Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

MAY 0 8 1998

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - 1997 ANNUAL NONRADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (ANEOR)

Enclosed is the 1997 ANEOR for WBN which fulfills the reporting requirements of Section 5.4.1 of Appendix B, "Environmental Protection Plan," of the WBN Technical Specifications. This report addresses the period from February 7, 1997 through February 6, 1998.

If you should have any questions, please contact me at (423) 365-1824.

Sincerely,

P. L. Pace
Site Licensing Manager

Enclosure
cc: See page 2

MAY 0 8 1998

cc (Enclosure):

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TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT

SECOND ANNUAL NONRADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

FEBRUARY 7, 1997 THROUGH FEBRUARY 6, 1998

TABLE OF CONTENTS

I. INTRODUCTION

The Watts Bar Nuclear Plant Second Annual Environmental Operating Report for the period of February 7, 1997 through February 6, 1998, is prepared in accordance with Appendix B of the WBN Technical Specifications 5.4.1, Environmental Protection Plan (Non-Radiological) (EPP). EPP Section 4.2 requires no non-routine reports at this time. This report includes a summary of:

- Reports previously submitted as specified in the Watts Bar Nuclear Plant National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168.
- All EPP noncompliances and the corrective actions taken to remedy them.
- Changes made to applicable state and federal permits and certifications.
- Changes in station design that could involve a significant environmental impact or change the findings of the Final Environmental Statement (FES).
- All special reports submitted per EPP Section 4.1.
- Reports submitted per EPP Section 4.2.
- Changes in approved EPP.

II. REPORTS PREVIOUSLY SUBMITTED AS SPECIFIED IN THE WATTS BAR NUCLEAR PLANT (WBN) NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

The following reports were submitted as specified in the WBN National Pollutant Discharge Elimination System (NPDES) Permit No. TN0020168:

- Aquatic Chronic Toxicity Monitoring Studies, submitted April 1997.
- *Aquatic Environmental Conditions In The Vicinity Of Watts Bar Nuclear Plant During The First Year Of Operation, 1996,* submitted June 1997.
- Aquatic Chronic Toxicity Monitoring Studies, submitted October 1997.
- Operational Priority Pollutant Analyses, submitted December 1997.
- *1997 Verification Of Thermal Discharge For Watts Bar Nuclear Plant,* submitted January 1998.

III. ENVIRONMENTAL PROTECTION PLAN NONCOMPLIANCES

- February 1997 - Semi-annual toxicity testing of the effluent from the Runoff Holding Pond, NPDES Discharge Serial Number (DSN) 112, demonstrated an observable chronic effect for larval fathead minnows (*Pimephales promelas*). The exact cause could not be definitely determined due to the isolated nature of the event. It was originally believed to be associated with beaver damming activity or corrosion of the discharge piping. Toxicity retesting, following repair of the discharge piping and removal of the beaver debris in July, did not demonstrate chronic toxicity to fathead minnows. Additionally, routine semi-annual testing in August remained within the permit limitation of No Observable Effect Concentration in not less than 100% effluent.

- August 1997 - NPDES DSN 112, Runoff Holding Pond discharge exceeded the daily maximum permit limitation of 9.5 Standard Units (SU) by 0.1 SU for one day. A pH measurement of 9.4 SU, taken the following day, was in compliance. The noncompliance was the result of naturally occurring diurnal increase in pH due to the photosynthetic activity of excessive algal growth in the pond. Since the cause of the noncompliance was attributed to a natural environmental phenomenon, no steps were taken to prevent the recurrence of the noncompliance. However, laboratory personnel were encouraged to perform routine sampling in the morning when the affect of photosynthetic activity would be minimized.

- October 1997 - NPDES DSN 101, Diffuser discharge temperature measurements were not taken for two days over a holiday weekend as required. Manual measurements had been implemented due to ongoing repair work to the continuous monitor. The noncompliance occurred as a result of inadequate awareness and communications among plant organizations. Training sessions were held with WBN Operators and Environmental Technicians, regarding this particular noncompliance and the importance of good communications during equipment failures was emphasized.

IV. CHANGES MADE TO APPLICABLE STATE AND FEDERAL PERMITS AND CERTIFICATIONS

A conditional major Title V Operating Permit application was made to the Tennessee Air Pollution Control Division in August 1997, as required by rule TN 1200-3-9-.02(11)(a). All of the facility's eight (8) individual air permits will be consolidated into one permit, upon state issuance. Watts Bar Nuclear Plant is permitted to operate under the terms of the most recent existing air permits as long as the limits proposed under Title V threshold levels are met. The limitations established under the existing permits are the same as those proposed under Title V.

In June 1997, a Notice of Intent to be covered under the Tennessee's new Storm Water Multi-Sector Permit Associated with Industrial Activities was filed. The state issued the new permit in July 1997 to replace the expiring WBN General NPDES Permit for Storm Water Discharges Associated with Industrial Activity.

V. CHANGES IN FACILITY DESIGN OR OPERATION

In accordance with EPP Section 3.1, facility design and operational changes were reviewed for potential affect on the environment. A study of facility design and operational changes proposed from February 7, 1997 through February 6, 1998, was performed. Projects considered as having potential impact on the environment included: those that could have caused waste stream generation/alteration; or that required the acquisition/modification of permits; or involved the use of hazardous material; or required physical construction. The study identified and documented a basis that the design and operational changes did not involve an unreviewed environmental question. A copy of this study is attached (Attachment 1).

VI. SPECIAL BIOLOGICAL MONITORING REPORTS FOR EPP SECTION 4.1

A. EPP Section 4.1.1 Aquatic Monitoring

Collection of data for the second and final year of biological aquatic operational monitoring program is ongoing as required by the NPDES permit.

B. EPP Section 4.1.2 Maintenance of Transmission Line Corridors

The TVA management plan for the FY 1997 program entitled *Transmission Power Supply/Transmission Operations and Maintenance Vegetation Management* is included in Attachment 2 of this report.

VII. NONROUTINE REPORTS

No nonroutine reports for EPP Section 4.2 were issued during this reporting period.

VIII. CHANGES IN APPROVED ENVIRONMENTAL PROTECTION PLAN SPECIFICATIONS

There were no changes in approved environmental technical specifications during this reporting period.

ATTACHMENT 1

a. **Study of Watts Bar Nuclear Plant (WBN)Design and Operational Changes Between February 7, 1997 and February 6, 1998 for Effects on the Environment**

Facility design and operational changes made or proposed during this report period were reviewed for potential to affect the environment as described below. None were found to result in an unreviewed environmental question. The following criteria were used to identify those projects with a potential for environmental affects:

(1) Waste stream generation/alteration -
(Air, Hazardous Waste, Solid Waste, PCB's, Asbestos, Wastewater)

(2) Permit Acquisition/Modification
[NPDES, Air, Inert Landfill, Other (316a, 404, etc.)]

(3) Hazardous Materials

(4) Physical Construction Involved
(Erosion/Sedimentation Effects, Transportation Effects, Noise Effects, Groundwater Effects, Surface Water Effects, Floodplain Effects, Wetland Effects, Prime Farmland Effects, Unique Natural Features Effects, Aquatic Ecology Effects, Terrestrial Ecology Effects, Protected Species Effects, Sensitive Habitat Effects, Visual Effects, Historical, Cultural and Archeological Effects, Changes in Site Land Use, and Controversy)

b. **Special Tests**

As part of a joint Department of Energy and TVA project to determine the feasibility of production of tritium in a commercial light water reactor an Environmental Assessment and Finding of No Significant Impact for *Lead Test Assembly Irradiation And Analysis Watts Bar Nuclear Plant, Tennessee And Hanford Site, Richland, Washington,* was completed in July 1997. A special test is being conducted at Watts Bar Nuclear Plant during this reporting period.

c. **Temporary Alterations**

There were no temporary alterations conducted during this period that met environmental impact criteria.

d. **Design and Operational Changes**

A Draft Environmental Assessment for a proposed project to construct and operate a Supplemental Condenser Cooling Water system, which will connect the existing Watts Bar Fossil Plant intake and discharge piping to WBN cooling towers, was prepared in December 1997. Completion of a Final Environmental Assessment or final decision for this project is still pending.

ATTACHMENT 1

d. Design and Operational Changes (continued)

All facility design and operational changes made during this report period with a potential impact on the environment were found to be within the scope of existing permits and in compliance with environmental regulations. Those changes reviewed are as follows:

1. Construct Permanent Sewage Treatment Plant Office and Laboratory Building
2. WBN Site North Yard Area Reclamation
3. Lead Test Assembly Irradiation and Analysis - Fuel Handling
4. Drip Pans for Hydraulic Fluid Leak - Air Conditioning
5. Replace/Upgrade Construction Piping and Tie in Existing Connections - Potable Water
6. Replace Non-Reclaim Waste Pumps - Condensate Demineralizer
7. SGBD Increased Blowdown Rate - Steam Blowdown
8. Replace Moisture Separator Reheater Tube Bundles - Main Steam
9. Establish Ecolochem Inc. Interface Boundaries - Water Treatment
10. Remove Hydrants and Cap Piping - HP Fire Protection
11. Add Vents to MSR HP Doghouse Located Outside - Main Steam
12. Add Loop Seals to CRDE Rooms - Station Drainage
13. Install RCW Intake Flume Jumper - Raw Cooling Water
14. Resize and Reroute HP Turb. Spillover Valves and Piping - Turbogenerator Control
15. Remove Air Purge System and Add High Point Vent - Condenser Cooling Water
16. Cap Drain Station Drainage Piping - Sampling System
17. Flush Rad. Monitor and Effluent Piping - Radiation Monitoring and Waste Disposal
18. Provide Replacement for Acid Process - Condensate Demineralizer
19. Replace Acid Lines with Alloy 20 Material - Water Treatment
20. CO_2 Condening Pkg. Mount Detail for Condenser - CO_2 Storage
21. SSD Provides Wrong Release Volume - Waste Disposal
22. Provide Automatic Pressure Relief for Penetrations - Safety Injection
23. Replace Bypass Flow Dampers - Ventilation System

In summary, there have been no facility design or operational changes from February 7, 1997 to February 6, 1998, which have resulted in an unreviewed environmental question.

ATTACHMENT 2

Transmission Power Supply/Transmission Operations and Maintenance Vegetation Management

FY 1997 Program

TVA must manage vegetation on its substations, communication sites, Customer Service Center (CSC) sites, and its rights-of-way (ROW) and transmission line easements to ensure uninterrupted electrical service, access to switches and equipment, as well as access under all weather conditions to its lines, their structures, and switches. In addition, TVA must ensure National Electrical Safety Code electrical clearances between conductors or structures and tall growing vegetation or structures constructed by others along ROW or easements. Trees located off ROW that could fall or be cut into a transmission line are increasingly important to the utility industry and the public because of the variety of interruptions they may cause and the related public security and safety problems that may result.

Transmission Operations and Maintenance (TOM) is charged with the responsibility of providing the safe, continuous, and reliable electric service to its customers. Primary customers include distributors, cities and industries, health and security services, businesses, municipality services, homeowners, and other utilities and services. Electricity is a commodity/service which is needed on demand and cannot be stored in large quantities. In today's world, it is essential for providing vital services, domestic use, basic work, and economic growth. Therefore, the pathways for the flow of electricity must be kept open at all times.

At the end of the 1996 calendar year, aerial surveys, walking patrols, random and targeted inspections of ROWs, substations, microwave sites, and CSCs revealed a significant amount of undesirable, tall vegetation as a threat to line and substation equipment reliability. In many cases, this is the result of past practices of reclearing limited amounts of ROW, leaving buffer zones along the edges in order to reduce costs. In other cases, it is caused by existing wetlands and developing wetlands restricting possible access along ROW because of restrictions on mechanical reclearing and the use of herbicides. In still other cases, it is because of the very active mechanical reclearing program that has been in place for the last 12 years. Mechanical reclearing without the use of herbicides or stump treatment results in species that are very tolerant of mechanical damage resprouting very densely from the stumps and root collar left. At the next two- to three-year mechanical reclearing cycle, the same thing happens, and the density increases further until there are enough roots to supply very rapid growth (8 to 12 feet in a year). At that point, some other means of reclearing must be attempted.

The 1997 plan is the result of changing regulations, policies, procedures, and practices. New developments in techniques have been field tested or currently are being tested in pilot plots, demonstration plots or areas; and TOM is actively in consultation with manufacturers, vendors, applicators, other utilities, regulatory agencies, universities, and interested individuals. The historic approaches have been useful, economical, and effective up to a point. However, they have created situations that must now be addressed differently and, as a result, have created the need for adaptations and modifications that balance efficiency of vegetation control, economics of various practices and materials, and changing needs and perceptions of the public and property owners.

National priorities have changed with increasing focus on maintaining biological diversity of native vegetation, control of invading vegetation, selective treatments, and a refocus on avoiding, reducing, or minimizing both toxicity of materials applied and their duration of toxicity. There is no consensus regarding what integrated pest management practices to use on public ROW. However, as discussed below, experience supports a combination of mechanical reclearing and herbicide application as the most practical and sensible plan to environmentally protect the ROW vegetation and adjacent land uses with its vegetation mix.

Many mechanical techniques being employed result in aesthetically unpleasant views, grotesque tree shapes, and dead stubs of species that have only terminal tip new growth. Significant amounts of debris and damaged remaining vegetation occur which in many cases become rapidly infested with diseases or invading insects, which then spread into surrounding sound trees off the easement. In some cases, like oak wilt and pine shoot moth or gypsy moth invasion, the debris is a major source of easily invaded damaged food.

In addition, the U.S. Forest Service now has evidence of oak blight and hickory and elm virus and fungus spreading from such areas into valuable hardwood stands and eliminating entire stands. Recent experience with wind- and ice-damaged trees has also shown rapid invasion and spread of insects and diseases to surrounding trees creating hazard trees to power lines, property owners, highways, waterways, and other utility services.

These events and further development of methods of application, efficiency of uptake, and careful studies to reregister numerous chemical herbicides, carrier chemicals, and inert ingredients have created a new era of possibilities for use of herbicides. Documentation of the need for much smaller amounts of chemicals to control vegetation selectively has reduced the potential market for and economics of old or very toxic chemicals that were used as herbicides. The overall result has been a very focused effort toward developing and marketing much more efficient chemicals that are either highly selective or require much less total chemical (low volume) to achieve effective and selective vegetation control.

Manufacturers have worked with applicators to develop additional or new procedures and equipment to more carefully and accurately apply smaller amounts of herbicide to the species to be controlled. In addition, they have worked to develop combinations that can be prescribed to selectively remove only the species of interest while leaving other desirable species with a good ground cover and diverse food potential for birds, wildlife, and even domestic animals. The herbicides can remove undesired species and release (stimulate and remove competitive vegetation) desirable vegetation.

The removal of tall vegetation and retention of desirable low-growing, well-rooted nutrient and food value plants for wildlife has been the interest of extensive research at utilities, universities, and various agencies. The research is well documented and now very extensive. It demonstrates that proper use of herbicides is extremely desirable from a plant diversity, biomass improvement, and wildlife food value perspective. The studies clearly show not only increased plant diversity but insect, bird, and mammal diversity also. Some types of federally listed threatened or endangered species are now managed by either mechanical reclearing or use of herbicides in their habitat in order to allow limited populations to expand beyond their present boundaries.

Many wildlife management areas now restrict our reclearing efforts to herbicides. In other areas of the southeast, fires are used rather than mechanical methods, which in the long-term create dense monocultures of resistant trees of little value to most insects, birds, or mammals as shelter or food. Demonstrations in several areas of the southeast with property owners, wildlife interests, and utilities have been accepted by local schools as teaching areas, by naturalists as educational and secondary demonstration areas, and by local parks as extensions of the park.

Therefore, in planning for the 1997 growth year which is anticipated to be extremely rapid due to high rainfall, late fall, cold winter (which removes many foraging insects and pest insects), the Valley's rich soils and long-growing season, we need to be prepared to use a variety of techniques, methods, and materials on the approximately 40,000 acres that must be recleared to reduce power line interruptions and to ensure access in the event of an emergency outage. Normally well over half of the total acres are mechanically recleared, but denser stands of near pure cultures of resistant, resprouting species are becoming more prevalent. Mechanical reclearing has been and will continue to be supplemented by hand clearing in limited areas or extreme terrain. Hand clearing is extremely hazardous to employees, the lines and structures, the surrounding vegetation, and in wetlands to the wetland soil seal.

Aerial applications of Spike 40P pellets will continue to a decreasing extent in remote areas and in special applications. The rate of application is being lowered as mandated under the Environmental Protection Agency's (EPA) re-registration program. Spike 40P is ceasing to be manufactured due to poor economics and less reliability for the purposes intended. Wettable powder Spike 80W will continue to be a part of the program in ground applications at newly recommended, lower rates.

Other herbicides reviewed by TOM as part of its participation in the U.S. Forest Service's (USFS) review of vegetation management in National Forests will be used in place of some Spike applications. Similar product discussions with U.S. Fish and Wildlife Service (USF&WS) indicates agreement with the toxicity and impact analysis conducted by the Forest Service, and the same products are approved for use on National Refuge lands. These herbicides allow better selectivity, leave no residual, have lower application rates, and are highly effective on the species of interest. They also allow a wider range of application techniques and seasonal treatability extending the treatment season. Finally, from test plots, demonstration plots, and observations of other utility and university uses of these materials, we know that they not only reduce the total amount of material that need to be applied but preserve low-growing vegetation and the diversity of plants present or developing from seeds present in the soil when overstory vegetation is removed. These herbicides leave better ROW vegetation stands, extend the reclearing cycle, reduce the stem count, and eliminate target species that would have been recleared at the next reclearing cycle.

On the application day, the weather forecast and hourly conditions are carefully observed to ensure that wind and potential rain do not become a factor during or for the 48 hours after application. All transfers to the helicopter are made in preselected areas with appropriate protective measures in place at the transfer point and during the transfer. In the event of a spill, absorbent is present and the trained employees begin immediate cleanup, proper storage of the cleanup materials and clothing, and ultimate disposal of the material.

Then they contract or guide TVA personnel to implement the various techniques at the appropriate seasonal time to each line and segment, including the sensitive areas and their buffer zones.

When TOM determines herbicides are to be used, they are selected from the following list of TVA- and other agency- approved herbicides:

Trade Name	Active Ingredients/ Formulations	Label Signal Word
Accord	Glyphosate-liquid	Caution
Arsenal	Imazapyr-liquid-granule	Caution
Escort	Metsulfuron Methyl-dry	Caution
Stalker	Imazapyr-RTU	Caution
Garlon 4	Triclopyr-liquid	Caution
Garlon 3A	Triclopyr-liquid	Danger
Diuron	Diuron-dry	Caution
Spike 40P	Tebethiuron-pellet	Caution
Spike 80W	Tebethiuron-wettable	Caution
Tordon K**	Picloram	Warning
Transline	Clopyralid-liquid	Caution
Pathfinder II	Triclopyr-RTU	Caution
Krenite UT	Fosamine Ammonium	Warning
Sahara CP	Imazapyr/Diuron DG	Caution
Endurance	Prodiamine-liquid	Caution
Vanquish	Diglycolamine	Caution
Predict	Norflurazon	Caution

RTU-Ready to Use

** Restricted Use Pesticide-Requires special documentation after use, special training, and care in planning its use, application and observance of buffer zones.

Mixtures of these selectively may be used to control some resistant species in mixed, tall-vegetation zones. When mixtures are used the special additions are very small quantity additions to the basic herbicide formulation and result in applications of a very few ounces per acre.

TOM bare ground approved herbicides that may be used are:

Topsite	Diuron/Imazapyr	Caution
Roundup	Glyphosate-liquid	Caution
SpraKil SK-26	Tebuthiuron/Diuron	Caution
Arsenal &Diuron	Imazapyr/Diuron	Caution
Pathfinder	Triclopyr-RTU	Caution
SpraKil SK-13	Tebuthiuron/Diuron	Caution
Sahara	Imazapyr/Diuron	Caution
Roundup Pro	Glyphosate	Caution
Scythe	Pelargonic Acid	Warning
Endurance	Prodiamine	Caution
Predict	Norflurazon	Caution

Pilot work with the following bare ground herbicides is being conducted in 1997:

Pronone	Hexazinone-1-methyl 1,3,5-triazine	Danger
BarGround	Bromacil/Diuron/Sodium Chlorate/Sodium Metaborate	Danger

Bare ground herbicides are applied prior to vegetation emergence or to treat individual plants that may potentially interrupt electrical equipment operations.

Tree growth regulators (TGRs) are being considered for use on tall trees or some species that, though limited in height, can get into the conductor's electrical danger zone.

In very limited cases where special circumstances demand tree trimming, the TGRs are considered to limit branch linear growth and increase the length of retrimming cycles.

Approved TGRs for TVA easements are:

TGR	Flurprimidol	Caution
Profile 2SC	TGR-Paclobutrazol	Caution

These materials are normally inserted into the tree, and the holes are sealed or injected at the base into the root collar zone.

The herbicide, Pathway, is being used for brush-on and spray-on applications on stumps immediately after initial cutting/clearing of some ROW to eliminate resprouting and rapid suckering or rapid regrowth. Test plots have been established and are being evaluated to determine the effectiveness of Pathway. Pathway is a Picloram-2,4-D mix that carries a warning signal word. Only enough is applied to treat the cambium layer immediately behind the outer bark.

All of the above herbicides have been evaluated in extensive studies at universities, in support of their original registration, and current re-registration applications or approvals and labeling requirements. Most have been reviewed in the public participation process of Environmental Impact Statements (EISs) on Vegetation Management in U.S. Forests, especially those in the EISs for the Southeast, Coastal Plain, and Ozarks. TVA participated in the preparation and review of those documents and adopts the findings described therein. The results of these reviews have been a consistent finding of limited environmental impact beyond that of control of the target vegetation. All the listed herbicides have been found to be of low-environmental toxicity to wildlife, employees, or the public when applied by trained applicators following the label and registration procedures, including buffer zones for Federally listed threatened or endangered species or their habitat.

TVA continues to test other herbicides as they become available for use. Generally, our selections for testing are from major manufacturers such as DowElanco, American Cyanamid, DuPont, or Monsanto. In previous years, TVA's environmental specialists, ROW Program Administrators (PAs), environmental compliance specialists, and others have reviewed these herbicides and many others that were rejected by TVA for various reasons. The reviews have begun with the registration and label information and supporting documented research. They have included discussions with the EPA, Department of Interior agencies, U.S. Department of Agriculture, and its various agencies, state regulatory agencies, universities, manufacturers, vendors, applicators, environmental program interests that might be directly affected, property owners, and members of the general public who have expressed an interest in TVA's proposals to use herbicides. The reviews involved specific environmental and technical reviews of test plots, demonstration plots, and field trials. In addition, work by other utilities and their reviewers, highway departments, pipeline companies, and universities has been evaluated, along with the open literature of peer-reviewed articles and some agencies "gray" literature. Documents and research of adversaries to the use of herbicides have also been reviewed, evaluated, and considered where new information is found.

As a result, aerial applications to foliage with liquid Accord and Arsenal or Arsenal tank mixed with supplemental additions of Escort, Garlon, or Tordon K, and/or Krenite have been tested in pilot plots, demonstration large-scale trials, and actual field tests in a variety of circumstances across the power system with emphasis in the western portions of the power service area. General aerial application of liquid herbicides is being conducted when it is the most efficient method of dealing with some easements, terrain, blocks of tall, resistant, or very dense resprouting vegetation stands, or in areas where EPA labels allow treatment of wetland trees, shrubs, and extremely fast growing species that cannot effectively be controlled by hand and mechanical methods are precluded by Corps of Engineers or other regulations and environmental sensitivities. The annual plans and General Integrated Vegetation Management Program Document that has been supplemented by the annual plans and prior EISs and Environmental Decision Records have provided the means to do aerial applications of liquid herbicides on a demonstration basis in previous years.

Conditions under which liquid and aerial liquid applications can be made have changed dramatically through new research and techniques developed in recent years. It is practical to apply selective, low-volume, liquid herbicides not only in remote, steep terrain hazardous to employees, mechanical equipment, and operating personnel, but also in small plots difficult to access because of other land uses, access problems due to unreachable property owners, sensitive intervening row crops, or horticultural, nursery, or pasture uses that include specialty and exotic plants and animals. Similarly, in more restricted applications by ground or hand-to-fence rows, small wood lots, isolated trees on the easement, structures in row crops, etc., can now be made without adverse impact or potential for a residual or sensitive species impact.

As part of TOM's normal ROW reclearing program, specialists review recently issued EPA/U. S. Department of Agriculture (USDA) county-labeled restrictions on pesticides. The label restrictions are developed jointly by EPA/USDA/USF&WS interests and indicate by county what sensitive zone for Federally listed threatened or endangered species must be protected and by what minimum width of buffer zone cannot be treated. Each fall TVA requests an updated list and adds materials covered or counties affected. Transmission/Power Supply (TPS) and TOM buffer policies regarding sensitive area protection from clearing and reclearing by mechanical and herbicide methods are more conservative by choice and by experience than present label restrictions.

ROW PAs plan their reclearing prescriptions based on field information, herbicide selectivity knowledge, species mixes present, and guidelines showing suspected tolerant species (see attachment). As new field or manufacturer information and research reviews indicate additional resistant or sensitive species, the information is factored into the planning effort. Once each ROW PA has a plan, they are provided to a central staff member for review and further coordination. The PAs provide maps marked with locations and methods, along with other information to TVA's Resource Group (Res Grp) specialists so they may review their information data bases for environmentally sensitive areas and mesh the proposed method, techniques, and/or material for reclearing with the knowledge about the easements. The environmental specialists mark sensitive areas and return the marked materials and any further conditions to the PAs who review it, add appropriate TOM buffer zones or other restrictions to the crews, and then mark it on the materials to be used to resurvey the reclearing areas just before application of the selected method. In the case of herbicide aerial application, the easements are aerially examined no more than three days before the application to ensure conditions have not changed, to illustrate to the pilot the sensitive zones and buffers, and to convey other pertinent information before the application is to be made. During the preapplication aerial overflight, a TVA representative usually accompanies the pilot.

Only enough herbicide is mixed to complete the day's work. Delivery of herbicides in liquid form is usually confined to the just-in-time scenario, and there is no long-term or continuous storage and transport by TVA. A Spill Prevention, Control and Countermeasure Plan (SPCC) accompanies the transfer vehicle, and groundwater protection is a major consideration during transfers from the vehicle to helicopters. The herbicide truck, nurse truck, and helicopter are equipped with absorbent and containment materials in the event of a spill or accident.

All TPS applications of herbicide are made by state trained- and licensed- applicators holding current licenses. Contract applications are made by similarly trained and licensed applicators who must provide proof of current licensing and training to TPS before contracts are awarded.

TVA is aware of increasing interest in protecting not only surface waters but ground waters; therefore, TPS takes a very conservative approach to selecting herbicides. It focuses on herbicides that are foliage active or, when applied to basal stems, are readily absorbed by the tree and do not remain active in the soil or water if it should rain in a short term interval after the application (more than 48 hours). TPS restricts herbicide application to periods when no rain, snow, or frozen ground is predicted for the next 24 to 48 hours after the day of application. Use of soil retentive herbicides is decreasing in the United States, but some liquid herbicides and TGRs are soil bound, then released to the plant when a rootlet transfers an electron to the soil and an exchange occurs.

TPS restricts the amount of herbicide mixed for the area of application, does not store herbicide near water or sinkholes, and maintains an inventory in a central location out of the weather and off the ground. Spill containment materials go with the herbicide, and personnel are trained in spill notification, containment, cleanup, and proper methods of disposal.

TPS uses selected EPA-registered and -labeled herbicides with the lowest available toxicity rating to humans, wildlife, and the environment that still effectively control the species targeted. Once a ROW is treated and the woody species root systems are killed or severely retarded, subsequent reclearing may use hand or mechanical methods or different herbicides to control new or resistant species. This allows longer-term reclearing cycles and uses much less herbicide because of the reduced stem count.

The herbicides selected are increasingly being chosen for decreased toxicity to the environment. The newer herbicides and application methods allow attack on only plant amino acid pathways, require less total chemical for each acre treated through low-volume foliar or basal stem applications, and control only the portion of the plant to which it is directly applied (tree trimming impact).

Through time, TPS has moved from hand clearing and reclearing to chemical treatment to mechanical reclearing. In 1993-1996, TOM moved toward more acres treated with herbicides but with much less chemical applied per acre than in the 1960s and 1970s. The changes have followed economic, regulatory, and method of application trends, as well as the results of ROW research from a wildlife and biodiversity standpoint. In addition, they have followed the wishes of our constituencies. In recent years, those wishes have changed with property owner and wildlife managers becoming increasingly vocal about mechanical means and resulting impacts or potential for impacts. Therefore, herbicides are an integral part of TOM's reclearing program.

Materials have also changed through time as new materials have been developed, tested, registered by, and approved for specific uses by the EPA,USFS, USDA, and USF&WS, which through research and development of better application techniques require less materials to do a given job. As an example, Accord is now registered for direct application to water to control willow and buttonball.

Arsenal and Accord have been developed not only for ROW application with buffer zones but for side trimming trees at the edge of the ROWs without killing the whole tree. The canopy branches hanging toward the conductors of the power line can be removed by this method.

TOM makes reasonable attempts to contact property owners before making herbicide applications or conducting other significant ROW activities. TPS uses herbicides with methods that provide the lowest volume of application on the label consistent with proven effectiveness on the vegetation. It also uses a conservative buffer around sensitive areas (more conservative than labeling for threatened or endangered species buffer zone restrictions).

The entire thrust of the ROW reclearing program is to ensure that critical facilities that include very sensitive electronic diagnostic and control equipment are not disrupted by sustained or instantaneous vegetation contact, flashover, or danger trees (even in severe weather conditions). Examples of these critical facilities are water treatment plants, hospitals, sewage treatment plants, security and communication systems, process control equipment in refrigeration, food preparation and manufacturing, etc. All such equipment using or controlled by computers or microchips is drastically affected by a few milli-seconds of power flow interruption. The newest systems cannot be off-line for more than a fifth of a cycle. Disruptions of power flow is evident in homes by flashing digital clocks, VCRs, timers, and other indicators; but in critical electrical applications that flashing indicator is far too long for an interruption.

Guidelines for Herbicide Treatment Prescriptions

Suspected and verified resistant or tolerant tree species are indicated below, and site treatment prescriptions must take these species into account when planning ROW herbicide treatment:

Tank Mixes	Suspected Tolerant Species
Accord/Arsenal	Conifers, elm, hackberry, cedar, black locust, honey locust, baccharis, magnolia and bay
Tordon K/Garlon 4	Privet hedge, ash, cherry, cedar, maple, chinaberry, boxelder and elm
Tordon K/Garlon 3A	Privet hedge, ash, cherry, cedar, chinaberry, maple, boxelder, sweetgum and elm
Tordon K/Garlon 4/Arsenal	Elm, hackberry, cherry and cedar
Tordon K/Escort/Arsenal	Hackberry
Arsenal/Escort	Conifers, hackberry, bay, magnolia, baccharis and redbud
Arsenal/Krenite UT	Hackberry, cedar, conifers, bay, magnolia, baccharis redbud
Arsenal/Garlon 4	Elm, hackberry, bay, cedar and conifers
Spike alone	Sassafrass, persimmon, cedar and sumac

Elm and buckeye may be tolerant of most herbicides unless the higher rates specified on the label are used.

Mechanical mowing without use of herbicides creates dense monocultures of:

Various oaks, maples, and hickories, while resprouting drastically increases stem density problems with green ash and sumac among others.