5. MAINTENANCE, REPAIR AND SERVICING

The use of machinery vastly increases labor productivity, but it also provides some problems. Not the least of these is that it requires continuous maintenance, repair and servicing. In our concern for the fire problems caused by the machines and their operators, there is a tendency to overlook the serious fire risks that can occur from such activities. If all maintenance, repair and servicing of mechanical equipment could be done in shops or corporation yards, the threat of wildland fire from these activities would be negligible. This, however, is not the case and such activities often take place in highly fire hazardous situations.

5.1 Welding, Cutting and Grinding

- **PRC §4427 (Clearance and tools required)**
- **Title 14CCR §918.7 (Welding and blasting watch)**

The primary fire risk from these activities is the falling of sparks, slag or hot metal into dry vegetation fuel beds. There is also some risk of ignition of fumes from volatile fuels or solvents. The electric arc and gas flame are heat sources which are seldom allowed contact with vegetation or other fuels.

Welding, cutting, and grinding are common emergency repairs used to repair disabled machinery. This means that the choice of time and location is severely limited or non-existent. The machine may very well be situated in the middle of a hillside covered with dry grass or pine needles. Before any arc is struck or other repair work started, the area should be made as fire safe as possible.

All flammable vegetation and other fuels must be removed for a minimum radius of 10 feet from the work area. Several companies regularly provide 25 feet clearance. Also, firefighting equipment, including a 46 inch round point shovel and a backpack pump water type fire extinguisher, must be provided close by (i.e., less than 25 feet from the activity).

When fire danger rating is “Very High” or a “Red Flag” condition is in effect, or when winds prevail, a larger clearing radius should be employed. When fire danger rating is “Extreme” or a “Red Flag Fire Alert” is in effect, all welding, cutting or grinding activities in the field should be stopped.

Whenever welding, cutting or grinding is done in the field, a fire-watcher should be on hand during the operation and left at the site for at least one hour after the completion of the repair. Keep in mind that a welder wearing a hood or dark goggles can seldom see a vegetation fire.

Spark arrester and clearing requirements, as discussed later, are applicable to portable generators supplying power to arc welders and grinders. It should also be remembered that the responsibility and liability of the operator is the same although it may be shared, when using an independent contract welder rather than an employee. He/she must be sure the professional welder is aware of and follows fire safe practices and complies with the law.

Much of what is discussed above is included in various timber sale and construction contracts, state law, and in some local ordinances. In those jurisdictions where welding permits are required, clearance and fire tool requirements will usually be included among the conditions of the permit. Fire conscious operators will take these precautions voluntarily.
Figure 5-1.
USFS Issued Welding Permit
5.2 Refueling and Lubrication

Whenever possible, refueling and lubrication should be done at properly equipped and cleared shop or yard areas. On logging and many construction operations, this is not reasonably feasible. In these situations, certain precautions should be taken. In the interests of both fire prevention and water pollution control, all drain oil, used oil filters, rags, and other trash should be disposed of by complete removal from the site. These items should be transported to, and deposited in, an appropriate public waste disposal site.

Wheeled or tracked machinery is usually serviced from a truck, which means it will normally be brought to a log landing or other similar cleared area accessible by the service truck. If this is not the case, or if portable equipment (e.g., chain saws or small generators) is being refueled, a clearing to mineral soil for at least a 10-foot radius should be made and the unit to be serviced placed in the center before any fuel transfer takes place. For both fire and personnel safety, all power units should be shutdown and cooled before being serviced. Before restarting, spilled fuel should be wiped off portable units and moved at least 3 feet. The units should then be positioned so that the exhaust points away from the spot where refueling took place.
Above ground storage of gasoline in quantities in excess of one 55-gallon drum should be avoided. In any event, a clearing of all vegetation and other flammables should be maintained for at least a 15-foot radius from the container and/or pump. Some companies employ a “hotfoot” clearing around fuel storage areas.

Laws, ordinances, or regulations in many places require that a dike of sufficient height and area to retain the entire contents of the tank (in case of rupture or overflow) be constructed around any tank of 500 gallons or larger capacity. Such quantities of fuels should not be stored within 250 feet of a live stream or 50 feet of any vegetation. Fueling hoses should be fitted with automatic closing valves and nozzles to shut off the flow of fuel. This provides safety in case of hose rupture or nozzle dropping.

5.3 Servicing Equipment

The equipment used to supply servicing is subject to the same laws and regulations as the equipment being serviced, and for the same reasons. The exhaust from a pump engine or air compressor engine is just as dangerous as that from a tractor or a truck. Thus, every internal combustion engine from a one horsepower Briggs and Stratton to a 1000 horsepower motor-generator set, must be equipped with a spark arrester. The only exemption is for muffler-equipped engines on trucks, buses and passenger vehicles. All other engines mounted on such vehicles (e.g., to power fire pumps, compressors, generators, etc.), mounted on trailers or skids, or hand portable, must be spark arrester equipped. In addition, if the unit is not mobile or is to be operated in a given location for a time, a clearing of flammable material must be made around it for a radius of at least 10 feet. Firefighting tools must be provided nearby.
Photograph 5-4.
Generator with Spark Arrester and Clearance

Service vehicles, including fuel and mechanics’ trucks, should be equipped with large (i.e., 20-40 lb.) multipurpose fire extinguishers. The operators of these vehicles should be well trained in the use of extinguishers. Operators are often alone and in remote locations when servicing or repairing machinery. It is therefore important they be capable of quick and effective fire suppression action in case an ignition occurs.

Photograph 5-5.
Large Fire Extinguisher on Mechanic’s Truck
5.4 Spark Arrester Servicing

Spark arresters are often overlooked or given inadequate attention during servicing of machinery. Every mechanic, operator, and owner knows that the air cleaner on an internal combustion engine must be regularly cleaned or replaced. If it is not, the engine loses power. They are, therefore, conscientious about performing this service. The need for cleaning or emptying the spark arrester is not always apparent. Except in the case of screen-type arresters (usually found only on small multi-position engines), the performance of the engine is not affected. This may cause some operators to disregard routine cleaning. However, when the trap is full (or the screen burned out) the arrester loses its effectiveness causing carbon sparks to be emitted.

Spark arresters should be checked and cleaned often on a regular basis (every 30 days or less). The proper way to do this is to make sure the machine is parked in a cleared fire-safe area. Remove the band or plug, then start the engine and blow out the carbon.

Photograph 5-6.
Retention Spark Arrester with Band Removed
Photograph 5-7.
Retention Spark Arrester with Plug