DOE/EA-1110

Final
Environmental Assessment
for
Vegetation Control at VHF Stations, Microwave Stations, Electrical Substations, and Pole Yards

Prepared for
Southwestern Power Administration
U.S. Department of Energy

Prepared by
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DISCLAIMER

1.0 Purpose and Need for Action

Southwestern Power Administration (Southwestern), an agency of the U.S. Department of Energy, operates very high frequency (VHF) and microwave radio stations, electrical substations, and pole yards to support the transmission of electrical power throughout Arkansas, Missouri, and Oklahoma. A significant impediment to station operation and employee safety is the growth of vegetation at the stations. The purpose of this environmental assessment (EA) is to evaluate the alternatives available for controlling vegetative growth at the stations.

Southwestern maintains 53 stations throughout Arkansas, Missouri, and Oklahoma. Station locations often have more than one use, but can be divided into two general use categories: 1) electrical substations and pole yards, and 2) radio tower stations (VHF or microwave). Although each station size is different, generally the substations are larger in size than the radio tower stations or the pole yards. The general locations of operated stations are depicted on Figures 1, 2, and 3.

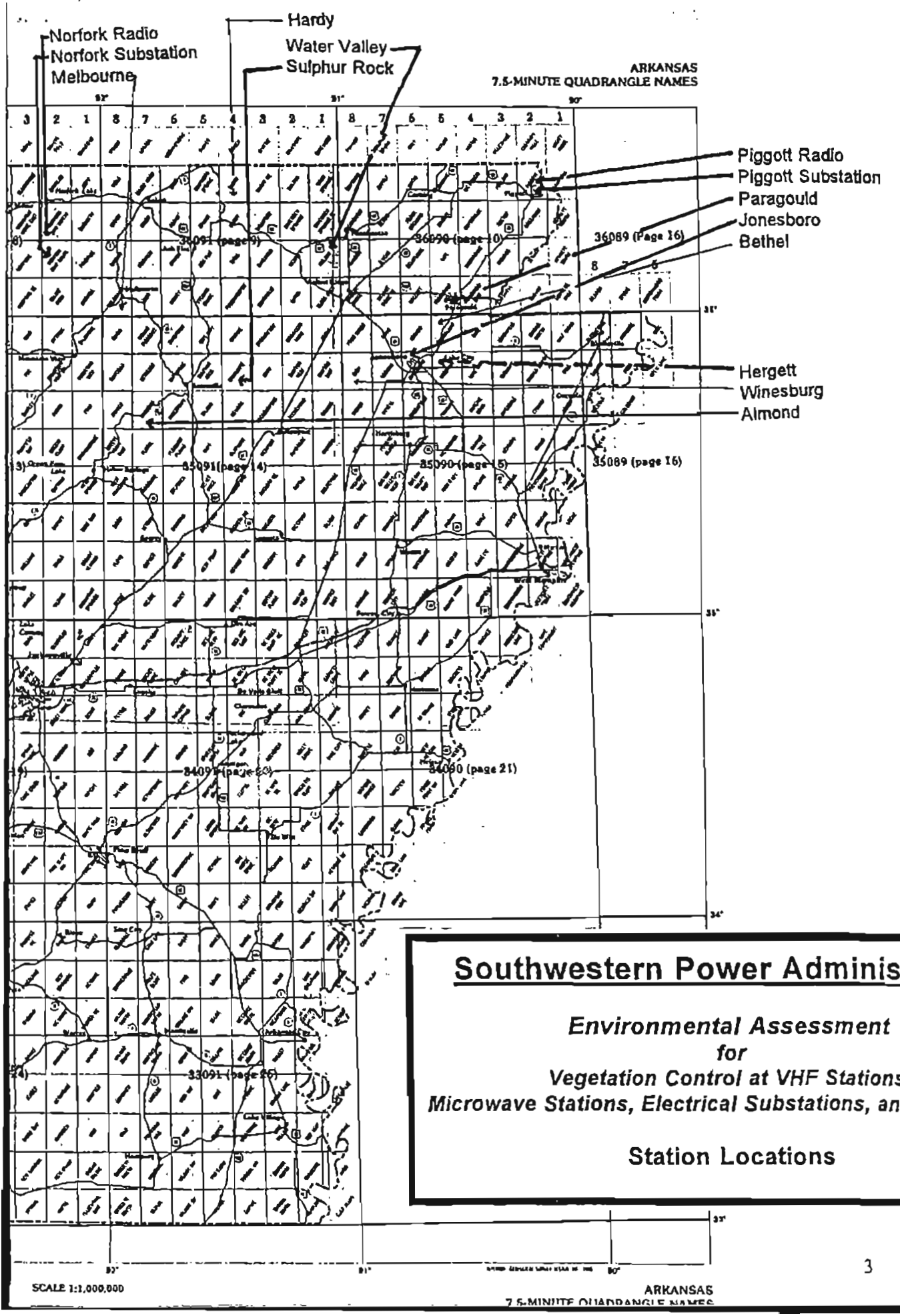
Southwestern has been using a combination of mechanical/manual and herbicide control to control vegetation. These methods of vegetation control at the substations have been successful and have not presented any environmental problems when properly utilized. Gravel is used at the electrical substations to maintain an insulating buffer for workers. The gravel insulates the workers from potentials that may be present in the soil during electrical faults and also provides a more stable working surface during wet periods than either soil or grass. Vegetation control at the stations is necessary to eliminate vegetation from the gravel areas that may result in electric potentials which may be hazardous to workers and to reduce the risk of fire from dried vegetation. Vegetation control at all of the stations also provides ease of travel within the station during maintenance and emergency response, and prevents vegetative interference with operational equipment. Federally-mandated reductions in staff and budgetary resources require Southwestern to evaluate all potentially efficient methods for controlling vegetation at the stations. Based on these concerns, Southwestern is evaluating a number of alternative methods for vegetation control at the stations. The alternatives evaluated for controlling vegetation include: 1) no vegetation control; 2) mechanical/manual control; and 3) a combination of mechanical/manual and herbicide control (proposed action). The herbicides suitable for use in the proposed action were evaluated to determine the potential impacts to the environment.

An Environmental Impact Statement (EIS) evaluating similar vegetation control alternatives was prepared by the U.S. Department of Agriculture (USDA), National Forest Service for use in National Forest lands in Oklahoma and Arkansas. In addition, Southwestern recently completed an EA for vegetation control within rights-of-way in Oklahoma, Arkansas, and Missouri. Alternative evaluations and issues of concern discussed in this EA often reference information contained in the USDA EIS and the Southwestern EA for Vegetation Control in Rights-of-Way.

Prior to continuing the present method of vegetation control, Southwestern must determine whether the selected alternative poses a significant impact to the environment. This determination is aided through the review of this EA. The EA was developed with input from federal and state agencies, public organizations and individuals, and experts familiar with the various alternatives and their impacts. This input was solicited during the scoping process, when these groups were identified and informed of Southwestern's intent to prepare the EA. These groups were given the opportunity to provide the document manager with information on the alternatives under evaluation or to suggest other reasonable alternatives.

The scoping process consisted of the notification of federal and state agencies with interest in the project, public notification published in local newspapers (near the station locations), and direct contact with various experts familiar with relevant portions of the EA. Significant issues raised during the scoping process included potential impacts to air quality; water quality, surface water and groundwater; wetlands; vegetation; wildlife; threatened and endangered species; archaeological, cultural, and historical resources; prime farmland; and human health. In addition, issues concerning the transportation and storage of herbicides and the potential effects from accidents or spills were raised.

In the event that the selected alternative does not pose a significant impact to the environment, a Finding Of No Significant Impact (FONSI) would be issued by Southwestern. If a FONSI is not issued, an EIS may be developed.



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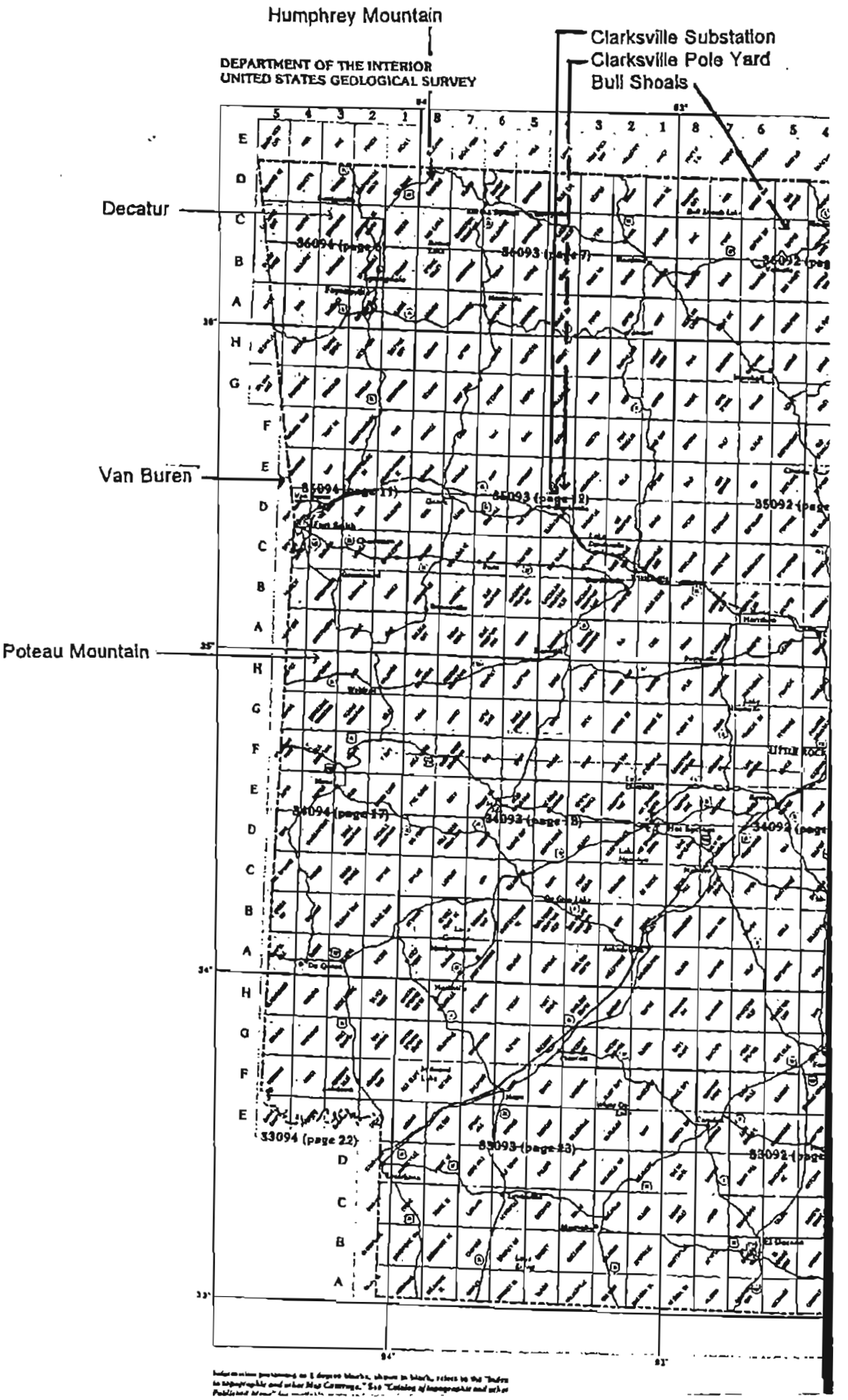
Station Locations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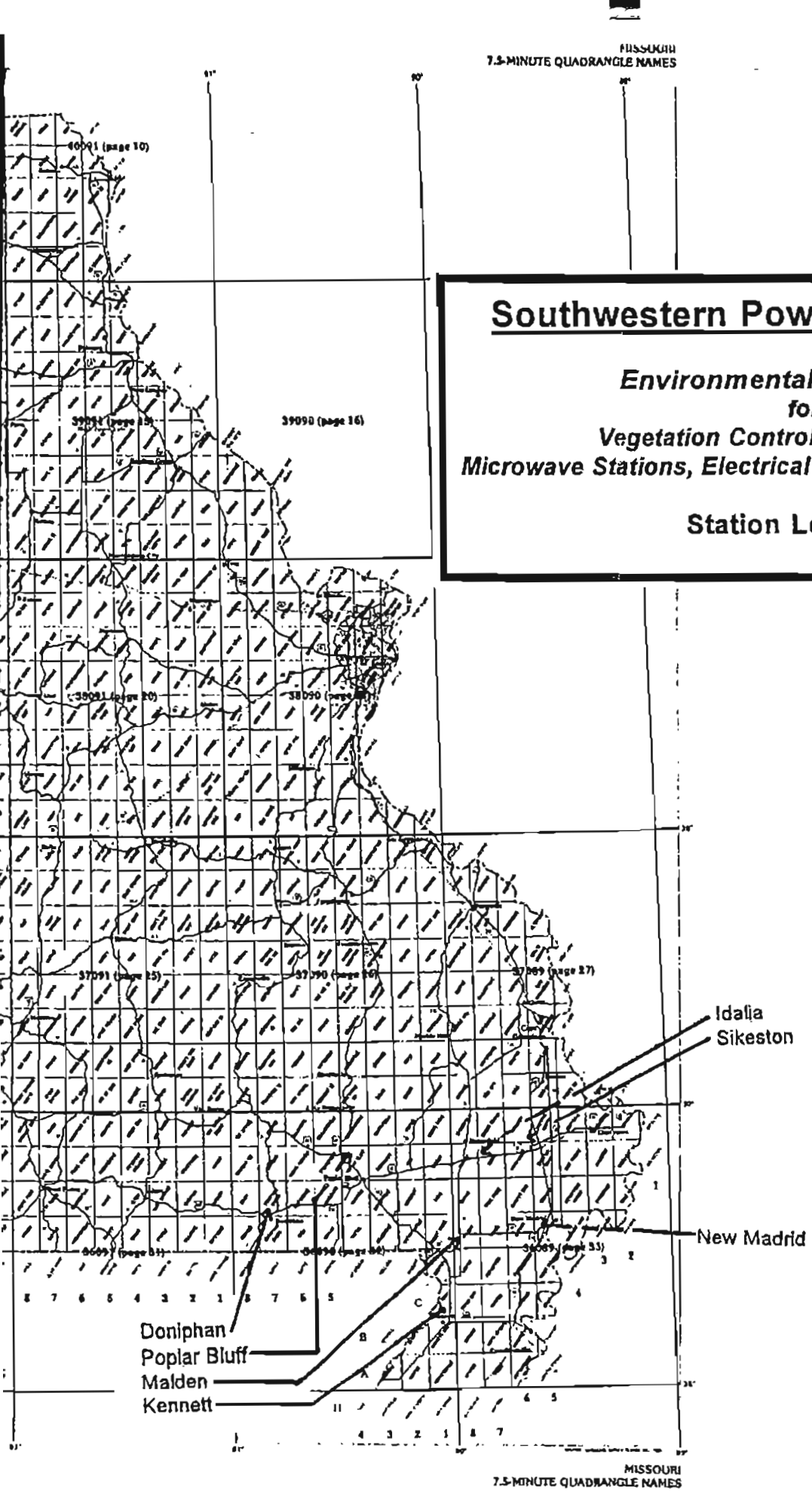

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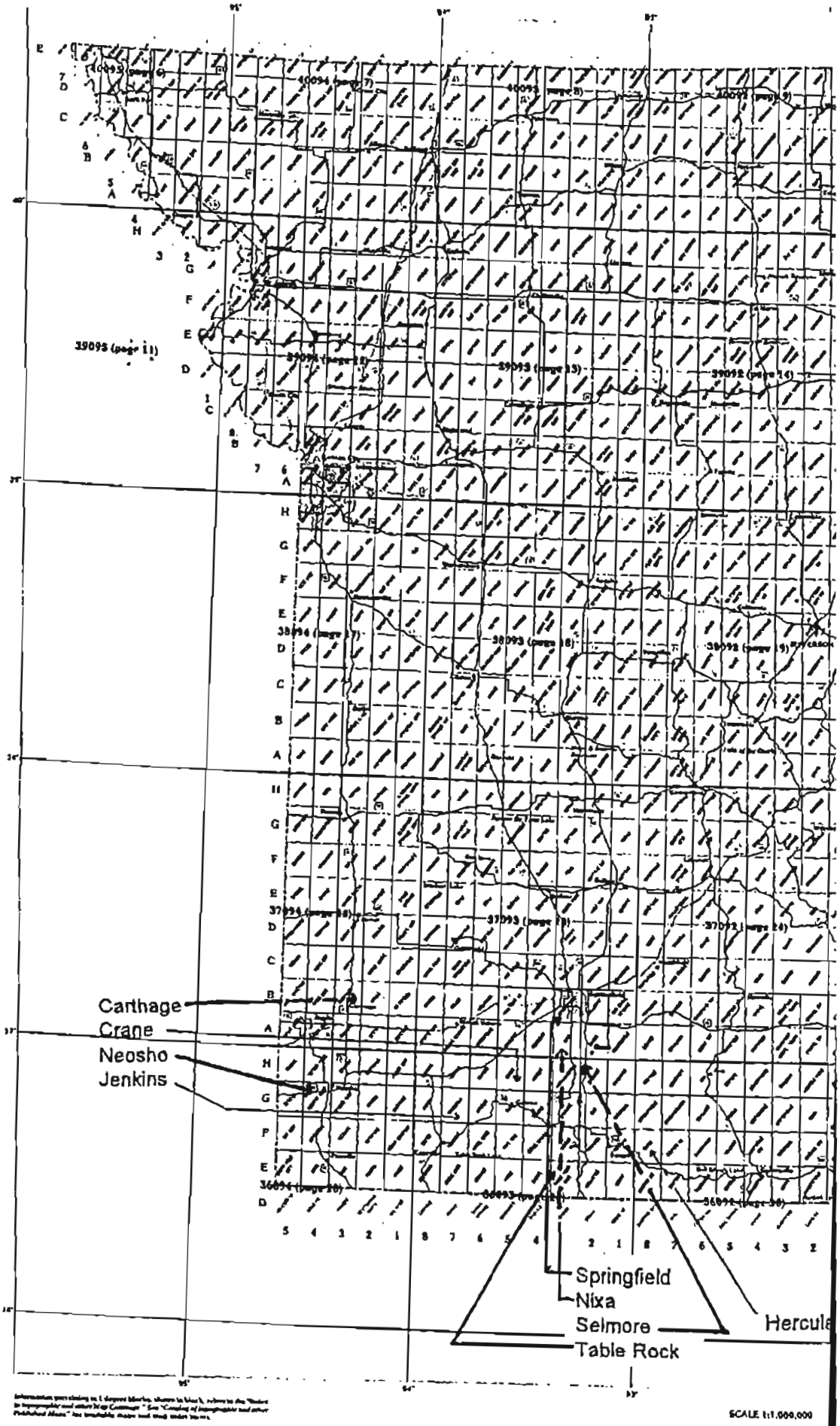

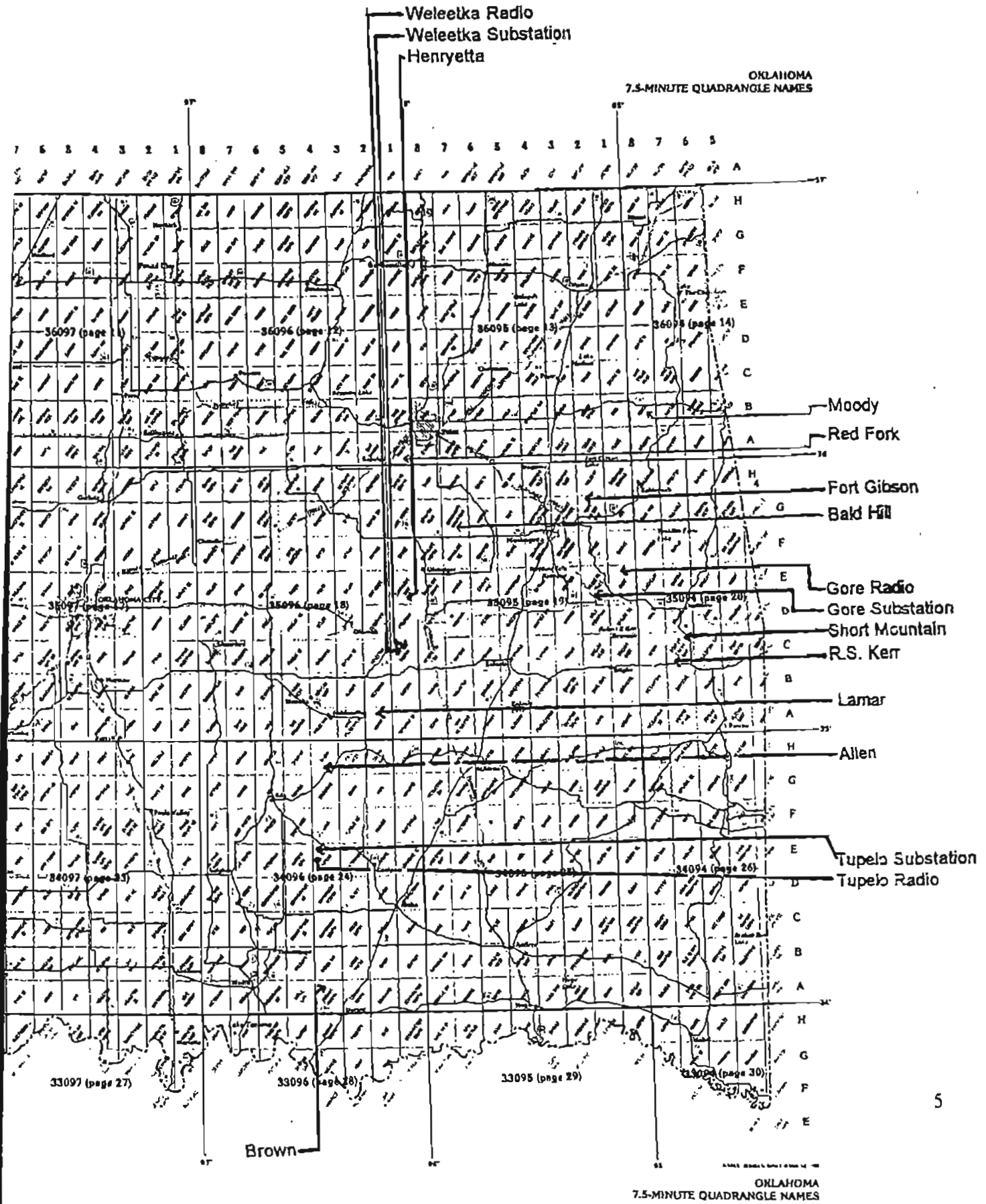
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7.5-MINUTE QUADRANGLE NAMES
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Red Fork
Fort Gibson
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Gore Radio
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Short Mountain
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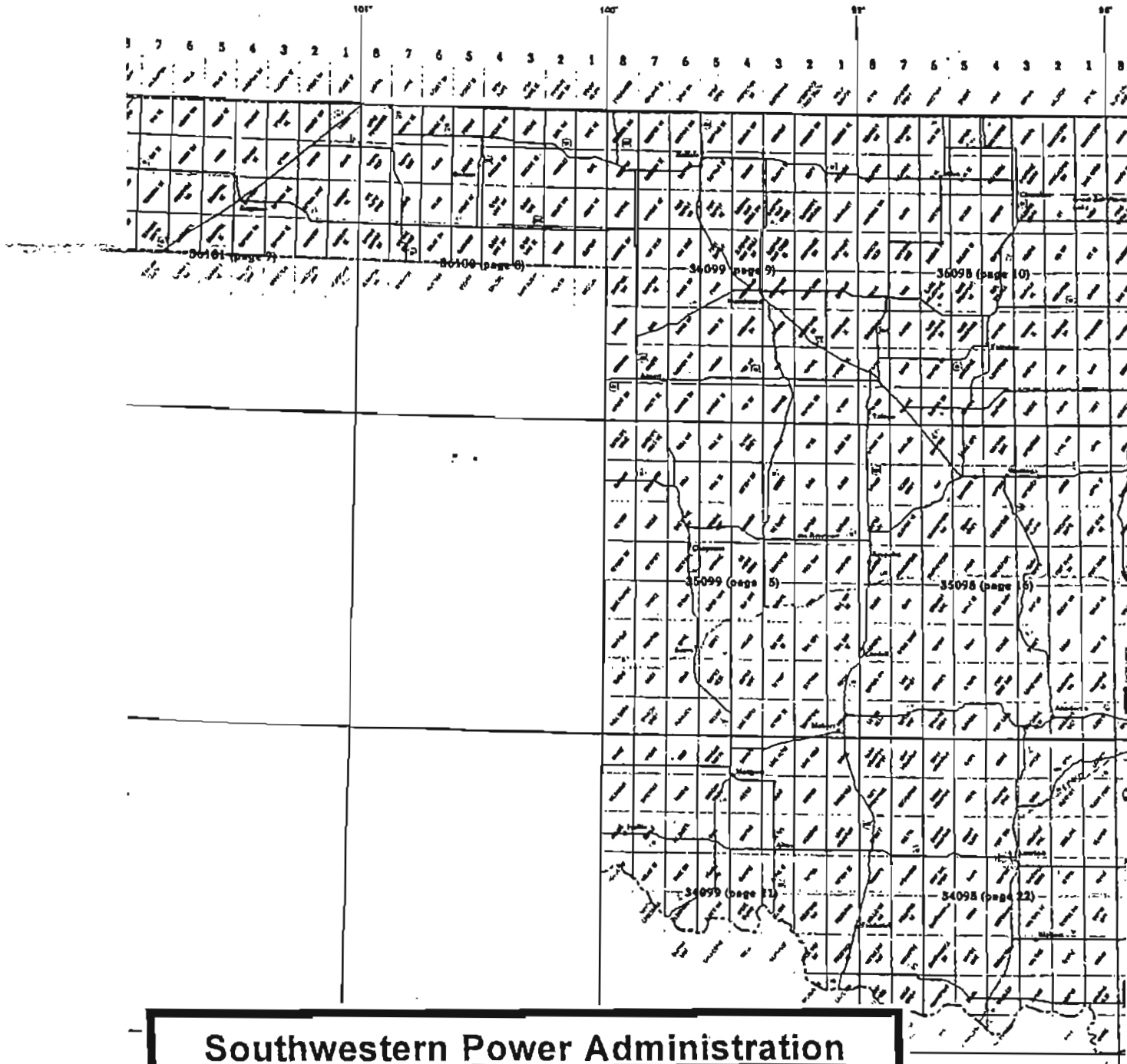

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Station Locations

2.0 Description of the Alternatives

Southwestern removes vegetation that may interfere with operations or pose a threat to worker safety at VHF and microwave radio tower stations, electrical substations, and pole yards. Generally, the land surface at each station location consists of maintained lawn with gravel surrounding the operational equipment. The majority of the stations are separated from the neighboring properties by a fence. Potential alternatives for vegetation control developed during the scoping process include: 1) no vegetation control (no action); 2) mechanical and manual control; and 3) a combination of mechanical, manual, and herbicide control (proposed action). Suggestions for alternatives received from interested persons, organizations, and governmental agencies were reviewed, considered, and incorporated by the preparation team.

2.1 Alternative 1 - No Action

The no action alternative includes no vegetation control at the stations.

2.2 Alternative 2 - Mechanical and Manual Control

Alternative 2 uses mechanical and manual methods to control vegetation. The mechanical methods include a tractor-mounted brush hog mower to maintain landscaped areas; large lawn mowers for grass cutting, power weed trimmers to maintain fence rows and areas surrounding radio tower supports; and chain saws to occasionally remove tree or shrub branches threatening operations at the station. When necessary, Southwestern employees would manually pull vegetation from within the gravel areas, along fence rows, or around radio tower supports. Generally, the cuttings from mechanical and manual vegetation control would remain onsite and allowed to deteriorate.

The brush hog mower cuts, chops, or shreds vegetation near the land surface and allows mulching of vegetation and onsite nutrient recycling. This tool is most effective on vegetation 3 inches (7.6 centimeters) or less in diameter.[1] Southwestern uses this method to maintain the majority of the landscaped areas within the stations.

The other mechanical methods are more easily controlled by humans; therefore, the target vegetation can be individually controlled. The large lawn mower and the power

[1]U.S. Department of Agriculture, Forest Service, Southern Region, "Final Environmental Impact Statement for Vegetation Management in the Ozark/Ouachita Mountains", Management Bulletin R8-MB, March 1990, pp. II-22, II-27.

weed trimmer cuts vegetation and breaks the connection between the roots and stem. This tool is most effective on herbaceous vegetation growing along fence rows or around structures, since the cutting edge can be easily manipulated to control target vegetation. The chain saw is used to control vegetation larger than 3 inches (7.6 centimeters) in diameter, including dense shrub growths, tree limbs, and large trees.[1] These manual methods are initially effective on woody vegetation; however, resprouting from the stumps or other exposed woody vegetation is common.

2.3 Alternative 3 - Proposed Action

The proposed action includes combining herbicide application with mechanical and manual methods to control undesirable vegetation along the fencelines and within the graveled areas at each stations. Discussions concerning the proposed action in this EA are limited to the evaluation of herbicides to supplement mechanical and manual control methods. The mechanical and manual vegetation control methods are discussed in Section 2.2.

Herbicides would be used to 1) establish and maintain a non-vegetative barrier within the gravel areas onsite, 2) reduce and prevent a build up of dried vegetative matter, 3) and prevent vegetative interference with operational equipment. At electrical substations, the gravel insulates the workers from potentials that are present in the soil during electrical faults and may also provide a more stable working surface during wet periods. Moisture in the ground, ponded water on the land surface, and water contained in plant matter may reduce the insulation capabilities of the gravel and increase the potential for fatal electrical shock. Herbicide use would eliminate vegetation within the gravel area and provide a provide a surface less prone to moisture collection, which would decrease the potential for electrical shock during maintenance or emergency response. A build-up of dried vegetative matter, from dead plants or leaves, increases the risk of fire at all of the stations. Herbicide use along fencing and around structures would reduce the risk of fire by eliminating vegetation, and the associated build up of dried vegetation caused by allowing controlled vegetation to deteriorate onsite, within the station. Excessive vegetation may interfere with the operation of equipment, cause electrical failure, cause fire, inhibit quick and efficient repair of equipment during emergencies, or hinder regular station maintenance.

The combination of herbicides with mechanical and manual methods would reduce the maintenance requirements at the stations for Southwestern. Herbicide applications at

each station would occur twice a year, once in the Spring and again in the early Fall with additional treatments to resistant individuals throughout the growing season.

Herbicide application methods would include a combination of Foliar Spray Application, Soil-Spot Application, and Mechanical Ground Application depending on season of the year, species needing control, and area treated. Established herbaceous plants, such as grasses and weeds, would be primarily controlled using Foliar Spray Application. Soil-Spot and Mechanical Ground Applications would be used to control seed germination and vegetative growth within the gravel covered areas.

Herbicides would be applied using one, or a combination of the following methods: (1) backpack sprayers, (2) pressurized sprayers, and/or (3) squirt bottles. The backpack sprayers, pressurized sprayers, and squirt bottles are standard items and can be manually adjusted to deliver the amount of herbicide needed.

2.3.1 Foliar Spray Application

Foliar Spray Application is used for individual or broadcast plant treatments and to selectively control undesirable vegetation. Under this application method, herbicide would be applied directly onto the target foliage in large spray droplets using the backpack sprayers or pressurized sprayers. The Foliar Spray Application method would be used when vegetation is fully leaved, green, and growing.[2,3] Early season application would be made after full-leaf out of the species to be controlled is obtained; late season application would be made prior to the appearance of fall colors.

2.3.2 Soil-Spot Application

Soil-Spot Application is used to control undesirable vegetation within a specific area. Under this method, herbicide would be applied directly to the ground surface (soil or gravel) in either a grid pattern or at individual locations using backpack sprayers or pressurized sprayers. This method would be applied during any season of the year, except when soil is frozen or excessively compacted.

2.3.3 Mechanical Ground Application

Mechanical Ground Application is used to control and prevent vegetative growth over a widespread area. Under this method, herbicide would be applied to the ground surface (soil or gravel) in a uniform spray generating large spray droplets using the backpack sprayers or pressurized sprayers. Using this method the herbicide mixture would be applied uniformly throughout an area, allowing for widespread vegetation control. This

method would be applied during any season of the year, but not to frozen or excessively compacted soil.

2.3.4 Herbicide Selection

Fifteen herbicides were identified as representative of the spectrum of herbicides currently available on the market for use by utilities in vegetation control at stations. The herbicides identified included: Accord, Arsenal, Escort, Hyvar-X, Karmex-DF, Krovar I-DF, Oust, Pendulum-3.3 EC, Pendulum-WDG, Roundup, Spike-40P, Spike-80W, Surflan, Topsite, and Tordon 101M.

After identification of these herbicides, the characteristics of each of the fifteen herbicides were determined using manufacturers' labels and technical reports. The characteristics identified included physiological and biochemical behavior, target vegetation, habitat usage, application method, soil persistence, degradation mechanisms, and emergence status. The Herbicide Characteristics Matrix, Table 1, depicts the results of this evaluation for each of the fifteen herbicides.

After development of the Herbicide Characteristics Matrix, the ability for each of the fifteen herbicides to effect air quality, surface water quality, groundwater quality, wetlands, vegetation, aquatic life, wildlife, threatened and endangered species, prime farmland, and human health was conducted using manufacturers' labels, Material Safety Data Sheets, and technical reports. The Impact Matrix, Table 2, depicts the results of this evaluation for each of the fifteen herbicides.

Comparing Southwestern's goal of continued vegetation control with limited herbicide applications to the characteristics of and potential impacts from the fifteen herbicides, a herbicide selection criteria was developed. The selection criteria was developed to limit environmental impacts and human health effects while achieving Southwestern's goal with herbicides currently available on the market. Since Southwestern proposes to control both established and future vegetation growth, it is likely that a mixture of pre-emergent and post-emergent herbicides would be needed. Southwestern has determined that herbicides proposed for use in vegetation control at the stations must meet all of the minimum herbicide selection criteria:

1) active on herbaceous vegetation,
2) able to use in terrestrial habitats,
3) exhibits moderate or greater soil adsorption,
4) exhibits a low likelihood to migrate to surface water,
5) exhibits a low to moderate likelihood to leach to groundwater,

6) exhibits a non- or low-oral toxicity to wildlife at the expected application rate, and
7) exhibits no long-term adverse health effects to humans at the expected application rate.

Four of the fifteen herbicides identified, Accord, Roundup, Oust and Surflan, meet all of the herbicide selection criteria and could be used by Southwestern to assist manual and mechanical vegetation control. However, there is currently no toxicity information available for the effects of Oust and Surflan on invertebrate species, therefore they were excluded from further consideration. Prior to application, these herbicides would be diluted with water. Occasionally, herbicides would be diluted with either mineral oil, diesel oil, kerosene, limonene, or another surfactant when used in conjunction with the cut stump method or when used to control highly resistant species. A coloring agent may be added to the mixture to aid the applicator in determining the area covered.

2.3.5 Cumulative Activities

Cumulative activities result from or are associated with the proposed action. These activities are not specifically related to the goals of the proposed action. Cumulative activities associated with the proposed action include waste generated and herbicide containment.

2.3.5.1 Waste Generated

Wastes generated during the proposed action include herbicide product containers, spray tips, and personal protection equipment. Herbicide product containers would be triple rinsed with water, punctured, and disposed of in a sanitary landfill or by any other method indicated on the manufacturers' label. Spray tips would be triple rinsed and disposed of in a sanitary landfill or by any other method indicated on the manufacturers' label. Personal protection equipment would either be rinsed and disposed of in a sanitary landfill or washed and reused. The rinse water generated in cleaning containers and spray tips would be applied in the treated areas.

2.3.5.2 Herbicide Containment

Product herbicide would be delivered to the stations in 2.5-gallon (9.5-liters) or 55-gallon (208.5-liters) containers. The herbicide would normally be diluted with water. Occasionally, herbicides would be diluted with mineral oil, diesel oil, kerosene, limonene, or a surfactant. Surfactants and/or dyes may be added to the herbicide depending on the method of application to aid in absorption into the target vegetation. Non-water diluents

would be transported to the site in small (less than 5-gallon [19.0-liters]) containers and would be poured into the hand or backpack sprayers as necessary. The herbicide dilution process would occur within the station boundary.

In case of a rupture or other release of a herbicide container, the remainder of mixed herbicide would be applied to the target area until the container was empty. Leaking herbicide containers would not be transported out of the station until the container was empty. If an uncontrollable rupture or other release of a herbicide or non-water diluent container did occur, Southwestern personnel would contain any liquids within the station.

To further reduce the risk of release, no product herbicide, diluted herbicide, or non-water diluents would remain in non-contained areas at the station without Southwestern personnel present.

2.3.6 Future Activities

Future development of new and improved herbicides will undoubtedly occur. The characteristics and potential impacts of new herbicides proposed for use would be evaluated with respect to the subjects listed in Tables 1 and 2. Selection of new herbicides would be limited to herbicides meeting the herbicide selection criteria, as discussed in section 2.3.4.

Modifications to the existing stations, such as operating area expansions, or the acquisition or construction of additional stations by Southwestern, could occur in the future. Modifications to the existing number and size of stations that occur within the study area described in this EA (Environmental Setting, Section 3.0) would not need to be evaluated with respect to potential impacts from herbicide application. However, major changes such as a change in the selection criteira for herbicides, a change in the method used to control vegetation (e.g. fire control), or the proposed use of the proposed alternative in an area not addressed under this EA may require the preparation of an additional EA. The potential impacts of the proposed action upon the environment and human health in the study area has been conducted in this EA; however, the presence of karst geology, threatened and endangered species, archaeological, historical, or cultural resources, and prime farmland would need to identified and mitigated following the practices identified in this EA.

Table 1
Herbicide Characteristics Matrix

Herbicide	Physiological & Biochemical Behavior	Target Vegetation	Habitat Usage	Application Method	Soil Persistence	Degradation Mechanisms	Emergence Status	Remarks
Accord[a,b,c] (41.5% Glyphosate)	Inhibits protein synthesis	All vegetation	Terrestrial Wetland Aquatic	Cut-Surface Foliar Spray Mechanical Ground	60-day half-life. High soil adsorption.	Soil microbes	post-emergent	
Arsenal[a,d] (28.7% Imazapyr)	Inhibits cell growth and DNA synthesis	All deciduous and herbaceous vegetation and germinating seeds.	Terrestrial Wetland	Cut-Surface Foliar Spray Soil Spot Mechanical Ground	3 months to 2 years activity period. High soil adsorption.	Photodegraded	pre-emergent post-emergent	Not active on coniferous trees.
Escort[a,e] (60% Metsulfuron)	Inhibits cell division	All vegetation	Terrestrial Wetland	Cut-Surface Foliar Spray Mechanical Ground	Greater than 30-day half-life. Low soil adsorption.	Soil microbes, chemical hydrolysis	pre-emergent post-emergent	Do not mix with Hyvar-X. Effective on kudzu.
Hyvar-X[a,f] (80% Bromacil)	Inhibits photosynthesis, absorbed through roots.	Some herbaceous and deciduous species depending on application rate.	Terrestrial Wetland	Soil Spot Mechanical Ground	5 to 6-month half-life. Low soil adsorption. Less likely to adsorb to soil than other commercial herbicides.	Soil microbes	pre-emergent, with addition of surfactant can be post-emergent.	At soil sterilant rates may be active for more than one season.
Karmex DF[a,g] (80% Diuron)	Inhibits photosynthesis, absorbed through roots.	Some herbaceous species at low rates. All herbaceous species at higher rates.	Terrestrial Wetland	Soil Spot Mechanical Ground	Active for growing season. Moderate soil adsorption.	Soil microbes	pre-emergent	Not recommended for use on sand, loamy sand, gravelly soils, or subsoils.
Krovar I-DF[a,h] (40% Bromacil and 40% Diuron)	Inhibits photosynthesis, absorbed through roots.	Some herbaceous and deciduous species depending on application rate.	Terrestrial	Soil Spot Mechanical Ground	5 to 6-month half-life. Low soil adsorption.	Soil microbes	pre-emergent, with addition of surfactant can be post-emergent.	At soil sterilant rates may be active for more than one season.

Table 1
Herbicide Characteristics Matrix

Herbicide	Physiological & Biochemical Behavior	Target Vegetation	Habitat Usage	Application Method	Soil Persistence	Degradation Mechanisms	Emergence Status	Remarks
Oust[a,j] (75% Sulfometuron)	Inhibits cell division.	All herbaceous emergent vegetation and germinating seeds.	Terrestrial Wetland	Foliar Spray Soil Spot Mechanical Ground	Greater than 30-day half-life. Moderate soil adsorption. Mobility and persistence increases with soil pH.	Soil microbes, Chemical hydrolysis	pre-emergent post-emergent	Do not mix with Hyvar-X. Active on Johnsongrass.
Pendulum-3.3 EC[a,j] (37.4% Pendimethalin, 7.28% Napthalene)	Inhibits cell division, primarily during seed germination.	Some herbaceous vegetation. Not effective on established weeds.	Terrestrial Wetland	Soil Spot Mechanical Ground	Active for up to 8 months depending on application rate. High soil adsorption.	Photodegradation Volatization	pre-emergent	Must monitor workers for Naphthalene PEL.
Pendulum-WDG[a,n] (60% Pendimethalin)	Inhibits cell division, primarily during seed germination.	Some herbaceous vegetation. Not effective on established weeds.	Terrestrial Wetland	Soil Spot Mechanical Ground	Active for up to 8 months depending on application rate. High soil adsorption.	Photodegradation	pre-emergent	Dust poses explosion hazard.
Roundup[a,b,k] (41.0% Glyphosate)	Inhibits protein synthesis.	All emergent vegetation.	Terrestrial Wetland	Cut-Surface Foliar Spray Mechanical Ground	60-day half-life. High soil adsorption.	Soil microbes	post-emergent	
Spike-40P[a,b,l] (40% Tebuthiuron) *Pelleted formula*	Inhibits photosynthesis.	All herbaceous or woody vegetation.	Terrestrial	Soil-Spot Mechanical Ground	12 to 15-month half-life. Low soil adsorption.	Soil microbes	pre-emergent soil sterilant	Active within 6 feet of treated area. Activation occurs after rainfall carries herbicide into soil.

Table 1
Herbicide Characteristics Matrix

Herbicide	Physiological & Biochemical Behavior	Target Vegetation	Habitat Usage	Application Method	Soil Persistence	Degradation Mechanisms	Emergence Status	Remarks
Spike-80W[a,b,m] (80% Tebuthiuron)	Inhibits photosynthesis.	All vegetation, depending on application rate.	Terrestrial	Soil-Spot Mechanical Ground	12 to 15-month half-life. Low soil adsorption.	Soil microbes	soil sterilant, can be either pre- or post-emergent	Takes up to 3 years to be effective. Active within 6 feet of area sprayed.
Surflan[a,o] (40.4% Oryzalin)	Affects seed germination and root development.	Some species of herbaceous vegetation and germinating seeds. Not effective on established weeds.	Terrestrial	Soil Spot Mechanical Ground	60 - 90-day half-life. Moderate soil adsorption.	Soil microbes, Photodegradation	pre-emergent	Needs 0.5 - 1 inch of rainfall or irrigation for activation.
Topsite[a,p] (0.5% Imazapyr and 2.0% Diuron)	Inhibits DNA synthesis, cell growth, and photosynthesis.	Some species of herbaceous vegetation and germinating seeds.	Terrestrial Wetland	Foliar Spray Soil Spot Mechanical Ground	Active for up to 2 years. Moderate soil adsorption.	Soil microbes, Photodegradation	pre-emergent, early post-emergent	
Tordon 101M[a,b,q] (10.2% Picloram and 39.6% 2,4-D)	Inhibits plant growth	All broadleaf vegetation, selective to grasses.	Terrestrial Wetland	Cut-Surface Foliar Spray Soil Spot Mechanical Ground	30-day half-life. Low soil adsorption.	Soil microbes, Photodegradation	pre-emergent, post-emergent	Combustible at 35°C. Restricted Use Pesticide

Table 1
Herbicide Characteristics Matrix

Herbicide	Physiological & Biochemical Behavior	Target Vegetation	Habitat Usage	Application Method	Soil Persistence	Degradation Mechanisms	Emergence Status	Remarks

[a]Weed Science Society of North America, Herbicide Handbook, 1989.
[b]U.S. Department of Agriculture, Forest Service, Pesticide Background Statements, Volume 1 - Herbicides, Agricultural Handbook No. 633, August 1984.
[c]Monsanto Corporation, Specimen Label for Accord, 1992.
[d]American Cyanamid Company, Specimen Label for Arsenal, 1992.
[e]E.I. Dupont de Nemours and Co., Specimen Label for Escort, 1993.
[f]E.I. Dupont de Nemours and Co., Specimen Label for Hyvar X, 1993.
[g]E.I. Dupont de Nemours and Co., Specimen Label for Karmex DF, 1994.
[h]E.I. Dupont de Nemours and Co., Specimen Label for Krovar I DF, 1989.
[i]E.I. Dupont de Nemours and Co., Specimen Label for Oust, 1993.
[j]American Cyanamid Company, Specimen Label for Pendulum 3.3 EC, 1993.
[k]Monsanto Corporation, Specimen Label for Roundup, 1993.
[l]Dow Elanco, Specimen Label for Spike 40P, 1992.
[m]Dow Elanco, Specimen Label for Spike 80W, 1992.
[n]American Cyanamid Company, Specimen Label for Pendulum WDG, 1994.
[o]Dow Elanco, Specimen Label for Surflan, 1988.
[p]American Cyanamid Company, Specimen Label for Topsite, 1993.
[q]Dow Elanco, Specimen Label for Tordon 101M, 1992.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Alternative 1 - No Action										
No vegetation control	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	No impact.	High potential for worker electrocution by grounding during contact with water containing vegetation.
Alternative 2 - Mechanical and Manual Control										
Manual or Mechanical Control[a]	May increase dust during cutting operations.	Erosion of treated areas may cause increased turbidity and sedimentation.	No impact.	No impact.	Short-term loss of onsite vegetation.	Potential injury from mower blades.	Runoff may carry increased sediment causing decreased dissolved oxygen.	No impact.	No impact.	Injury from airborne vegetation.
Alternative 3 - Proposed Action										
Accord[a,b,c] (41.5% Glyphosate)	Application method minimizes mist drift.	Low likelihood to migrate offsite in runoff, due to high soil adsorption and rapid degradation Halflife of 2 weeks in water[b]	Low likelihood to leach to ground water based on soil adsorption and rapid degradation	No impact. Herbicide in runoff would not be absorbed by non-target vegetation, since glyphosate is absorbed by foliage.	No impact. Herbicide in runoff would not be absorbed by non-target vegetation, since glyphosate is absorbed by foliage.	Slight eye irritation in rabbits. No to low oral toxicity.	Non-toxic to fish.	Runoff or spray drift may directly effect T&E plants or indirectly effect T&E animals.	No impact. Not soil residual or absorbed by plant roots.	Potential short-term effects from inhalation during application.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Arsenal[a,d] (28.7% Imazapyr)	Application method minimizes mist drift.	Moderate likelihood to migrate by runoff, due to long activity period.	Low likelihood to leach to groundwater based on soil adsorption.	Runoff could cause short-term loss of vegetation and inhibit seed germination along drainage path.	Runoff could cause short-term loss of most vegetation, and inhibit seed germination along drainage path.	Slightly toxic.	Slightly toxic to fish and inverts.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation and germinating seeds.	Mild skin and eye irritant during application.
Escort[a,e] (60% Metsulfuron)	Application method minimizes mist drift.	Moderate likelihood to migrate offsite by runoff, due to low soil adsorption.	Moderate likelihood to leach to groundwater based on low soil adsorption.	Runoff or soil erosion, could cause loss of most vegetation along drainage path.	Runoff or soil erosion could cause loss of most vegetation along drainage path.	Eye and skin irritant, low oral toxicity.	Slightly toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation and germinating seeds.	Potential effects from inhalation during application, skin and eye irritant.
Hyvar-X[a,f] (80% Bromacil)	Application method minimizes mist drift.	High likelihood to migrate offsite by runoff, due to low soil adsorption.	High likelihood to leach to groundwater based on soil adsorption. Has been known to contaminate groundwater.	Runoff could cause loss of vegetation and soil sterility along drainage path.	Runoff could cause loss of vegetation. Soil sterility may effect vegetation outside of treated areas along drainage path.	Slightly toxic by ingestion, inhalation, and contact. High doses can cause liver changes in mammals. Mild eye and skin irritant.	Slightly toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Powder is irritating to eyes, nose, throat, and skin.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Karmex DF[a,g] (80% Diuron)	Application method minimizes mist drift.	45-day half-life in water. Moderate likelihood to migrate offsite by runoff, due to moderate soil adsorption and long activity period.	Moderate likelihood to leach to groundwater based on soil adsorption and long activity period.	Runoff could cause loss of vegetation and soil sterility along drainage path.	Runoff could cause loss of vegetation along drainage path. Soil sterility may effect vegetation outside of the treated areas.	Slight toxicity to birds and mammals. Mild eye irritant.	Moderate toxicity to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Slightly toxic by ingestion, moderately toxic by contact. Moderate eye and skin irritant.
Krovar I DF[a,h] (40% Bromacil and 40% Diuron)	Application method minimizes mist drift.	High likelihood to migrate offsite by runoff, due to low soil adsorption and long activity period.	High likelihood to leach to groundwater based on soil adsorption. Bromacil has been known to contaminate groundwater.	Runoff could cause loss of vegetation and soil sterility along drainage path.	Runoff could cause loss of vegetation along drainage path. Soil sterility may effect vegetation outside of the treated areas.	Low toxicity to birds and mammals. Mild eye and skin irritant.	Slightly toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Low order of toxicity by contact and ingestion. Moderate skin irritant, mild to moderate eye irritant. Overexposure may cause liver, spleen, thyroid, and red blood cell effects.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Oust[a,l] (75% Sulfometuron)	Application method minimizes mist drift.	Low likelihood to migrate offsite because of short half-life.	Low likelihood to leach to groundwater based on short half-life.	Runoff could cause vegetation loss and soil sterility along drainage path.	Runoff could cause vegetation loss and inhibit seed germination along drainage path. Soil sterility may effect vegetation outside of the treated areas.	Low oral toxicity. Nontoxic at expected application rates. Mild eye irritant.	Slightly toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Potential short-term effects as a eye, nose, throat and skin irritant.
Pendulum-3.3 EC[a,l] (37.4% Pendimethalin, 7.28% Naphthalene)	Application method minimizes mist drift. Volatilizes in air.	Low likelihood to migrate offsite in runoff due to high soil adsorption.	Moderate likelihood to leach to groundwater, due to soil adsorption and activity period.	Runoff could limit seed germination, but not affect established vegetation along drainage path.	Runoff could limit seed germination, but not effect established vegetation along drainage path.	Nontoxic to birds, and bees. Slight to moderate oral toxicity to mammals at concentrations above the expected application rate. Longterm exposure caused weight loss and benign tumors in rats. Mild skin and eye irritant.	Toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact germinating seeds and cause soil sterility.	Moderate eye and skin irritant. May stain skin. May cause weight loss and an increase in benign thyroid lesions at concentrations above the expected application rate.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Pendulum WDG[a,n] (60% Pendimethalin)	Application method minimizes mist drift. Dust can be harmful.	Low likelihood to migrate offsite in runoff due to high soil adsorption.	Moderate likelihood to leach to groundwater, due to soil adsorption and activity period.	Runoff could limit seed germination, but not affect established vegetation along drainage path.	Runoff could limit seed germination, but not effect established vegetation along drainage path.	Nontoxic to slightly toxic to mammals at the expected application rate. Moderate skin and eye irritant. Longterm exposure caused weight loss and benign tumors in rats.	Toxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact germinating seeds and cause soil sterility.	Moderate eye and skin irritant. May stain skin. May cause weight loss and an increase in benign thyroid lesions at concentrations above the expected application rate.
Roundup[a,b,k] (41.0% Glyphosate)	Application method minimizes mist drift.	Low likelihood to migrate offsite in runoff, due to high soil adsorption and rapid degradation.	Low likelihood to leach to groundwater based on soil adsorption and rapid degradation.	No impact through runoff as glyphosate is absorbed by foliage not roots.	No impact through runoff as glyphosate is absorbed by foliage not roots.	Slight eye irritation in rabbits. No to low oral toxicity at concentrations above the expected application rate.	Nontoxic to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	No impact. Not soil residual or absorbed by plant roots.	Potential short-term effects from inhalation during application.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Spike-40P[a,b,l] (40% Tebuthiuron)	No impact. Pelleted formula eliminates drift.	Pelleted formula has low likelihood to migrate offsite in runoff. Erosion of treated soil increases likelihood to impact.	High likelihood to leach to groundwater, due to low soil adsorption and long activity period.	Runoff could cause soil sterilization and vegetation loss along drainage path. High threat to non-target vegetation.	Runoff could sterilize soil, kill vegetation, and inhibit seed germination along drainage path.	Slightly toxic to inverts; growth retardant; increases spleen weight; moderate irritant to mammals from eye and ingestion.	Slightly toxic to fish and inverts.[b,l]	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Growth retardant, increases spleen weight, temporarily effects pancreas. Moderate skin irritant.
Spike-80W[a,b,m] (80% Tebuthiuron)	Application method minimizes mist drift.	High likelihood to migrate offsite in runoff due to long activity period and low soil adsorption.	High likelihood to leach to groundwater, due to low soil adsorption and long activity period.	Runoff could cause vegetation loss and soil sterility along drainage path. High threat to non-target vegetation.	Runoff could cause vegetation loss and soil sterility along drainage path.	Slightly toxic to inverts; mild skin, eye, and inhalation toxicity to mammals; decreases growth; increases spleen weight.	Slightly toxic to fish and inverts.[b,l]	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Mild skin, eye, and inhalation toxicity. Growth retardant, increases spleen weight, temporarily effects pancreas.

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects
Surflan[a,o] (40.4% Oryzalin)	Application method minimizes mist drift.	0.4 day half-life in water. Low likelihood to migrate offsite in runoff due to rapid degradation and soil adsorption.	Low likelihood to leach to groundwater due to rapid degradation and soil adsorption.	Runoff could limit seed germination, but not effect established vegetation along drainage path.	Runoff could limit seed germination, but not effect established vegetation along drainage path.	Nontoxic to birds; can cause increase in benign skin tumors and thyroid changes in mammals at concentrations above application rate; mild skin and eye irritant.	Moderate toxicity to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation and germinating seeds.	Slight eye and skin irritant. May cause an increase in benign skin tumors and pathologic thyroid changes at concentrations above the expected application rate.
Topsite[a,p] (0.5% Imazapyr and 2.0% Diuron)	Application method minimizes mist drift.	Moderate likelihood to migrate offsite in runoff due to long activity period.	Moderate likelihood to leach to groundwater due to long activity period.	Runoff could limit seed germination and vegetation loss along drainage path.	Runoff could limit seed germination and vegetation loss along drainage path.	Low toxicity to birds and mammals. Mild skin and eye irritant.	Low toxicity to fish.	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation and germinating seeds.	Mild eye and skin irritant.
Tordon 101M[a,b,q] (10.2% Picloram and 39.6% 2,4-D)	Application method minimizes mist drift.	Photodegrades in 5-20 days. High likelihood to migrate offsite in runoff, due to low soil adsorption and long half-life.	High likelihood to leach to groundwater based on low soil adsorption[b]	Runoff could cause vegetation loss and soil sterility along drainage path.	Runoff could cause vegetation loss and soil sterility along drainage path.	Eye and skin irritant, potential teratogen, may cause tumors	Low toxicity to fish.[b,j]	Runoff may directly effect T&E plants or indirectly effect T&E animals.	Runoff may directly impact vegetation, germinating seeds, and cause soil sterility.	Severe eye irritation, skin irritation and skin burn, repeated over exposure may cause liver effects.[b,k]

Table 2
Impact Matrix

Method	Air Quality	Surface Water Quality	Ground Water Quality	Wetlands	Vegetation	Wildlife	Aquatic Life	T&E Species	Prime Farmland	Human Health Effects

[a]Weed Science Society of North America, Herbicide Handbook, 1989.
[b]U.S. Department of Agriculture, Forest Service, Pesticide Background Statements, Volume 1 - Herbicides, Agricultural Handbook No. 633, August 1984.
[c]Monsanto Corporation, Specimen Label and MSDS for Accord, 1992.
[d]American Cyanamid Company, Specimen Label and MSDS for Arsenal, 1992.
[e]E.I. Dupont de Nemours and Co., Specimen Label and MSDS for Escort, 1993.
[f]E.I. Dupont de Nemours and Co., Specimen Label and MSDS for Hyvar X, 1993.
[g]E.I. Dupont de Nemours and Co., Specimen Label and MSDS for Karmex DF, 1994.
[h]E.I. Dupont de Nemours and Co., Specimen Label and MSDS for Krovar I DF, 1989.
[i]E.I. Dupont de Nemours and Co., Specimen Label and MSDS for Oust, 1993.
[j]American Cyanamid Company, Specimen Label and MSDS for Pendulum 3.3 EC, 1993.
[k]Monsanto Corporation, Specimen Label and MSDS for Roundup, 1993.
[l]Dow Elanco, Specimen Label and MSDS for Spike 40P, 1992.
[m]Dow Elanco, Specimen Label and MSDS for Spike 80W, 1992.
[n]American Cyanamid Company, Specimen Label and MSDS for Pendulum WDG, 1994.
[o]Dow Elanco, Specimen Label and MSDS for Surflan, 1988.
[p]American Cyanamid Company, Specimen Label and MSDS for Topsite, 1993.
[q]Dow Elanco, Specimen Label and MSDS for Tordon 101M, 1992.

3.0 Environmental Setting

The Environmental Setting is a general description of the area where the stations are located. The stations are located in the Central Lowland, Ozark Plateau, Ouachita, and Mississippi Alluvial Plain Physiographic Provinces. The Central Lowland Province is characterized by numerous wide, flat valleys incised by rivers. The Ozark Plateau Province is characterized by deep, narrow valleys with sharp ridges. The Ouachita Province is dominated by easily eroded shale and sandstones. The Mississippi Alluvial Plain Province is a relatively flat area, that is well drained and contains excellent farmland.[2] Generally, the land surface at each station consists of a combination of maintained lawn with gravel surrounding the operational equipment separated from the neighboring properties by a cyclone fence.

3.1 Air Quality

Air flow and quality are dominated by changing air masses and storm systems. In the Ozark region, air flow and quality are dominated by migrating, frequently changing air masses during the dormant season and an Atlantic high-pressure system, whose clockwise movement pulls in tropical air from the Gulf of Mexico during the growing season. Prevailing winds in the region are typically from the northwest from October to March, and from the southwest from April to September.[3]

Regionally, air quality is generally good in winter and spring when changing weather patterns keep the atmosphere mixed. Occasional stagnation periods in summer and fall cause natural and manmade pollutants to accumulate. Stagnation is worsened in valleys, where pollutants are contained by surrounding hills and downslope air flows. The stations are located within nonattainment areas where air quality is well within U.S. Environmental Protection Agency standards.[4,5,6]

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[2]Lapedes, Daniel N., Editor, McGraw-Hill Encyclopedia of the Geological Sciences, 4th edition. New York: McGraw-Hill, Inc. 1977.

[3]U.S. Department of Agriculture, Forest Service, Southern Region, "Final Environmental Impact Statement for Vegetation Management in the Ozark/Ouachita Mountains", Management Bulletin R8-MB, March 1990; pp. III-18.

[4]Missouri Department of Natural Resources (MDNR), Division of Environmental Quality, Air Pollution Control Program Report, 1992.

[5]Oklahoma Department of Environmental Quality (ODEQ), Air Quality Service, Oklahoma 1992 Air Quality Report, 1992.

3.2 Water Quality

The humid climate of the region produces abundant precipitation. Precipitation can either generate overland flow and runoff into surface waters or infiltrate into the soil and recharge groundwater. Evapotranspiration (loss of water from atmospheric evaporation and transpiration through the leaves) can have a significant effect on runoff and infiltration depending on the local geographic conditions, soil permeability, soil thickness, and geology.

3.2.1 Surface Water

Generally, rainfall runoff from the stations flows overland and enters intermittent streams, which direct surface waters to perennial streams, natural lakes, manmade lakes, and reservoirs. Where the stations are located adjacent to perennial streams, lakes, or reservoirs, rainfall runoff from the station would flow overland and directly enter these water bodies. Many of the watersheds fed by the perennial streams are used as sources for public drinking water. Surface water quality is excellent in most streams except during major storms, when runoff from mines, farms, roads, and construction sites contribute runoff materials to the surface water. Localized contamination often occurs near urban areas, industrialized centers, agricultural chemical use areas, and waste sites. In the Springfield portions of the Ozark Plateau, limestone and dolomite produce neutral pH surface water high in dissolved minerals. Elsewhere, sandstone and novaculite produce neutral pH surface water low in dissolved minerals.[7,8,9,10]

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[6]U.S. Environmental Protection Agency, Aerometric Information Retrieval System, Air Quality Subsystem for Arkansas, provided by the Arkansas Department of Pollution Control and Ecology, August 11, 1994.

[7]U.S. Department of Agriculture, Forest Service, Southern Region, "Final Environmental Impact Statement for Vegetation Management in the Ozark/Ouachita Mountains", Management Bulletin R8-MB, March 1990, pp. III-16.

[8]U.S. Geological Survey, Water Resources Data - Arkansas, Water Year 1993, Water Data Report AR-93-1, March 1994.

[9]U.S. Geological Survey, Water Resources Data - Missouri, Water Year 1993, Water Data Report MO-93-1, April 1994.

[10]U.S. Geological Survey, Water Resources Data - Oklahoma, Water Year 1993, Water Data Reports OK-93-1 and OK-93-2, May 1994.

3.2.2 Aquatic Life

The diverse aquatic habitats of the region support many species of fish, reptiles, amphibians, mollusks, and aquatic insects. The basic habitat types are lotic (standing water such as lakes and ponds) and lentic (flowing water such as streams).

Lentic habitats contain the greatest diversity of species and are divided into cool and warm water. Cool water streams are generally found in the Ozark Plateaus and the Ouachita Province and support various fish species including cutthroat trout (*Onchoryhnchus clakri*), lake trout (*Salvelinus namaycush*), brown trout *(Salmo trutta*), rainbow trout (*Salmo gairdneri*), smallmouth bass (*Micropterus dolomieui*), and darters (*Etheostoma spp.*). Warm water streams are generally found in the Mississippi Alluvial Plain and the Central Lowlands. These streams support various fish species including largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and minnows (*Notropis spp.*). One of the basic food sources for all of these fish are aquatic invertebrates including mayflies (Order Ephemeroptera), stoneflies (Order Plecoptera), caddisflies (Order Trichoptera), crayfish (Order Decapoda), worms (Phylum Annelida), and mussels (Order Mollusca). Generally, these invertebrates are very sensitive to water quality changes.[11,12,13]

Lotic habitats are often fed or drained by lentic habitats thereby allowing some of the species to migrate and colonize the different habitats; however, in a general description, these two habitats function and support life differently. Fish found in lotic habitats include largemouth bass, walleye (*Stizostedion vitrium*), bluegill sunfish (*Lepomis macrochirus*), and crappie (*Poxomis spp.*). Aquatic invertebrates commonly found within lotic habitats include dragonflies and damselflies (Order Odonata), and zooplankton.[15,16,17]

3.2.3 Groundwater

Groundwater levels in the surficial aquifer respond to climatic influences, as continual discharges to streamflow are offset by periodic rainfall. There are also areas within the study area where streams recharge the groundwater in a region. Water levels in these unconfined aquifers are typically highest in the winter and lowest in the summer.

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[11]U.S. Department of Agriculture, Forest Service, Southern Region, "Final Environmental Impact Statement for Vegetation Management in the Ozark/Ouachita Mountains", Management Bulletin R8-MB, March 1990, pp. III-16, III-17.

[12]Pennak, Robert W., Ph.D., Fresh-Water Invertebrates of the United States. New York: The Ronald Press Company, 1953.

[13]Wetzel, Robert G. and Gene E. Likens, Limnological Analyses. New York: Springer-Verlag, 2nd edition, 1991.

Groundwater found within limestone and dolomite usually contains high levels of calcium carbonate. Groundwater found with the valley deposits of the Mississippi, Arkansas, Red, Ouachita, and White Rivers is often high in iron. Groundwater can be easily impacted in karst terrain through sinkholes, sinking creeks, and caverns.[12,13,14]

Generally the stations in Oklahoma are located within the Central Lowlands Physiographic Providence where the surficial geologic deposits are predominantly bedrock formations consisting of shale, and shaly sandstone and to a lesser extent non-karst limestone. The stations are located within the Canadian River, the North Canadian River, and the Arkansas River alluvial valleys. The surficial geologic deposits in these areas consist of unconsolidated clay, silt, sand and gravel. These deposits comprise unconfined aquifers with moderate to high permeability whose water table is generally within 10 to 30 feet (3.0 to 9.1 meters) below land surface. Within Cherokee County, groundwater in the surficial aquifer in this region exists in fractured and karstified carbonate formations.

Northern Arkansas and southern Missouri are largely encompassed by the Ozark Plateau Physiographic Province. The majority of the stations in southwest Missouri and northern Arkansas are situated within the Ozark Plateau Physiographic Province. The Ozark Plateau is characterized by an extremely thick sequence of carbonate (limestone and dolomite) bedrock formations. Generally there exists a thick clay rich residual soil overlying the bedrock. Groundwater in the surficial geologic deposits exists in unconfined to semiconfined fractured and karstified bedrock formations.

Stations located in southeastern Oklahoma and west-central Arkansas are situated within the Ouachita Physiographic Province and underlain by weathered shale. The dominant rock types consist of sandstone along the ridges and shale in the valleys. The topsoil in the upland regions generally consist of sandy loam and is only a few feet thick. Bedrock formations in the upland region have a low permeability and yield very small quantities of water to wells. The surficial geologic deposits in low lying areas commonly consists of alluvial deposits of clay, silt, sand, and gravel. The alluvial deposits generally possess surficial unconfined aquifers and groundwater occurs relatively close to the ground surface.

Stations located in Dunklin, New Madrid, Butler, and Stoddard Counties in Missouri, and in Craighead, Greene, and Clay Counties in Arkansas, are situated in the Mississippi Alluvial Plain Physiographic Province. The surficial geologic deposits in this region consist of unconsolidated alluvial deposits of clay, silt, sand, and gravel. The surficial

aquifer in this area is generally unconfined and groundwater occurs relatively close to the land surface.[14]

3.3 Wetlands

Wetlands are transitional lands between terrestrial and aquatic ecosystems, and are characterized by the presence of hydrophytic vegetation, hydric soil, and hydrology. In addition to providing habitats for many plants and animals, wetlands function to improve water quality, control flood waters, and control erosion.[15]

Wetlands have been impacted by agriculture in the United States. Agricultural impacts include drainage and filling, channelization, alteration of wetland hydrology, and the runoff of herbicides, pesticides, fertilizers, and soil into the wetland.[16]

Rainfall runoff from the stations may enter several types of wetlands, including forested, scrub-shrub, and emergent, adjacent to or downstream of the stations. Forested wetlands are dominated by woody vegetation greater than 20 feet (6 meters) tall. Scrub-shrub wetlands are dominated by woody vegetation less than 20 feet (6 meters) tall. Emergent wetlands are dominated by erect, rooted, herbaceous hydrophytic vegetation.[19]

3.4 Vegetation

The stations are located adjacent to various ecosystems and plant communities, including agricultural, forested, and old field. In the agricultural areas, the ecological succession and vegetation abundance and diversity have been influenced and controlled by man. These lands are used for crop propagation or pasture. The stations are located adjacent to various types of forested areas, including oak-hickory or mixed pine-oak forests. Oak trees (*Quercus spp.*) and hickory trees (*Carya spp.*) dominate oak-hickory forests. Longleaf pine (*Pinus palustris*) and Virginia live oak (*Quercus virginiana*) are among the trees that dominate a mixed pine-oak forest in this region. Occasionally, the stations are located adjacent to abandoned agricultural lands where ecological succession of these lands promotes development from bare ground to a mix of grasses, shrubs, and

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[14]U.S. Environmental Protection Agency, Regional Assessment of Aquifer Vulnerability and Sensitivity in the Conterminous United States, August, 1991.

[15]Tiner, Ralph W., Jr., "Classification of Wetland Ecosystems" in Wetlands Ecology and Conservation: Emphasis in Pennsylvania, The Pennsylvania Academy of Science, 1989.

[16]Tiner, Ralph W., Jr., "Agricultural Impacts on Wetlands in the Northeastern United States", presented at the National Symposium on Protection of Wetlands from Agricultural Impacts, sponsored by the U.S. Fish and Wildlife Service, April 26-28, 1988.

tree saplings to forested areas. Species such as goldenrod (*Solidago spp.*), fescue grass (*Festuca spp.*), huckleberries (*Gaylussacia spp.*), blueberries (*Vaccinium spp.*), sweet fern (*Comptonia peregrina*), greenbrier (*Smilax spp.*), meadowsweet (*Spireau spp.*), and arrowwood (*Viburnum spp.*) are typical of the abandoned agricultural lands.[17]

3.5 Wildlife

The wildlife found within or adjacent to the stations is influenced by the adjoining land use. The two primary land uses adjacent to the stations include agricultural and forested lands. Based on the history of land use activities at the stations, the habitat requirements of many species are not met within the station. Although the species found within the station would be limited to animals that could bypass the fencing, small mammals, reptiles, birds, and large animal species use the lands adjacent to the stations for foraging, nesting, and as a travel corridor. Typical species likely to be found adjacent to the stations include various mammals, such as the white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), and white-footed mouse (*Peromyscus leucopus*), various birds, such as the wild turkey (*Meleagris gallopavo*), northern bobwhite quail (*Colinus virginianus*), rufous-sided towhee (*Pipilo erythrophthalmus*) and common yellowthroat (*Geothylpis trichas*), various reptiles, such as the black rat snake (*Elaphe obsoleta*) and copperhead (*Agkistrodon contortrix*), and various amphibians, such as the spotted salamander (*Ambystoma maculatum*).[19]

3.6 Threatened and Endangered Species

The presence of federally- or state-listed threatened and endangered (T&E) species within a ½ mile (0.8 kilometer) radius of the stations was investigated for this study. There are no known T&E species located directly within the stations and there are few records of T&E species located within a ½ mile radius of any station. The T&E species locations have been identified by either the U.S. Fish and Wildlife Service or the respective state office overseeing T&E species. Southwestern plans to review and update the T&E species locations with respect to the stations on an annual basis.

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[17]Krioher, John C., A Field Guide to Ecology of Eastern Forests, North America (The Peterson Guide Series). New York: Houghton-Mifflin Company, 1988.

In Arkansas, the Ozark cavefish (*Amblyopsis rosae*) is known to exist in caves on the same quadrangle as the Decatur station; however, it is not known to exist within ½ mile from this station.[18] [19]

In Missouri, the hyssopleaf thoroughwort (*Eupatorium hyssopifolium*) is located within the ½ mile radius of the Poplar Bluff station; however, this T&E species is not located on an expected drainage pathway from the station. A subterranean habitat for the Ozark cavefish is located approximately ¾ mile downgradient of the Neosho, MO station. The Missouri bladder-pod (*Lesquerella filiformis*), a federally endangered plant is located within the counties of four stations, namely Nixa, Selmore, Springfield, and Carthage. During a recent field investigation, areas downgradient of these sites were investigated to determine the presence or absence of this species. No Missouri bladder-pod plants or habitat were identified downgradient of these stations during the field investigation[20,21]. Habitats for the black-tailed jackrabbit (*Lepus californicus*) and gray bat (*Myotis grisescens*) are located within ½ mile of the Crane and Jenkins stations in Missouri.[22]

In Oklahoma, the following federally-listed T&E species have been documented within the counties that the stations are located within: bald eagle (*Haliaeetus leucocephalus*), interior least tern (*Sterna antillarum*), piping plover, (*Charadrius melodus*), whooping crane (*Grus americana*), Ozark big-eared bat (*Plecotus townsendii ingens*), Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), and the American burying beetle (*Nicrophorus americanus*).[23]

The distribution and location of T&E species is dependent upon the individual species habitat and nest site requirements. The bald eagle is a fish-eating bird and found nesting in large trees or cliffs near water where abundant fish populations exist. The interior least

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[18]Arkansas Natural Heritage Commission, Data Report of Elements of Special Concern along Southwest Power Administration Line Corridors, in letter to Corry Platt, BLACK & VEATCH Waste Science, Inc., October 19, 1994.

[19]Arkansas Natural Heritage Commission, Data Report of Elements of Special Concern at Southwestern Power Administration VHF and microwave radio stations, substations, and pole yards, in letter to Corry Platt, Black &Veatch Waste Science, Inc., March 16, 1995.

[20]Missouri Department of Conservation, Data Report for Southwest Power Administration, in letter to Corry Platt, BLACK & VEATCH Waste Science, Inc., September 8, 1994.

[21]Results of Missouri bladder-pod field investigation, performed by Southwestern Power Administration, April 17 - 26, 1995.

[22]Missouri Department of Conservation, Data Report for Southwestern Power Administration, in letter to Corry Platt, Black & Veatch Waste Science, Inc., March 14, 1995.

[23]Oklahoma State University (OSU), Endangered and Threatened Species of Oklahoma, Oklahoma State University Press, 1993.

tern and piping plover are found nesting on sandy beaches along rivers or lakes in the region. The whooping crane inhabit marshes and prairie potholes for foraging and nesting. The Ozark big-eared bat, Indiana bat, and gray bat roost and hibernate in limestone caves in the region and feed on insects. The American burying beetle inhabits oak-hickory forests and open grasslands in the area of the Oklahoma stations. After burying a small vertebrate carcass, the American burying beetle lays its eggs in the carcass. The Ozark cavefish lives only in caves and tends to occur in flowing cave streams as opposed to quiet pools. The Ozark cavefish are often found in caves with high nutrient concentrations caused by bat guano.[24]

3.7 Archaeological, Cultural, and Historical Resources

During the scoping process, the respective state offices overseeing archaeological, cultural, and historical resources indicated that the proposed action would not disturb subsurface features. Therefore, these offices determined that an additional search to identify archaeological, cultural, and historical resources within the station locations was not warranted.

3.8 Prime Farmland

Prime farmland areas include soil types of significant agricultural value and are specifically regulated by the Natural Resource Conservation Service of each state. Prime farmland is defined by the U.S. Department of Agriculture as the land best suited for producing food, feed, forage, fiber, and oilseed crops. The soil quality, growing season, and moisture supply within prime farmlands produce sustained high yields of crops when treated and managed with acceptable farming methods. Prime farmlands may be cropland, pasture, woodland, or any lands other than urban areas, developed lands, or open water[25]. Generally, the prime farmlands can be delineated using the local soil survey.

Delineation of prime farmland areas with respect to the station locations was conducted by comparing the soil types adjoining the station locations to a listing of soil types classified as prime farmland supplied by the local USDA, Natural Resource Conservation Service office. Several of the stations are upgradient or adjacent to prime farmland designated areas. The majority of the stations that adjoin prime farmland are

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[24]Ibid

[25]U.S. Department of Agriculture, Natural Resource Conservation Service, Soil Survey of Stoddard County, Missouri, issued December 1985.

located within the Mississippi Alluvial Plain and the Central Lowlands Physiographic Provinces.

4.0 Description of Environmental Impacts

The Description of Environmental Impacts evaluates the known or potential impacts to the Environmental Setting features within or adjacent to the stations. Table 2, the Impact Matrix, provides an overview of the potential impacts of each alternative to the environmental and human health features identified during the scoping process and described in Section 3.0. The following sections contain a summary of the potential impacts to the environment and human health by alternative. Discussions within this section relating to the proposed action are limited to potential impacts from only the herbicides meeting the herbicide selection criteria, as described in Section 2.3.4.

4.1 Air Quality

There would be no impact to air quality from Alternative 1, since no vegetation control activities would occur.

The brush hogging, weed whacking, and chain saws used in Alternative 2 may create some dust particles. The dust particles created by this method are minimal relative to adjacent land uses such as agriculture.

The Foliar Spray and Mechanical Ground Application methods used in the proposed action may result in some drift of droplets of herbicide; however, the droplet size used in the proposed action would reduce drift. Under the conditions limiting the use of the mechanical sprayer, it is unlikely that there would be any drift or volatilization of herbicides meeting the herbicide selection criteria.[3]

4.2 Water Quality

4.2.1 Surface Water Quality

There would be no impact to surface water quality from Alternative 1, since no vegetation control activities would occur.

The manual and mechanical methods of Alternative 2 may remove vegetation down to the soil surface or disturb the soil, creating an erosion potential. Soil particles may be carried by rainfall runoff into nearby streams, where the particles may increase turbidity and result in habitat loss. In addition, vegetative debris may be carried into nearby streams, affecting nutrient loading, which may affect aquatic life.

The herbicides meeting the herbicide selection criteria may migrate to surface water through rainfall runoff or soil erosion. The ability for herbicides to bind to soil particles or rapidly degrade decrease the potential for migrating offsite in rainfall runoff. Erosion

of treated soil would carry herbicides offsite, which may deposit herbicides into the water column or cause increased sedimentation and turbidity within the surface water body. The herbicides meeting the herbicides selection criteria, Accord and Roundup, exhibit little likelihood to migrate offsite because of either rapid degradation or high soil adsorption. To further reduce any potential impacts to surface water quality from sediment runoff, soil erosion controls would be established along drainage pathways at the stations.

4.2.2 Aquatic Life

There would be no impact to aquatic life from Alternative 1, since no vegetation control activities would occur.

The manual and mechanical methods of Alternative 2 may remove vegetation down to the soil surface or disturb the soil, creating an erosion potential. Soil particles may be carried in rainfall runoff into nearby streams, where the particles may increase turbidity and result in habitat loss. In addition, vegetative debris may be carried into nearby streams, increasing turbidity and decreasing the dissolved oxygen content, which may adversely affect aquatic life.

Herbicides may be carried to surface water in rainfall runoff or by soil erosion. Herbicides present in the water column may cause a loss in aquatic vegetation, such as algae, which could decrease the dissolved oxygen concentration and cause habitat loss. Deposition of soil particles into the surface water may increase turbidity causing a decrease in dissolved oxygen or habitat loss. The ability for herbicides to impact aquatic life is directly associated with the ability for the herbicides to migrate offsite and the toxicity of the herbicides. Of the herbicides meeting the herbicide selection criteria Accord and Roundup are non-toxic to fish. To further reduce any potential impacts to aquatic life from sediment runoff, soil erosion controls would be established along drainage pathways at the stations.

4.2.3 Groundwater Quality

There would be no impact to groundwater quality from Alternative 1, since no vegetation control activities would occur.

Manual and mechanical vegetation control activities associated with Alternative 2 would have no effect on groundwater quality.

The herbicides in the proposed action were evaluated based on their affinity to adsorb to soil particles. Herbicides that are strongly adsorbed to soil particles are less likely to leach to groundwater. Herbicides meeting the selection criteria moderately adsorb to soil

particles and are less likely to leach to groundwater. To further reduce any potential impacts to groundwater quality, herbicides would not be applied within 15 feet (4.6 meters) of sinkholes, visible fractures in rock outcrops, sinking creeks, and caverns. Areas exhibiting karst features would be field identified and marked prior to herbicide application.

4.3 Wetlands

There would be no impact to wetlands from Alternative 1, since no vegetation control activities would occur.

Manual and mechanical vegetation control activities associated with Alternative 2 would not impact vegetation in wetland areas, since none of the stations are located within wetlands.

Although herbicide use is not proposed within wetlands, the herbicides meeting the herbicide selection criteria may migrate to wetlands in rainfall runoff or soil erosion. The ability for herbicides to bind to soil particles or rapidly degrade decrease the potential for migrating offsite in rainfall runoff. Erosion of treated soil would carry herbicides offsite, which may deposit herbicides into wetlands. Upon migrating to the wetland, the physiological and biochemical behavior of the herbicide would determine the extent of any impacts upon wetland vegetation. Migration of herbicides that effect vegetation by either foliar absorption or preventing seed germination would not effect the established vegetation but may prevent future seed germination. Herbicides that are absorbed by plant roots may impact established wetland vegetation because the herbicide could be absorbed into the established plant.

4.4 Vegetation

There would be no impact to vegetation from Alternative 1, since no vegetation control activities would occur.

Manual and mechanical vegetation control activities associated with Alternative 2 would directly impact vegetation in treated areas. These impacts are short-term since the vegetation regenerates between treatments.

All of the herbicides evaluated in the proposed action would directly impact vegetation. The physiological and biochemical behavior of the herbicides evaluated would determine the extent of any impacts upon vegetation. Accord and Roundup would only effect the vegetation applied to, since these are incorporated into the plant by foliar absorption. The remaining herbicides evaluated exhibit soil residual properties and are

either absorbed by roots, prevent seed germination, or both. Many of the herbicides which do not meet Southwestern's selction criteria are absorbed by plant roots and may impact desirable vegetation with roots in the treated area, such as vegetative buffers surrounding the stations. Runoff, of herbicides that inhibit seed germination or are absorbed through foliar absorption, is less likely to impact offsite vegetation or cause soil scaring, since both of these physiological and biochemical behaviors would not effect established vegetation.

4.5 Wildlife

There would be no impact to wildlife from Alternative 1, since no vegetation control activities would occur. The use of the stations by wildlife for foraging and nesting may increase if the stations were left fallow.

Manual and mechanical vegetation control activities associated with Alternative 2 may directly impact wildlife by contact with the mower blades.

All of the herbicides evaluated in the proposed action have some toxicological effects on tested animal species at high experimental doses. Many of the herbicides which do not meet Southwestern's selction criteria are associated with either increased tumor development, potential teratogenic effects, increased weight of internal organs, or a decrease in growth; however, the herbicide selection criteria limits the use of herbicides to ones that exhibit low toxicity to wildlife at the expected application rate. The concentration of active ingredient at the expected application rate make it unlikely that any wildlife species would be exposed to toxic doses of herbicides.

4.6 Threatened and Endangered Species

There would be no impact to T&E species from Alternative 1, since no vegetation control activities would occur.

There would be no impact to T&E species from Alternative 2, since vegetation control occurs only within the stations. The developed nature of the stations precludes the stations from containing the habitats required by the T&E species that exist near the stations.

Migration of the herbicides evaluated in the proposed action is possible through rainfall runoff. Runoff could transport herbicide outside of the fenced station expanding the herbicide treated area. Herbicides carried offsite by rainfall runoff would migrate in established drainage pathways. T&E plant species located within these drainage pathways would be impacted by the herbicides meeting the herbicide selection criteria; however,

there are no known T&E plant species located within ½ mile downgradient of any of the stations.

The T&E animal species potentially effected by herbicides meeting the herbicide selection criteria include interior least tern, piping plover, whooping crane, black-tailed jackrabbit, gray bat, and American burying beetle. Based on the habitat requirements and nest site preferences of the interior least tern, piping plover, and whooping crane and the potential toxic effects of the herbicides on bird egg shells, migration of soil residual herbicides could effect nest success. Based on habitat requirements and nest site preferences of the American burying beetle and that the active ingredients of some of the herbicides meeting the selection criteria (Accord and Roundup) have been tested on invertebrates, other than the American burying beetle, and have been found to be generally slightly toxic to nontoxic at concentrations greater than the expected application rate. There was no data available to evaluate the toxicity of Oust and Surflan to invertebrates[26,27]. Since, offsite migration of herbicides would follow established drainage pathways and it is unlikely that the American burying beetle nests within the established drainage pathways, no significant impacts to this species would be expected. There is little likelihood of any impact to the black-tailed jackrabbit because the herbicide selection criteria limits use of herbicides to those that exhibit a low toxicity to wildlife. To reduce any potential impacts to these T&E species from sediment runoff, soil erosion controls would be established at the stations where these species inhabit rainfall runoff drainage pathways.

The Ozark cavefish could be impacted by herbicides leaching into the groundwater this species inhabits. Herbicides with a high likelihood to migrate to groundwater would present a greater risk to this species' habitat; however, herbicides with a high likelihood for groundwater migration do not meet the herbicide selection criteria and would not be used. Limiting the use of herbicides that have a high likelihood to migrate to groundwater and not applying herbicides to noticeable karst features (Section 4.2.3) reduces migration of herbicides and the associated impacts to the Ozark cavefish habitats.

The remaining T&E species identified within the ½ mile radius of the stations would not be impacted by offsite migration of herbicides, since the habitat requirements and nest

[26]U.S. Department of Agriculture, Forest Service, "Pesticide Background Statements", Volume I - Herbicides, Agricultural Handbook No. 633, August 1984,

[27]Forest Pest Management Institute, "Proceedings of the Carnation Creek Herbicide Workshop", Suite Ste. Marie, Ontario, Ministry of Forests, Research Branch, 1989.

site preferences of these species would not be impacted by an expansion of the herbicide treated area.

4.7 Archaeological, Cultural, and Historical Resources

There would be no significant impact upon archaeological, cultural, and historical resources from any of the alternatives, since none of the alternatives include subsurface disturbances or activities.

According to the respective state office overseeing archaeological, cultural, and historical resources, the proposed action would not impact archaeological, cultural, and historical resources, as no subsurface disturbances would occur. If future activities, as described in Section 2.3.7, potentially impact archaeological, cultural, and historical resources then mitigation measures recommended by the respective state office would be followed.

4.8 Prime Farmland

There would be no impact to prime farmland from Alternative 1, since no vegetation control activities would occur.

The manual and mechanical vegetation control methods associated with Alternative 2 would not effect prime farmland, since the vegetation control activities would occur within the developed areas of the stations.

All of the herbicides meeting the herbicide selection criteria may impact prime farmland through rainfall runoff of treated areas. Herbicides carried offsite by rainfall runoff would primarily effect vegetation and soils within established drainage pathways. Continuous use of herbicides meeting the herbicide selection criteria could impact prime farmland in the short-term by effecting vegetation with roots along the station's drainage pathway, and in the long-term by either preventing seed germination, or by causing soil sterilization within the station's drainage pathway. To reduce impacts to prime farmland, the local USDA, Natural Resource Conservation Service, District Coordinator would be consulted regarding recommended techniques to reduce soil erosion and migration of herbicides by rainfall runoff at stations adjoining prime farmland prior to herbicide application.

4.9 Human Health Effects

The risk of electrocution to workers is the greatest under Alternative 1. The elimination of vegetation near operating equipment and the maintenance of graveled areas insulates the workers from potentials that may be present in the soil during electrical faults and may also provide a more stable working area during wet periods.

The manual and mechanical methods associated with Alternative 2 would have little long-term effects on human health. Short-term effects include injury to workers from airborne vegetation or gravel during clearing operations and wounds from sharp machinery.

Risks to humans from herbicide application generally occur during operation of the mechanical sprayer, when herbicide may be inhaled or contacted, and during the manual application methods, when herbicide may contact skin. The greatest potential risks to human health are to workers involved in the application. All of the herbicides evaluated may cause human health effects through inhalation and contact; however, the likelihood of exposure through inhalation is unlikely since the droplet size used reduces herbicide mist. There is also a potential for electrocution to workers by mist formation and drift; however, the large droplet size used during the application mitigates this potential. The risk to the human health of workers through skin contact with the herbicide would be reduced by wearing appropriate clothing and gloves as specified on the manufacturers' label. The risk to the general public from contact with treated areas is reduced since fencing surrounds most of the stations preventing public access to treated areas. Overexposure to many of the pesticides which do not meet Southwestern's selection criteria may cause either an increase in benign tumors, internal organ effects, or both; however, the herbicide selection criteria limits the use of herbicides to ones that do not exhibit chronic toxicological effects to humans at the expected application rate. The concentration of active ingredient at the expected application rate make it unlikely that any humans would be exposed to doses that would cause chronic toxicological effects.

An additional potential risk to human health would be from the ingestion of water contaminated by herbicides. This potential risk would be mitigated by the restriction of herbicide use in areas with noticeable karst features, such as sinkholes; however, groundwater in non-karst areas may be impacted by herbicides, which rapidly leach to groundwater. Herbicides that meet the herbicide selection criteria would reduce the likelihood to leach to groundwater.

4.10 Transportation Impacts

4.10.1 Transportation of Herbicides to Site, On-site, and From Site

Machinery and personnel would be transported to and from the stations using established and maintained roadways. Herbicides would be transported to the site in manufacturers' containers, available in either 2.5-gallon (9.5-liters) containers or 55-gallon (208.2-liter) containers. Herbicides would remain in manufacturers' provided containers until mixed with water prior to application. Unused herbicides would be transported from the site in manufacturers' containers. Diluted herbicides would be transported onsite using either a 60-gallon (227.0-liters) or 200-gallon (757.0-liters) tank mounted onto a tractor, backpack sprayers, or pressurized sprayers. Southwestern plans to use and accurately mix the amount of herbicide needed to accomplish vegetation control within each station; therefore, there will be no need to transport diluted herbicide between stations.

4.10.2 Potential Accidents and Resulting Spills

A potential exists for motor vehicle accidents to occur while transporting herbicides. No Department of Transportation (DOT) placarding is needed on motor vehicles transporting herbicides. Absorbent material would be carried with the herbicide to contain any spills resulting from motor vehicle accidents. A copy of the MSDS fact sheets for the herbicides and the non-water diluents would be carried with the containers to inform any emergency response personnel of dangers associated with the herbicide.

4.11 Accident Impacts

Three potential accident scenarios were identified in association with the proposed action, including human error in herbicide mixing, application of incorrect mixture, and fire/explosion. Potential accident scenarios relating to workers were identified and discussed in section 4.9.

A potential exists for incorrect dilution of herbicide prior to application. The manufacturers' label for each of the herbicides lists a range of recommended dilution rates, depending on the vegetative species needing control. A higher concentration of herbicide would be used for more resistant vegetation. This scenario would pose the greatest threat during the use of the mechanical sprayer, as the greatest area is covered by this method. The potential for environmental impacts presented in this report from the proposed herbicides were evaluated based on the highest concentration of herbicide to be applied by any method according to manufacturers' labels. Although environmental consequences resulting from incorrect dilution would be highly unlikely since Southwestern personnel

supervising the application of the herbicide mixture have been formally trained in herbicide handling and application, incorrect dilution could detrimentally impact the environmental setting.

A potential exists for applying either the incorrect dilution of herbicide, incorrect herbicide, or applying the herbicides incorrectly. Each of these scenarios would pose negative environmental hazards if the incorrect action is not within manufacturer's labelled directions. The destruction of vegetation outside of the station would increase the risk for erosion. In the case of excess damage to vegetation, Southwestern would mitigate the effected areas. These three scenarios are unlikely since Southwestern personnel supervising the application of the herbicide mixture have been formally trained in herbicide handling and application.

A potential exists for fire and explosion resulting from incorrect storage of the herbicides. Extinguishing agents appropriate for the herbicides used in the proposed action would be carried within Southwestern vehicles transporting or applying the herbicides. A copy of the herbicide MSDS sheets would be carried by Southwestern personnel and transferred to emergency personnel upon any fire or explosion.

4.12 Compliance with other Regulations

4.12.1 Disposal of Excess Herbicide

Southwestern plans to use and accurately mix the amount of herbicide needed to accomplish vegetation control within each station. Empty herbicide containers would be triple rinsed and disposed of in a sanitary landfill, following manufacturers' labels. Water from rinsing would be added to the herbicide formulation and applied as normal.

Excess pure herbicides would be stored by Southwestern for future use. In the rare event that pure herbicide would be disposed of, manufacturers' labelled instructions would be followed.

4.12.2 Applicator Certification

Southwestern would have trained personnel supervising the application and mixing of herbicides. Southwestern personnel have been trained by the state of Arkansas in herbicide application. There is currently no certification necessary within the states of Missouri and Oklahoma for landowners to apply herbicides; therefore, certification of Southwestern personnel within these states is not necessary. Arkansas, Missouri, and Oklahoma do have certification programs for commercial herbicide applicators. In the event that Southwestern would subcontract the herbicide application, the subcontracting

firm's field personnel would be required to meet all appropriate local, state, and federal certification requirements.

5.0 List of Preparers, and Agencies Consulted

5.1 Preparers

- Corry T. Platt, Black & Veatch Waste Science, Inc., Biologist, principal author
  specialties: terrestrial ecology; aquatic ecology; plant ecology; ornithology; wetlands: habitat requirements; waste handling, disposal, and regulations

- Dane G. Pehrman, Black & Veatch Waste Science, Inc., Biologist, co-author
  specialties: wetland ecology; water quality; ecological health effects; wildlife

- Kevin EuDaly, Black & Veatch Waste Science, Inc., Scientist
  specialties: *human health effects*

- Timothy T. Travers, Black & Veatch Waste Science, Inc., Scientist
  specialties: air quality

- Michael Ferrari, Black & Veatch Waste Science, Inc., Scientist
  specialties: transportation

- John Field, Black & Veatch Waste Science, Inc., Geologist
  specialties: regional geology and soils

- Robert Orr, Black & Veatch, Inc., Geologist
  specialties: NEPA regulatory compliance

- James B. Jennings, Southwestern Power Administration, Office of Maintenance, Special Assistant
  specialties: Project Document Manager

- David Dossett, Southwestern Power Administration, Environmental Protection Specialist
  specialties: NEPA regulatory compliance

- Jerry Murr, Southwestern Power Administration, Maintenance Supervisor
  specialties: herbicide vegetation control; pesticide applicators certification

5.2 Agencies Consulted

The following personnel were contacted to obtain information needed during the preparation of this EA. The individual spoken with, agency representing, and topic(s) discussed are listed below.

Name	Affiliation	Topic(s) Discussed
John Giese	Arkansas Department of Pollution Control & Ecology	Regulations surrounding destruction of wetland vegetation.
Tim Ellison	Arkansas, State Plant Board	Pesticide Applicator Certifications, pesticide application permits.
Cindy Osborne	Arkansas Natural Heritage Program	Threatened and Endangered Species locations.
Sam Cooke	Arkansas Wildlife Federation	Public concern for herbicide application, herbicide application methods, proposed herbicides.
Ples Spradley	USDA, Arkansas	Regulations surrounding herbicide application.
John Madres	Missouri, Department of Natural Resources, Water Quality Management	Regulations surrounding destruction of wetland vegetation.
Bill Bieffenbach	Missouri Natural Heritage Program	Threatened and Endangered Species locations; habitat and exact locations of Ozark cavefish; buffer zones.
John Madres	Missouri, Water Quality Branch	Regulations surrounding wetland vegetation.
Paul Brooks	Missouri Dept. of Natural Resources, Air Quality	Herbicide application permits.
Becky Bryan	National Forest Service, Mark Twain National Forest, Missouri	Regulations surrounding herbicide applications, herbicide application permits, Forest Service policies, buffers, sensitive areas.
Paul Ondray & Jim Lea	Missouri Department of Agriculture	Regulations surrounding herbicide application, herbicide application permits.
Ed Fite, III	Oklahoma Scenic Rivers Commission	Buffers surrounding state designated scenic rivers.

Name	Affiliation	Topic(s) Discussed
Derek Smithy	Oklahoma Water Resources Board	Regulations surrounding the destruction of wetland vegetation.
John Hassell	Oklahoma Conservation Commission	Regulations surrounding the destruction of wetland vegetation, anti-degradation regulation.
Sandy Wells & Jim Eigelhardt	Oklahoma Department of Agriculture	Regulations surrounding herbicide applications, herbicide application permits, buffers surrounding threatened & endangered species.
Mark D. Howery	Oklahoma Department of Wildlife Conservation	Threatened and Endangered Species locations; habitat requirements for the American burying beetle, interior least tern, and longnose darter.
Charles M. Scott	USFWS, Ecological Services, Oklahoma Field Office	Threatened and Endangered Species locations.
Gary D. Frazer	USFWS, Ecological Services, Missouri Field Office	Threatened and Endangered Species locations.
Dave Purser	National Forest Service, Ozark National Forest, Arkansas	Regulations surrounding herbicide applications, herbicide application permits, Forest Service policies.
Joyce Perser	US Army, Corps of Engineers, Little Rock	Regulations surrounding destruction of wetland vegetation.
Charles Cail	USDA, Natural Resource Conservation Service, Oklahoma	Prime farmland designations and locations.

DEPARTMENT OF ENERGY
SOUTHWESTERN POWER ADMINISTRATION

Use of Herbicide for Vegetation Control at VHF Stations, Microwave Stations, Electrical Substations, and Pole Yards
January 26, 1996

AGENCY: Southwestern Power Administration, Department of Energy (DOE)

ACTION: Finding of No Significant Impact (FONSI) for the Environmental Assessment for the use of herbicides for vegetation control at electrical substations, radio stations, and pole yards.

SUMMARY: Southwestern Power Administration (Southwestern) has prepared an Environmental Assessment (EA) that addressed vegetation control at Southwestern's substations, radio stations, and pole yards. The EA studied three methods of vegetation control: (1) no vegetation control (no action), (2) mechanical and manual control, and (3) a combination of mechanical/manual and herbicide control (the proposed action). Based on the analysis developed in the EA, Southwestern has concluded, that with proper herbicide application restrictions, there will be no significant environmental impact to the following:

1. Air Quality - Restrictions: Spray pressure and wind velocity limits shall be used to minimize mist formation, duration, and drift.

2. Surface Water Quality - Restrictions: Only herbicides registered by EPA for use in surface waters shall be used. These herbicides bind to soil particles or rapidly degrade. These properties minimize the potential for migrating off site in rainfall runoff. Erosion controls shall be established along established drainage pathways to minimize sediment that may contain herbicides from leaving Southwestern property.

3. Ground Water Quality - Restrictions: Herbicides that have high soil adsorption and therefore, will have low likelihood of reaching ground water, shall be used. Herbicides shall not be used within 15 feet (4.6 meters) of sinkholes, visible rock fractures in outcrops, sinking creeks, and caverns as identified in the karst formation identification training to be provided to applicators.

4. Wetlands - Restrictions: Southwestern facility properties do not have any known wetlands. In addition, the surface water quality restrictions, described

in item 2 above, will minimize any impact on aquatic life from facility rainfall runoff into any off site wetlands.

5. Wildlife - Restrictions: Herbicides shall show low oral toxicity to wildlife and shall be used at the application rates recommended by the manufacturer. These rates make it unlikely that any wildlife will receive a toxic dose.

6. Aquatic Life - Restrictions: Herbicides shall not be used within 15 feet (4.6 meters) of running water, lakes or ponds where aquatic life may be present. The surface water quality restrictions, described in item 2 above, will further minimize any impact on aquatic life.

7. Threatened and Endangered Species (T&E) - Restrictions: Herbicides shall not be used on the likely habitat of T&E species. No known T&E species are located within Southwestern facilities and very few within 1/2 mile (0.8 kilometer) radius of any site. Southwestern will review and update T&E locations with respect to its facilities on an annual basis and revise herbicide application restrictions as necessary.

8. Cultural Resources - Restrictions: None, subsurface areas are not disturbed during herbicide application.

9. Human Health Effects - Restrictions: Application procedures and Personal Protective Equipment recommended by the manufacturer shall be used to protect application personnel. Sprayer equipment and procedures shall be used which will not allow spray to come within unsafe working distances of live electrical components.

10. Transportation - Restrictions: Herbicides shall be transported in the manufacturer's original containers. Material Safety Data Sheets, spill clean-up materials, and appropriate fire extinguishing materials shall be transported with the herbicides.

11. Disposal of Waste Materials - Restrictions: Waste herbicide materials and containers shall be disposed according to manufacturers recommendations and applicable federal, state, and local regulations.

FOR FURTHER INFORMATION CONTACT:

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PUBLIC AVAILABILITY:

Copies of the EA and this FONSI are available from Southwestern at the above address.

DETERMINATION:

Based on the EA, Southwestern has determined that the proposed action is not a major Federal action significantly affecting the quality of human health or the environment within the meaning of NEPA, 42 U.S.C. 4321, et seq. The impacts implicit in the above 11 items are all temporary. Therefore, the preparation of an environmental impact statement is not required, and Southwestern Power Administration is issuing this FONSI.

Issued in Tulsa, OK this 9th day of February 1996.

Michael A. Deihl
Administrator
Southwestern Power Administration