7. MAINTENANCE OF WAY

The primary method of reducing hazards is to remove them for a minimum distance of 10 feet from the rail. The most dangerous right-of-way (R/W) fire hazards are: partially decomposed wood, slash, duff, dry grass, etc. found within the R/W. Studies of the location of fire starts indicate that a minimum width of treatment of 25 feet from the near rail should be adhered to (see Title 14, California Code of Regulations).

Right-of-way hazard reduction is not susceptible to a simplistic approach such as clearing to mineral soil for 50 feet from the outside rail for the entire length of the R/W. This approach is not only prohibitively expensive, and in some situations a physical impossibility, it is also unnecessary and unsightly. It may additionally be environmentally damaging because of unusually erodible soil, rare and endangered plants, etc.

7.1 Planning

Effective fire prevention cannot be accomplished by simply removing all flammables for a specified distance from the rail no matter which method or combination of methods are used. Neither can it be paid for, nor is it even necessary. How then are the decisions to be made regarding what to do as well as how, when and where to do it?

The obvious answer is through problem analysis and planning. Since no one person or organization is regularly in possession of all pertinent data and expertise needed for this process, and since the implementation of solutions may be the responsibility of different departments, this analysis and planning should be a cooperative effort. It is basically a company responsibility. For efficiency and continuity, one person should be put in charge.

The individual spearheading the prevention effort should not attempt to do it alone nor should he/she be expected to. He/she should have full access to, and be able to depend upon, personnel in the maintenance-of-way, mechanical and operations departments. He/she should also seek, and be given, data and suggestions from both fire prevention and fire suppression personnel of the protection agencies.

In order to determine the nature and extent of the problem it is necessary to know the locations and specific cause of right-of-way fires. It is also helpful to know the nature of the fuels ignited, e.g. ties, vegetation, structures, rolling stock, etc. Locations are needed not only by railroad milepost but also by distance from the near rail and which side of the rail. Specific causes may point to a mechanical or operational problem.

Analysis of this data, and all other available and pertinent data, will reveal which sections of the right-of-way are most susceptible to fires. It will also determine how wide the treatment should be at various locations and the method, or combination of methods, which will produce the needed treatment at least cost and highest efficiency.

Timing and scheduling of the work as required in Title 14, Article 2, is part of the planning process. The mutually agreed upon hazard reduction plan should be completed by spring with the work commencing as outlined within the plan.

7.2 Right-of-Way Hazard Reduction

There are three basic methods of reducing R/W fire hazards: mechanical clearing (physical removal), burning and chemical treatment. A subsection of this chapter will be devoted to each. A fourth subsection will deal with various combinations of the three basic methods and the times and places where combination treatment is most productive.

Mechanical Clearing

The most common method of railroad R/W hazard reduction is mechanical clearing, i.e., physical removal of the flammable vegetation and debris. This is sometimes done over an entire area from the edge of the ballast to the edge of the R/W or other desired width, and is sufficient positive fire prevention measure since nothing is left but bare soil. It is also considerably expensive, especially if done with inefficient machinery (e.g., bulldozer or grader), and can be environmentally damaging since it exposes the soil to both wind and water erosion.

A more common use of mechanical clearing is to construct a firebreak at the outer edge of the area to be treated. This is not considered an effective measure unless the area between the firebreak and the ballast is also treated in some way. Firebreaks should never be left open-ended. They should always be tied into some other fire barrier, i.e., the right-of-way itself, a road or highway, a river, etc.

Railroad companies commonly construct and maintain their fire breaks with bulldozers. For initial construction the bulldozer is probably, in most situations, the most suitable machine. Motor graders and discs will do as good a job, or better, at a fraction of the time and cost, except in steep terrain.

In most cases bulldozers are inferior to graders or discs for maintenance of firebreaks because they are likely to increase soil erosion. The angle of the blade on a motor grader can be reversed on successive passes so the previous berm is pulled back across the firebreak, thus requiring a shallower bite.

A particularly vulnerable spot for the starting of R/W fires is the accumulation of flammable debris which typically occurs in low spots, e.g., draws, culvert heads and drainage ditches. These areas are seldom accessible to heavy machinery causing handwork to be slow and inefficient.

Burning

In many situations burning is one way of getting rid of R/W fire hazards. Achieving the desired results safely is not easy nor is it simple. Regardless of the amount of knowledge and experience one might gain in the field of fire safety and prevention, new information is continuously being made available.

California requires permits for any open burning during fire season. In Southern California, burning permits are required year-round. The permit is normally issued by the fire protection agency having local jurisdiction. Most fire protection agencies will not issue permits for broadcast burning as is done for R/W hazard reduction without an on-site inspection. The terms and conditions of the permits are the minimums necessary to reasonably ensure safety to adjoining property, as well as compliance with fire laws and ordinances. They do not ensure success nor relieve the permittee of liability in case of escape.

Right-of-way burning should only be done in accordance with a prescription drawn up to achieve a specific purpose, taking into account the specific fuels, terrain, existing weather conditions and manpower and equipment available. Adequate control lines must be constructed in advance and sufficient personnel and equipment must be on hand to prevent an escape. These are generalities only, and must be made more precise and specific for any actual job.

Ignition devices commonly used in R/W burning include fusees, drip torches and pneumatic and power flame-throwers. Fusees and drip torches are very portable and easy to use on high banks or rough terrain.

Environmental concerns are more of a factor in burning operations than they are in mechanical clearing operations. Here the items of primary importance are air and water pollution. Soil erosion, which is the primary concern in mechanical clearing, is of minor or secondary concern in burning since the roots are usually left to hold the soil. Also, if the burning is done properly, the larger plants will remain. Open burning is regulated by fire laws and air pollution control laws. Many such laws state that open burning is prohibited unless the responsible fire protection agency certifies the material to be burned is a fire hazard.

Water pollution from R/W burning is not as likely to happen nor as easily determined as air pollution. However, if water quality control or fish and game agencies have good reason to believe the project will dump ash and lye in injurious amounts into streams or reservoirs, they may intervene. Such intervention may take the form of additional restrictions.

Chemical Treatment

Chemical treatment of fire hazards involves the application, usually in the form of a spray, of herbicides and/or fire retardant. Both federal and state law closely regulates this type of activity. These laws require most effective chemicals to be applied by a licensed or certified applicator.

The most common type of chemical treatment of railroad rights-of-way is with a non-selective soil-applied herbicide applied to the ballast and towpath and to enough additional width to comply with FRA (Federal Railroad Administration) regulations. In most cases, unless hindered by adverse weather or other outside factors, this provides excellent fire prevention protection within the width covered.

Right-of-way chemical treatment is usually applied from specially equipped rail cars or from hyrailer trucks. These units are owned by the contractors and move from one railroad or division to another. This is an economically efficient arrangement.

In a few cases, chemicals are applied by railroad-owned equipment operated by company personnel. In certain other cases where particularly wide applications are necessary, they are done by helicopter. These situations provide more flexibility in timing and thus usually produce excellent results.

Combination Treatment

Any one of the above right-of-way fire hazard reduction methods is seldom sufficient alone. A combination of any two or all three is usually called for.

Mechanical clearing is most useful for initial clearing of heavy fuels, such as old logs, and for construction and maintenance of firebreaks. Chemical treatment is most useful for maintenance of clearings already established. However, it can create flash-fuel problems if used as the first treatment. Burning can be used for either initial or maintenance treatment but is normally unsafe without a mechanically cleared firebreak.

Certain fire hazards cannot be treated by removal, burning or herbicides. These might include, in addition to ties and wooden trestles and snowshed, vegetation such as moss and grass growing on rock cliffs or cut-banks, rare or endangered plant species and short stretches or widths of R/W where the other methods are precluded for any reason. In these situations, fire retardant chemicals should be employed, either alone or in combination with the other methods.

Fire Resistant Plants

Another approach to R/W fire hazard reduction would be the substitution of fire resistant plants for the native vegetation. Some research has been done in this field by the U.S. Forest Service Pacific Southwest Forest and Range Experiment Station, the Los Angeles County Arboretum, and others. Most of this work has been directed toward landscaping for structures located in hazardous fire areas rather than large scale of R/W plantings. However, some limited success has been achieved which might be applied to R/W.

7.3 Special Problems

Certain items, conditions or locations present fire prevention problems that are unusual in type or degree. These items deserve special attention.

One such item is used ties. It has been estimated that the average age of a good quality tie when it is replaced is 30 years. If it was originally treated, most of the treatment chemical has been leached out. It may be starting to rot. In some cases, if the tie is badly cracked and splintery, it is an excellent fuel bed for an exhaust or brake shoe spark to fall into and start a fire unless it is removed from the right-of-way.

Photograph 7-1.
Rail Corner Hold Down

Photograph 7-2.
Cement Ties

Another special fire hazard is wooden structures. These include buildings, trestles, snowsheds, tunnel linings, ties, etc. Except for ties, these seldom catch fire, but when they do, they create intense heat and usually cause a wildfire. The likelihood of such structures catching fire will be markedly reduced if strict compliance with clearance laws is observed.

Wood chips deposited on the right-of-way have, in the past, created severe fire problems. With the advent of car netting, the accumulation of this hazardous fuel has been sharply reduced. On certain stretches of rails, chip accumulation will probably never be completely prevented. If allowed to build up between the rails, the chips can be just as dangerous in the winter as in summer but in a different way. When the chips become soaked with rain or snowmelt, they conduct electricity, shorting out block signals and switch controls.

7.4 Right-of-Way Inspections

Fire prevention inspections of right-of-way are made to determine the nature and extent of fire hazards present and the effectiveness of measures taken to abate them. This, of course, requires an understanding of what constitutes a fire hazard and what it takes to eliminate it. Depending on the purpose of the inspections and time available, such inspections may be made from the air, from a hyrailer, or by foot.

Aerial inspection, either from helicopter or from light fixed-wing aircraft, is the quickest way to make a general survey of conditions over a large segment of right-of-way. On the ground details cannot be identified in this way, especially under tree canopies. On the other hand, questionable areas can be spotted and noted for ground checking. Considerable ground inspection time can be saved by an advance aerial survey. Since most R/W requiring this type of inspections are in mountainous terrain, only pilots skilled in this type of flying should be used. The pilot and the observer should participate in a thorough advanced briefing so that neither will have their attention distracted unnecessarily while in the air.

A much more comprehensive R/W inspection can be made from a hyrailer. This method is good for relatively quick and reasonable thorough inspection of a moderately long piece of R/W (25 to 100 miles). Although much more detail can be seen this way than from the air, there are some drawbacks. Normal travel speed requires a scanning type of observation. Questionable items noted require stopping, backing up or alighting to verify. This is not always possible because of the need to clear the rails for trains. Also certain areas are difficult, if not impossible to observe from the vehicle. These would include high cut banks, steep fill banks, deep draws, etc.

By far the most intensive inspection can be made on foot. Because of the time involved, this method can only be used for spot checks of critical areas, usually one to five miles in length. The areas to be inspected may have been identified from one of the two other inspection methods, from fire spot maps or because of a specific fire. This method allows not only close visual inspection of the rails, ties, ballast and towpath, but also of conditions farther out and not visible from the air or the hyrailer. The walking inspector must be particularly alert for the approach of trains or other rail vehicles. They are not always as easy to see or hear as might be expected, especially in canyons or from the far side of tunnels. One should never enter a tunnel or start across a trestle without assurance that he/she can get safely to one end or the other before being trapped by a train.

7.5 Maintenance and Emergency Equipment

Another source of fire risk is the maintenance and emergency equipment used by railroad companies. Such equipment may be used either for routine maintenance of right-of-way, rails, rolling stock, or for clearing derailments and other calamities in order to restore rail traffic. Included are the

various internal combustion engine-driven machines, welders, cutters, grinders, etc. The use and operation of such equipment is subject to most of the same laws, regulations and fire-safe practices as are locomotives and other components of trains, plus some additional ones.

Photograph 7-3.
Mechanical Spike Driver

Photograph 7-4.
Track Replacement Equipment Work Gang

Photograph 7-5.
Replacing Rail with Pettibone Crane

Photograph 7-6.
Tie Sweeper

Photograph 7-7.
Rail Placement Device

Photograph 7-8.
Tie Replacement Equipment

Photograph 7-9.
Hyrailer (Rail Capable) Dump Truck

Internal Combustion Powered Equipment

This category includes all on-track equipment and off-track equipment. Any such equipment, except licensed highway vehicles, must be equipped with an effective spark arrester.

In addition, if the equipment is to be operated at a fixed location, a clearing of flammable material must be made around it for a minimum distance of ten (10) feet. Certain firefighting tools must be readily available, also. Hand-portable power equipment such as chain saws, post hole diggers, tampers, etc., is exempt from the clearing requirement. However, fire extinguisher and/or shovel must be maintained within 25 feet of the operation of portable gasoline powered equipment.

Though not specifically covered by law or regulation, in most jurisdictions refueling, especially with gasoline, is a hazardous operation. It should only be done with the engine stopped and in an area cleared of flammables for at least ten (10) feet in all directions. Hand held equipment should be moved away from the refueling site prior to restarting.

Photograph 7-10.
Gas-Powered Rail Cutter

Photograph 7-11.
Gas-Powered Impact Wrench

Photograph 7-12.
Gas-Powered Impact Wrench in Use

Welding, Cutting and Grinding

Permit requirements for these types of work vary between jurisdictions. It will be necessary for railroad supervisors conducting them to learn the local requirements and comply with them.

Whether permits are required or not, clearings of ten (10) feet or more and readily available firefighting tools will be required. Most companies have water tank cars available. It is good practice to have one of these either at the site or at the nearest siding whenever any of these operations take place during fire season. Another fire-safe practice is to leave a watch person on the scene for a minimum of one (1) hour after cessation of the work.

Photograph 7-13.
Side View of Water Car

Photograph 7-14.
Rail Fire Car with Working Gang

Photograph 7-15.
Pneumatic Rail Cutter

Photograph 7-16.
Cutting Rail (Note Spark Guard and Backpump)

Photograph 7-17.
Cutting Rail

Photograph 7-18.
Pneumatic Drill

Photograph 7-19.
Pneumatic Drill with Hot Shavings

Explosives

Some fire agencies require blasting permits in addition to the explosive permits.