5711 – SITE PREPARATION

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.01 Purpose. This section provides guidelines for planning and executing treatments necessary for improving the site prior to seeding or planting.

.02 Objectives. The objective of site preparation is to remove debris and woody or herbaceous vegetation preventing initial establishment of a uniform standard of seedlings.

.03 Authority. (See 5700.03)

.04 Responsibility. (See 5700.04)

.05 Definitions. (Reserved)

.06 Policy. (See 5700.06)

.1 Coordination. Improper site preparation can have an extremely detrimental effect on the environment. Therefore, in carrying out the Bureau's responsibility under multiple-use concepts, burning, chemical, and mechanical treatments are closely coordinated with BLM technical experts, other Federal agencies, state agencies, organized interest groups, and other interested parties such as downstream water users.

.2 Determining the Need for Site Preparation. Failures in seeding and planting are often a direct result of inadequate site preparation. Conditions such as heavy brush cover, dense grass or sod, logging slash and debris, or simply dry sites with poor soil and severe exposures may require advance treatment to prepare the site for planting or seeding. Conversely, however, site preparation done on the basis of broad generalizations can result in adverse effects greater than those that exist. Treatments may, for example, eliminate one or more undesirable specifies of shrubs only to have their space occupied by even less desirable specifies.

.3 Site Preparation Treatments.

.31 Manual. Manual site preparation is used to remove litter or control herbaceous vegetation on microsises where trees or seeds will be planted. These methods are relatively expensive and the least effective of all site improvement methods. Effectiveness is limited by lateral extension of weed roots into the treated spot and by loss of soil moisture to dryer surrounding area. Manual methods are usually confined to areas where heavy machinery or herbicides cannot be used.

A. Mulching. Mulching involves the use of paper, sawdust, or synthetic fiber to suppress herbaceous vegetation or prevent frost heaving. Mulching to control vegetation may be done following planting until the onset of dry weather. Mulching to prevent frost heaving, however, should be done as soon after planting as possible. A common error is failure to weight the paper so as to seal out light and prevent slippage.
B. Terracing. Terracing should be deep enough to remove sod and surface roots. Individual terraces encompass at least two square feet and slot slightly toward the backslope. Threes or seeds are usually planted in the center of the terrace.
C. Snag Felling. Snag seriously limits the effectiveness of aerial seeding and spraying and are a hazard to planting or seeding crews working among them. They may also create a substantial fire hazard.

.32 Mechanical. Machine treatments, with the exception of strip clearing and terracing, are limited to slops under 40 percent. Also, soils should be medium depth or deeper (5705.42A4), and free of rock outcrops. Work is confined to dry weather to maximize plant hill, and to prevent soil compaction, erosion, and stream siltation.

A. Trenching. Tractor-drawn implements, such as plows or disc trenchers, are used to construct trenches in which trees or seed will be planted. Trenching is most often done in dry regions or on droughty soils where light vegetation competes severely for soil moisture. Construct trenches on the contour with the soil thrown downhill, or to the south on level ground.

B. Complete Clearing. Complete clearing, often termed scarification, involves the use of tractor and brushblade to clear woody vegetation and debris from relatively large areas. Complete clearing is often used as one phase of a multi-treatment brush control project that includes aerial spraying or burning. Clearing to control herbaceous vegetation has not been as successful as with woody plants. Uproot brush as thoroughly as possible to expose mineral soil and insure adequate brush kill but use extreme care, even with brushblades, to avoid removing topsoil. Windrow or pile debris. On sloping ground, run them in an east-west direction to provide shade for seedlings. Windrows should not exceed 25 feet in width and should have breaks in individual rows to prevent erosion channels from forming. Intervals between windrows should approximate the following:

Slope of Ground	Width in Feet
0-5%	120-200
6-10%	100-119
11-25%	70-99
Over 25%	under 70

C. Contour Strip Clearing. Contour strip clearing is done on steep slopes where complete clearing is not feasible. The planting surface of cleared strips does not slope towards the backslope as with terracing. The interval of uncleared area between the toe of the disturbed soil on the upper strip and the top of the cut slope on the lower strip should approximate the following:

Slope of Ground	Width in Feet
Under 50%	5
51-60%	10
61-70%	15
Over 70%	20

D. Terracing. Machine terracing is an extreme measure usually applied to droughty sites in an attempt to increase soil moisture storage. Tractors equipped with angle blades are used to construct a flat surface that slopes slightly towards the backslope. Terraces are built on the contour and may be as short or as long as desired. Long terraces (50 feet or more) should have barriers placed across the channel at intervals of 10-20 feet so as to form troughs and impede erosion. Use contour strip clearing guidelines for interval between terraces.

E. Tilling. Tilling involves the use of tractor-drawn, farm-type implements such as discs or harrows to expose mineral soil and control light vegetation prior to seeding. Tilling is limited to areas relatively free of large logs, stumps, and rocks.

.33 Chemical. Chemicals may be used to control woody or herbaceous vegetation where there is no risk to existing regeneration or other resources and when target species are susceptible. All anticipated herbicide programs shall be submitted to the Washington Office (350) for approval and review for their economic impact and effect on human health, livestock, crops, fish, wildlife, and other elements of the environment. Chemical site preparation is often done as part of a multi-treatment plan involving clearing or burning. (See 7311 for safety consideration in the use of herbicides and other technical guidelines applicable to forest development.)

A. Factors Influencing Treatment Prescription. Development of an effective treatment prescription requires consideration of the following factors:

1. Season of Application. Many brush species are best controlled during early summer at the end of the period of rapid stem elongation. For others the dormant period or late summer is most effective. Control of herbaceous vegetation with atrazine, however, is limited to periods when sufficient rainfall follows treatment to carry the chemical into the root zone of target plants. For this purpose, one heavy rainfall is more effective than numerous light rainfalls. In dryer regions such as the Rocky Mountains, the probability of a heavy rainfall in the spring may be so low as to preclude the use of atrazine. Time of application is also influenced by the presence of conifers. Conifers at least susceptible to damage by herbicides during the dormant season and most susceptible during stem elongation.

2. Chemical. Most brush control work in forest development is done with 2, 4-D; 2, 4, 5-TP (Silvex). Herbaceous plants are generally controlled with atrazine or atrazine with a non-soil active helper such as 2,4-D. In oil or oil and water emulsions, 2,4-D is slightly more injurious of conifers than 2,4,5-T or Silvex. Atrazine and 2,4-D in water are usually harmless to conifers at normal rates of application.

3. Carriers. Water is used for most summer (foliar) brush treatments, although oil and oil-in-water solutions are often necessary for the control of certain specifies. Oil and oil and water solutions, however, may cause heavy damage to most conifers in the summer and to pines in any season.

4. Rate of Application – Chemical. Two to five pounds of active ingredient per acre are usually applied, depending upon the susceptibility and density of target species, degree of control required, and the number of treatments planned.

5. Rate of Application – Carriers. Eight to ten gallons of carriers per acre are usually applied.

6. Number of Treatments. The number of treatments necessary to achieve the desired control is frequently underestimated. Height of brush, its resistance to the chemical used, the presence or absence of an understory, and other treatments planned such as clearing or burning determine the number of treatments needed. Experience and technical advice from Bureau, university, or experiment station personnel are used to determine the number of treatments necessary.

7. Position of Conifers in Relation to Brush Canopy. A heavy brush canopy protects conifers beneath it from foliar application. In addition to being exposed to sprays, conifers whose crowns extend above the canopy or are located in openings usually do not represent a high potential for release.

B. Applying the Herbicide. Herbicide is usually applied by aircraft. Studies have shown that in aerial application, 25 to 75 percent of the herbicide volume can be lost due to draft after the chemical leaves the aircraft. Factors that influence drift include wind velocity, height aircraft above the ground, whether or not the emulsion is an invert and droplet size. Droplet size is influenced by shape and size of nozzle orifice, nozzle pressure, position of nozzle in the airstream, air temperature, and humidity.

C. Maximizing Toxicity. Unless other complicating factors are involved, such as the need to protect existing reproduction, spray application should strive for maximum toxicity. For example, toxicity is greatest for some specifies immediately following a period of rapid photosynthesis when food transport downward from leaves is highest. High temperature, bright light, and soil moisture are conducive to photosynthesis. However, if herbicide is applied during these conditions, heavy transpiration may reduce the effectiveness of the herbicides.

D. Calibration of Spray Equipment. Properly calibrated equipment is essential for proper distribution in aerial spray projects. (See 7311 for calibration procedures.)

.34 Prescribed Burning. Prescribed burning as a site preparation measure can be used to good advantage to destroy slash, debris, or brush where they are limiting factors in seedling establishment. Prescribed burning may be considered for any area where forest regeneration is well below marginal stocking, soil and watershed values will not be significantly damaged, usual plan succession is such that a condition unfavorable to seeding or planting is not expected to occur, and where fire or environmental quality such as air are not prohibitive. All prescribed burning plans must fully consider the maintenance and enhancement of environmental qualifies.