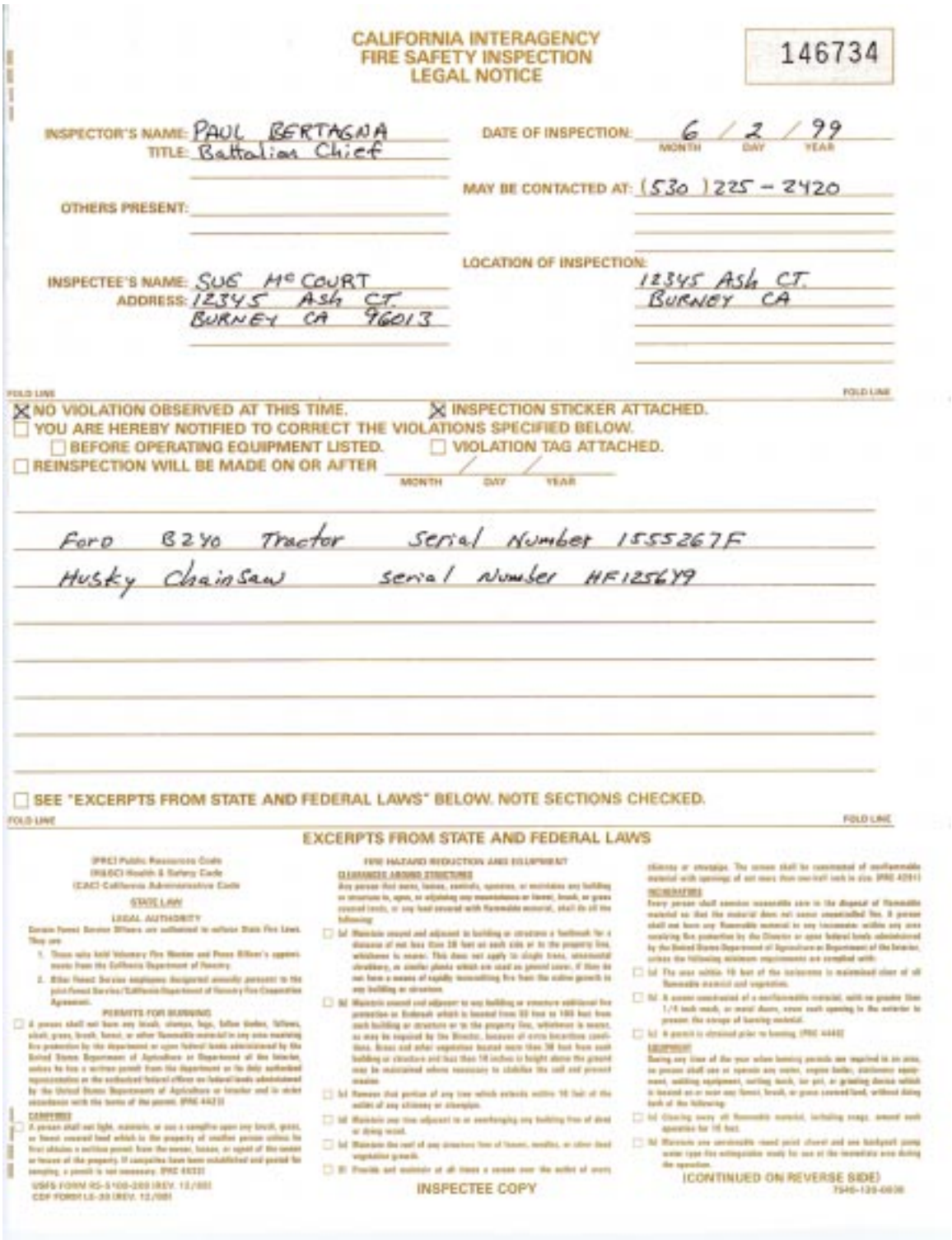
Fire emergency inspections include point of origin and ignition source determination. It also covers identification of the specific machine or person that provided the source of ignition. This is not merely for the purpose of providing data for statistical reports and fixing liability. It also releases non-offending manpower and equipment back into production as soon as possible and helps determine effective fire prevention measures, including design changes if so indicated.

Most routine inspections can be adequately performed by visual inspection. Inspectors should be equipped with such aids as Fire Prevention Field Guides, tape measures, notebooks, cameras, inspection stickers, “Red Tags” as well as copies of applicable laws, regulations, contracts, and agreements.

Photograph 4-1.
Inspection Sticker

Photograph 4-2.
Red Tag

The results of any fire agency inspection should be properly recorded. Each protection agency has its own forms and procedures for this purpose. All violations should be recorded in the field notebook and photographed. Inspections may be recorded on forms, memos, formal letters, etc. Regardless of the format of the inspection report, a copy should be sent or given to the company. Reports should be specific enough for the company to act upon them and for the courts to relate them to complaints or other legal actions in the event such actions are filed. They are not, however, to be used as work lists by the company.



CALIFORNIA INTERAGENCY
FIRE SAFETY INSPECTION
LEGAL NOTICE

146734

INSPECTOR'S NAME: PAUL BERTAGNA
TITLE: Battalion Chief

DATE OF INSPECTION: 6 / 2 / 99 (MONTH / DAY / YEAR)

MAY BE CONTACTED AT: (530) 225 - 2420

OTHERS PRESENT:

LOCATION OF INSPECTION: 12345 Ash CT. BURNEY CA

INSPECTEE'S NAME: SUE Mc COURT
ADDRESS: 12345 Ash CT. BURNEY CA 96013

FOLD LINE

☒ NO VIOLATION OBSERVED AT THIS TIME. ☒ INSPECTION STICKER ATTACHED.
☐ YOU ARE HEREBY NOTIFIED TO CORRECT THE VIOLATIONS SPECIFIED BELOW.
☐ BEFORE OPERATING EQUIPMENT LISTED. ☐ VIOLATION TAG ATTACHED.
☐ REINSPECTION WILL BE MADE ON OR AFTER ___ / ___ / ___ (MONTH / DAY / YEAR)

Ford B2410 Tractor Serial Number 1555267F
Husky Chainsaw serial Number HF125649

☐ SEE "EXCERPTS FROM STATE AND FEDERAL LAWS" BELOW. NOTE SECTIONS CHECKED.

FOLD LINE

EXCERPTS FROM STATE AND FEDERAL LAWS

(PRC) Public Resources Code
(H&SC) Health & Safety Code
(CAC) California Administrative Code

STATE LAW

LEGAL AUTHORITY

PERMITS FOR BURNING

FIRE HAZARD REDUCTION AND EQUIPMENT

CLEARANCE AROUND STRUCTURES

INCINERATORS

EQUIPMENT

INSPECTEE COPY

(CONTINUED ON REVERSE SIDE)

Figure 4-3.
Typical Inspection Form

Protection agency personnel may have occasion to observe conditions on equipment or operating areas other than violations of fire laws or regulations that may be dangerous. Also, a violation may be observed that is outside the inspector's jurisdiction. These conditions should be reported to the company as soon as possible. If they have contributed to a fire, or are likely to, the conditions should be recorded in writing and photographed.

4.4 Joint Inspection

Joint inspections are for the purpose of acquainting both fire protection agency and company personnel with violations and other problems and conditions. They often result in mutual agreement on methods of correcting problems. Joint inspections are not always possible due to time commitments or because of company or agency policy. They are, however, encouraged to whatever extent possible. The joint inspection provides an excellent opportunity for mutual understanding of the problems facing both industry and the agency as well as training opportunities for both participants.

Photograph 4-4.
Joint Inspection

Because of the safety hazards and security policies of many companies, inspections should be joint and by appointment. In some cases, such a procedure can shut down a small company. Notification of a forthcoming inspection should prevent any economic hardship to the company.

4.5 Mechanical Inspections

The source of ignition for most wildland fires caused by industrial activity is mechanical equipment, such as exhaust systems. Several laws have been passed as a result of this fact. However, other potential heat sources cause fires and should be included in a complete fire prevention

mechanical inspection.

Under normal circumstances no fire prevention inspection of machinery should be made with the engine running. Occasionally this will be impossible, in which case extreme caution must be exercised to avoid contact with exhaust systems, fans, belts, exposed gears, etc. Also, if the machine is mobile, the brakes should be set. Attachments such as blades and buckets must be lowered to the ground. Blocking of wheels or tracks is an additional safety precaution.

4.6 Exhaust Systems

- ***PRC §4442 (Using equipment without a spark arrester)***
- ***PRC §4442.5 (Spark Arrester notice to buyer or lessee or necessity of use)***
- ***36CFR §261.52 (Spark Arrester required on National Forest land)***

Exhaust systems start fires in two ways: a) an emission of carbon sparks, and b) direct contact with flammable materials. Contact with flammable materials may happen in either of two ways: a) by collection of flammables on manifolds and inside shields, or b) by parking where flammables touch, or come in close proximity to, pipes and other components. Potential problems from sparks and collection of flammables are detected by inspection of the machine itself. Problems from potential contact will be revealed by inspection of the operating area as well as inspection of company rules and regulations. These problems will be discussed later.

All internal combustion engines operating on forest, brush, or grass-covered lands are required to be equipped with an effective spark arrester. Muffler-equipped trucks, buses, and passenger vehicles (except motorcycles) are exempt, unless the system has been modified. However, if they are used regularly and primarily off-road in such areas it is good fire-safe practice to equip them with spark arresters in addition to mufflers. Turbochargers are normally accepted by fire protection agencies in lieu of spark arresters-so long as everything is in good working order and no exhaust gases (including crankcase breathers) are put into the exhaust system downstream from the turbocharger. Not all turbochargers prevent fuel sparks. Each turbo-charged exhaust system should be inspected as thoroughly as normally aspirated exhaust systems that require spark arresters.

Spark arresters are of two types. By far the most common is the retention arrester. Depending on make and model, this type of arrester will be fitted with a band covering ports or a plug through which trapped carbon particles are removed. The inspector should remove the band, or plug, to determine whether the arrester has been recently emptied and is functioning properly. Excessive amounts of carbon (i.e., enough to fall out when the band, or plug, is removed with the engine shut down) found inside constitute a violation. If the machine has been recently shut down, the inspector should wear gloves to prevent burns.

Photograph 4-5.
Retention Spark Arrester (Top)

Photograph 4-6.
Retention Spark Arrester with Band Removed for Inspection

The other type is the attrition arrester. This arrester will have no clean-out arrangement which makes it more difficult to inspect. The only sure way is to fit a screen of maximum legal-size mesh (.023 inch) over its discharge and observe whether or not any carbon particles are trapped inside the screen during a period of the engine's test operation. Another way would be night observation during normal operation of the machine to observe whether or not incandescent sparks are emitted.

Photograph 4-7.
Retention Spark Arrester, Plug Type

Photograph 4-8.
Attrition Spark Arrester (Screen Type)

Both types of arresters, as well as mufflers, should be checked, either visually or by a probe, to learn if they have been altered internally and are no longer anything but a disguised straight pipe. Spark arresters are manufactured in models designed to perform in either a vertical or horizontal position only. The inspector should determine whether the arrester is installed improperly. An improperly installed spark arrester will not function effectively.

Photograph 4-9.
Spark Arrester being Checked for Internal Burn Out or Modification

The U. S. Forest Service publishes a *"Spark Arrester Guide"* which lists approved spark arresters by make and model together with the type of machine and position for which they are approved. Every inspector, vendor, and owner should be familiar with this publication.

Photograph 4-10.
Spark Arrester Guide

1996 QUALIFIED AND RATED LIST—GENERAL PURPOSE SPARK ARRESTER					
	MANUFACTURER AND MODEL	APPL POS	FLOW	PAGE	REMARKS
1	Acerbis 036 MFS-2	Horizontal	74	55	Retaining screws loosen easily
2	Acerbis 036 MFS-5	Horizontal	60	55	–
3	Acerbis 036 MFS-6	Horizontal	64	55	–
4	Air-Maze C19035-3	Horizontal	120	56	–
5	Air-Maze C19035-3	Vertical	140	56	–
6	Air-Maze C19035-4	Vertical	118	56	–
7	Air-Maze C19035-4	Horizontal	126	56	–
8	Air-Maze C19035-5	Horizontal	217	56	–
9	Air-Maze C19035-5	Vertical	220	56	–
10	Air-Maze C19035-6	Vertical	238	56	–
11	Air-Maze C19035-6	Horizontal	302	56	–
12	Air-Maze C19035-7	Vertical	333	56	–
13	Air-Maze C19035-8	Horizontal	332	56	–
14	Air-Maze C19035-8	Vertical	333	56	–
15	Air-Maze C19035-9	Vertical	640	56	–
16	Air-Maze C19035-10	Vertical	640	56	–
17	Air-Maze C19035-10	Horizontal	679	56	–
18	Air-Maze 4-FA	Vertical	625	56	Horz test #387C/Not recommended for flow above
19	continued	–	–	–	300 cfm-screen type, subject to plugging.
20	Air-Maze 10-FA	Vertical	1,270	56	Horz test# 387C/Flows above 1270 cfm
21	continued	–	–	–	not acceptable.
22	Air-Maze 146-FA	Horizontal	1,335	56	Flow at 0.0 psi back pressure. Unit not
23	continued	–	–	–	rated at 1 psi.
24	Answer, J&R AP-500-D	Horizontal	91	57	See Husqvarna-Krizman KS-500D
25	Answer, J&R AP-650	Horizontal	166	57	See J&R Krizman KS-650
26	Answer, J&R AP-650-A	Horizontal	63	57	See J&R Krizman KS-650A
27	Answer, J&R AP-650-C	Horizontal	63	57	Approved as J&R Krizman
28	Answer, J&R AP-650-C	Horizontal	63	57	Angled body w/insert; band clamp may be replaced
29	continued		–	–	with screws
30	Answer, J&R AP-650-C	Horizontal	97	57	With insert; Required on all AP-650 C
31	Answer, J&R AP-650-C (Angle)	Horizontal	63	57	Angled Body with insert
32	Answer, J&R AP-650-D	Horizontal	67	57	Straight muffler, modified AP-650-0
33	Answer, J&R AP-650-D	Horizontal	67	57	AP-650-0 in a polygon shell
34	Answer, J&R AP-650-M	Horizontal	156	57	Straight muffler, modified AP-650-0

Figure 4-11.
Typical Page in Spark Arrester Guide

The most common place for flammables to collect on an exhaust system is the manifold. The exhaust manifold can become a collection point on any internal combustion engine, gasoline or diesel. Screening the engine compartment, reversing the fan or other design changes can often alleviate the problem. However, it can seldom be completely eliminated. The inspector should always check for accumulations at this point.

Photograph 4-12.
Accumulated Flammables Around Exhaust

Catalytic converters have sometimes been considered responsible for markedly increasing the risk of fire caused by the exhaust systems of gasoline-powered vehicles. Tests conducted by several organizations, both public and private, as well as fire history before catalytic converters were invented, all produce the same conclusion: catalytic converters themselves do not significantly increase the fire starting potential of exhaust systems through direct contact. The temperature of the exhaust pipe is already well above the ignition temperature of dry grass, leaves and needles. On the other hand, the shields installed around many converters to keep them from contacting such flammables often have the opposite effect (i.e., they collect the vegetation between the shield and the converter where it may catch fire and drop out onto a receptive fuel bed). Inspectors should check for such accumulations.

Photograph 4-13.
Catalytic Converter with Shield

Catalytic converters and the tail pipes behind them can sometimes reach temperatures as high as 2000° F. This is the result of a malfunctioning engine (e.g., misfiring spark plug, dirty air cleaner) allowing unburned fuel into the exhaust system. Under such conditions the fuel actually burns in the converter instead of in the cylinders. This can cause catalytic converters to melt down increasing the possibility of multiple fires. For this reason, the engines of vehicles equipped with catalytic converters should be well maintained and tuned-up frequently. (See Appendix D)

4.7 Miscellaneous

Wildland industrial operation fires often start with a machine catching fire. The fire is then transmitted to vegetative fuels. For this reason, the inspector should not only inspect the machine for potential ignition sources but also for the presence of firefighting equipment. A suitable fire extinguisher and appropriate hand tools, especially a shovel, are necessary.

The most common source of machine fires is the fuel system, including refueling procedures. Although this statement applies to all internal combustion engine equipment, it is particularly true of gasoline engines. This is because of the high volatility of gasoline, its low ignition temperature, and the tendency of its fumes to travel in flammable concentrations. Agency inspectors should look for: a) any obvious leaks, b) signs of wear, and c) vibration in fuel lines, especially the high pressure lines from the pump to the injectors on diesel engines. These are minimal safety expectations.

Operating company mechanical inspections should be made by mechanics. Both kinds of inspectors should assure themselves that engines are always shut down and positioned in a sufficiently large area which has been cleared of all flammable materials prior to refueling.

Other items on engines which should be checked during a fire prevention inspection include:

- worn, cracked or deteriorating insulation on electrical systems;

- loose or worn belts; worn or dry bearings and gears;
- flat tires, especially inside duels;
- low fluid level and/or heating in automatic transmissions and torque converters; overheating brakes; etc.

4.8 Operating Area Inspections

Fire prevention inspections of operating areas are made to determine the nature and extent of fire hazards present, the effectiveness of measures taken to abate them, and compliance with requirements for clearings, signs, smoking practices, extinguishers, tools, etc. Observation may be done from the air for larger operations. The best observations are made from the ground, regardless of size. While drive-by inspections can shorten the time involved for an inspection, he/she should expect to spend the majority of that time on foot.

Equipment servicing areas are normally accessible by vehicle. Often the most critical area is near the perimeter of the operating area, accessible only by tracked machines or foot. This is also often true of operations involving chain saws, air drills, cutting and welding equipment, or other portable machines.

4.9 Identification of Item Inspected

Proper identification of the item inspected is essential to avoid misunderstanding, inappropriate corrective action, or enforcement problems. Place or brand names alone are inadequate. There may be two Bear Creeks within a few miles of each other. A single operation may have several bulldozers of the same make and size working. The agency inspector needs to be flexible in his/her approach to identification as he/she is often responsible for inspecting several different types of industries. What is meaningful to one may not be to another.

4.9a Location

Location of the area or item inspected can usually be given by section, township and range. This is meaningful to both the protection agencies and the timber industry. It may not be to other industries. For them, additional location information, such as pit number, lease name and well number, project name, centerline distance number, or timber sale contract name and number, will be necessary. For the timber industry, an additional landmark location description is helpful.

When section, township and range are used, the location should be given as precise as is reasonably possible. There may be several ownerships, and/or operations within a single section. It is not difficult with modern topographic maps to determine location within a quarter section. In many cases, quarter-quarter section (40 acres) designation is entirely practical.

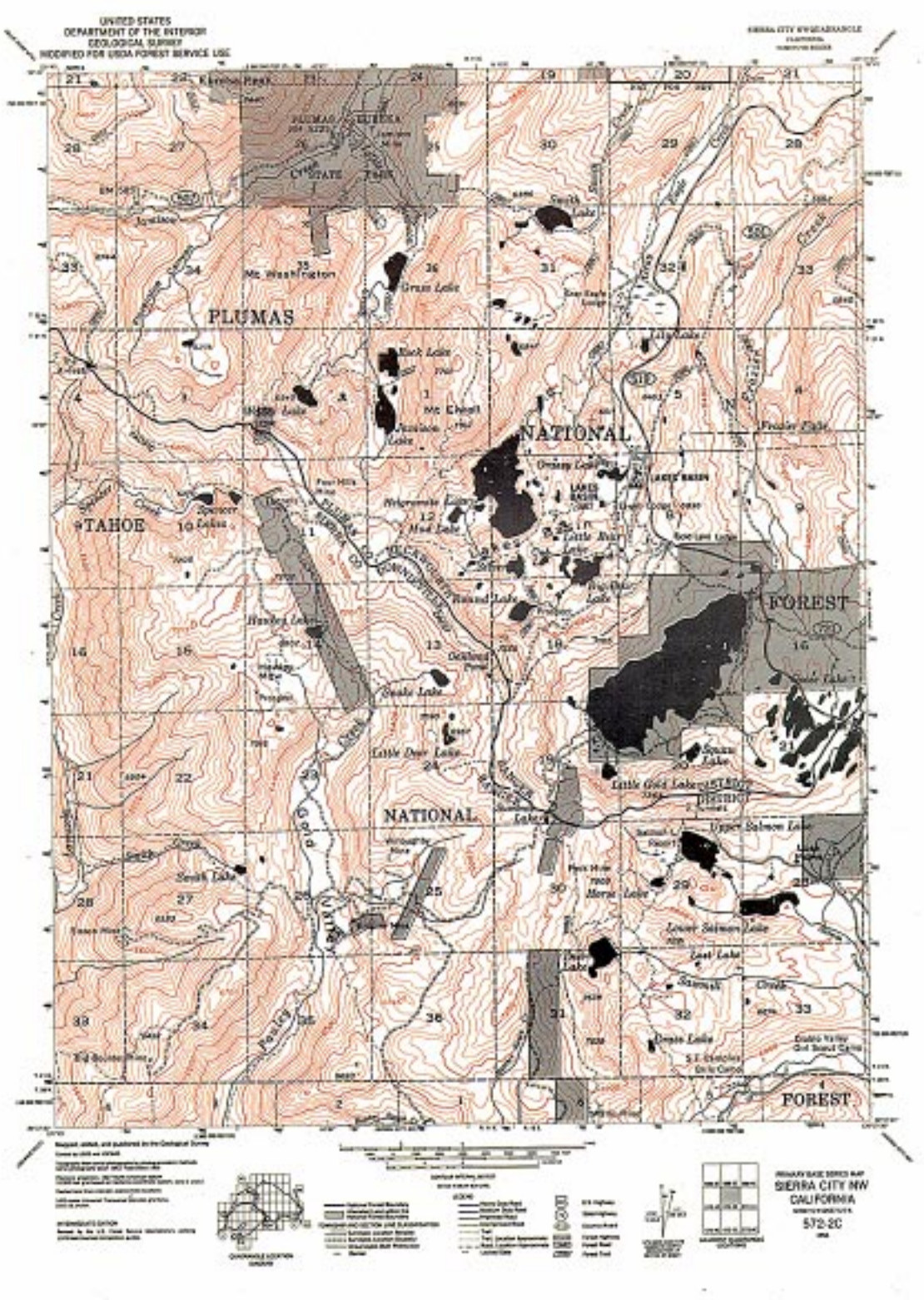


Figure 4-14.
Topographic Map with Property Boundaries Drawn

4.9b Equipment

Equipment should be as fully and precisely identified as reasonably as possible, even if there is only one of a type present during the inspection. Upon return, the inspector may find a substitute or several additional units. The most obvious identification is the brand name and type, such as bulldozer, yarder, end loader, or compressor. In addition, the size and serial number should be recorded. Some operators provide their own identification numbers on the machine. These are easier to use than serial numbers.

Photograph 4-15.
Identification Number on Equipment