PG&E’s Integrated Vegetation Management Program

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PG&E has a number of facilities where they utilize Integrated Vegetation Management, including the following facilities: Electric Transmission, Electric Distribution, Gas Transmission, Gas Distribution, Hydro, and Service Centers. These range from small facilities requiring annual bareground applications to rights-of-way that are several hundred feet wide and hundreds of miles long. Some examples of these facilities are powerhouses, switchyards, substations, dams, canals, gas metering sites, gas valve regulator sites, subject poles, service centers, and rights-of-way. These facilities are scattered throughout PG&E’s service territory and range from urban areas, to agricultural areas, to the high Sierras. PG&E has 4.5 million electric customers; 3.7 million gas customers; 18,516 miles of electric transmission lines; 108,170 miles of electric transmission lines; 5,700 miles of gas transmission pipelines; 36,700 miles of gas distribution lines; 3 gas storage facilities and 1,000 substations. PG&E’s service territory encompasses 70,000 square miles.

Integrated Vegetation Management provides the necessary tools for PG&E to accomplish our specific goals at the different types of facilities throughout our diverse service territory. IVM utilizes cultural, mechanical, manual, biological, and chemical techniques to accomplish specific goals. These goals range from bareground at switchyards, powerhouses, substations and subject poles; to selective vegetation management along rights-of-ways, canals and dams; to control of weeds in landscaped areas around service centers. The reasons for the varying goals are as varied as the sites themselves, but generally speaking fall under one or more of the following broad categories; safety, service reliability, legal requirements, and aesthetics. Often there are numerous reasons for managing a certain facility in a certain manner.

Vegetation management of Electric Transmission Rights-of-Ways provides a unique set of opportunities and challenges. PG&E is required to manage the vegetation along these ROWs by law. In order to supply safe, reliable electric power PG&E must manage the vegetation, including not only those plants that are tall enough at maturity to reach the conductors, but also vegetation that poses a fire hazard or interferes with access to the facility. The goal of this vegetation management program is to keep electric transmission facilities safe and to prevent interruptions caused by vegetation while maintaining a harmonious relationship with varied land uses and the environment.

The most common methods for initial removal of undesirable vegetation from within a right-of-way are mechanical and manual. Several factors must be considered before a method can be chosen, including the following: slope, vegetation density, and accessibility. Mechanical equipment is most cost effective where the vegetation is dense and the slope is not a limiting factor. Hand cutting or mechanical mowing vegetation perpetuates the growth of incompatible vegetation because of the biological response of resprouting. When a stem is cut, multiple sprouts can grow from the severed stump or the root system (so-called “root-suckering”). These sprouts are fast-growing because they are fed from a root system which is already well established. A repetitive cycle of cutting and sprouting results in an increasing density of tall growing species. The combination of mechanical methods and the selective use of herbicides is
very effective in controlling resprouting tree and woody brush species that present problems for the access and maintenance of electric transmission facilities.

It is a common public misconception that mechanical/manual methods (chain saws and mowing) are safer and have less environmental impact than the use of herbicides. Often overlooked are the environmental and safety concerns associated with repeated cutting of vegetation such as: soil compaction from heavy equipment, soil erosion, damage to sensitive wetland areas, worker and environmental exposure to petroleum products (which are more toxic than many herbicides used for right-of-way maintenance), the potential for physical injury from sharp tools and equipment to both workers and wildlife, the increased fire risk, and the repeated, significant alteration of potential wildlife habitat. The goal of an IVM system is to manage vegetation and to balance benefits of control, public health and safety, environmental quality, and cost.

The long-term goal of a vegetation management program is to provide for public and worker safety and to provide reliable service by converting right-of-way plant communities from predominately tall growing plant species to communities dominated by low growing plant species. This can be accomplished by selectively controlling tall growing plant species while preserving low growing grasses, herbs and woody shrubs over a period of many years. With proper management, the low growing vegetation can eventually dominate the right-of-way and retard the growth of the tall growing vegetation, providing control of incompatible vegetation and reducing the need for future treatments.

A description of each IVM technique currently utilized on PG&E ROWs follows:

**Mechanical:** Large mechanical equipment is either rubber-tired or track equipped. Mechanical mowing is generally used for the initial control of dense woody species or on 2 - 5 year cycles in areas where herbicides are not a viable option. Rubber-tired equipment, such as the “Hydro-ax” and the “Row King,” are used to cut and chip woody species where slopes are less than 25 percent. The rubber tired machines can also be used along improved road surfaces such as asphalt or gravel. Track mounted equipment, including the Slashbuster and the Brontosaurus, is used on unpaved surfaces up to 40 percent slope. These large mechanical brush mowers can be used to cut and masticate woody plants to within 12 inches of the ground surface which reduces fuel hazard. Mechanical treatment usually results in vigorous resprouting of woody species.

**Manual:** Chainsaws, polesaws, machetes, string trimmers, McLeods and chippers are used for manual vegetation management. Chainsaws, pole-saws, and machetes are used to remove woody species, such as oaks, conifers, and brush greater than 1 inch in diameter. The string trimmers and McLeods are used to clear grasses and smaller woody species. Manually cleared vegetation is then either lopped and scattered; piled and burned or chipped, depending on fuel hazard, soils, and access. Manual treatment usually results in vigorous resprouting of woody species.

**Cultural:** Mulches can be used to help control annual grass and broadleaf species. Seeding is also used to develop and maintain a desired species of vegetation.
**Biological:** Cattle and goats are two biological methods that have been used to control vegetation. Goats have been used at Diablo Canyon power plant to control woody plant species and to help convert the vegetation cover to grasses. Cattle leases have been used in some sites to graze predominately grass species along right-of-ways. Goats and cattle are not completely effective when used alone because of grazing preferences, but can be extremely effective when used in combination with selective herbicide applications.

**Chemical (herbicides):** The use of herbicides is regulated by the Federal Environmental Protection Agency (EPA), the California Environmental Protection Agency, the California Department of Pesticide Regulation (CDPR) and the local County Agricultural Commissioners. Herbicide applications require the following:

1) annual safety and product training for each herbicide used

2) the use of safety equipment, including goggles, gloves, long pants, long sleeved shirts, shoes and socks

3) a written Pest Control Recommendation by a Licensed Pest Control Advisor (PCA)

4) monthly reporting of each use of herbicide county

5) annual inspections by the County Agricultural Commissioner

**Foliar and contact application methods**

Foliar backpack applications can be selective or non-selective, depending on the type of herbicide and the application method. Foliar applications are usually most effective when made when the target vegetation is actively growing. The herbicide triclopyr can selectively control woody plants without affecting desirable grasses. Even non-selective herbicides, such as glyphosate, can be used for selective control through the use of low volume directed back-pack applications or by timing the application so that the desired annual species have already produced seed.

Basal stem treatments are another selective contact treatment. Basal stem treatments are usually made using 5 gallon backpack sprayers. Herbicides are mixed with an oil carrier to allow adequate bark penetration and are applied to the lower two feet of a woody plant. Basal stem applications have a longer application season and can provide good control from March through November. Applications are frequently made during the dormant season because they are easier once the plants have lost their leaves. Dormant applications have the advantage of being a low profile approach since the target species never leafs out in the spring and there is no brownout.

Cut stump treatments are used to prevent woody species from resprouting. After trees and brush are cut with a chainsaw or loppers, the stump is treated with herbicide. Most cut stump treatments can be made year round.

Injection is an application method in which capsules containing herbicide are injected into the woody cambium and the herbicide gradually translocates to the roots and stems. This is
another low profile application, since the applicator carries a 4, or 6 foot lance and not a backpack sprayer.

Vegetation Management Guidelines By Facility

PG&E’s IVM program incorporates mechanical and manual techniques to remove undesirable vegetation along with the use of Federal Environmental Protection Agency (EPA) and California EPA registered herbicides to control the resprouting of woody species. IVM is a process aimed at identifying an appropriate combination of techniques that together result in effective control, acceptable operating costs, public and worker safety and an acceptable level of environmental protection.

PG&E is required under FERC regulations, the Public Utilities Commission and the Public Resource Code to manage vegetation along electric transmission facilities to allow for safe access, maintenance and operation of those facilities. PG&E employs an IVM program that includes the use of chain saws, string trimmers, mechanical brush mowers, mulchers and herbicides. Chain saws and string trimmers are initially required to remove large woody species and dense annual species. Low-volume directed herbicide treatments are used to control woody species, including oak, alder, willows, maple, blackberry, poison oak, and other vigorous resprouting species. Conifer regeneration can be controlled with manual techniques or selective herbicide treatments. After the initial control the annual maintenance requires only targeted applications of herbicides to maintain safe and reliable access for operations. Specific facility treatments are described below:

• **Access Roads.** Facility operation and maintenance require a variety of access roads with surfaces that vary from unimproved dirt to asphalt. The road surface and sides are generally managed in bare ground for fire safety and for protection of the surface material. The sides may have a drainage ditch that is kept clear of vegetation to keep water off the road surface. Some road drainage systems are lined with gravel to reduce erosion. Trees and woody brush are generally maintained at least 5 feet from the edge of the road to allow for adequate visibility. Roads are also required for access to individual towers.

• **Culvert Heads.** The area on the upstream side of the culvert must be kept clear of vegetation to allow for proper operation of the culvert. This is typically done with a combination of manual and chemical techniques. Culverts with flowing water will be treated only with those herbicides that are registered for aquatic use. No riparian vegetation will be treated.

• **Towers, and Poles.** The area around the individual towers or poles is managed either for bare ground, or for grasses. All woody vegetation, including trees and brush, that hinders access to, or prevents effective inspection of poles, towers and supports, or that constitutes a safety hazard is targeted for control.

• **Power Line Rights-of-Way.** One of PG&E’s goals is to manage transmission lines rights-of-way to achieve a plant community of low growing woody and herbaceous plant species. Tree species capable of growing into overhead conductors are removed from within the right-of-way. Tree species typically targeted for removal include, but are not limited to: pines, firs,
cedar, maples, oaks and alders. Where lines span over deep canyons it is not necessary to remove trees or other vegetation that is not capable of growing into lines, or creating flame heights or heat of sufficient intensity to damage the facilities.

Best Management Practices

Best Management Practices (BMPs) have been prepared to minimize the overall risk to people and the environment while providing for safe and reliable electric transmission operations. They are included as part of these guidelines to assist in the planning and implementation of successful vegetation management.

The purpose is to provide principles for current and future vegetation managers that will minimize overall risk to people and the environment while providing safe and reliable service. The approach is designed to protect wildlife, groundwater, surface water, soils, utility customers, utility workers and the general public. The objectives are:

- Program prescriptions will be selected which balance environmental concerns, public needs, safety and cost effectiveness.
- PG&E will use Integrated Vegetation Management methods that are supported through scientific research and industry standards as being safe and effective for use in right-of-way vegetation management programs.
- PG&E will adopt Best Management Practices (BMPs) for all vegetation management activities. These practices will be based on the latest scientific research among utilities, manufacturers, applicators, regulators and universities. These BMPs will be distributed to applicators, regulators and the public.
- PG&E will set as a long term goal of vegetation management programs the reduction of the level of active herbicide ingredient per unit of land area. This is to be accomplished through the proper selection and use of application methods, equipment and technology which will promote and facilitate reduced application rates. Use records can be used to track application rates.
- PG&E will encourage the accelerated approval of any use/risk reduction recommendations to be included on the labels of herbicides used for vegetation control.

These Best Management Practices should be applied to all vegetation management activities including manual, mechanical, cultural, and biological techniques as well as herbicide applications. Where they focus on herbicide applications they are intended to supplement and not replace the herbicide labels.

Utilizing a combination of manual and mechanical techniques followed by selective herbicide applications is the most cost effective environmentally sensitive approach in many situations. Numerous long term studies have demonstrated an increase in species density and richness (Bramble and Byrnes, 1982) on electric transmission ROWs that have been maintained
by herbicides since 1953. Additionally, they documented greater use of the ROW that was
maintained with herbicides by wildlife; including deer, rabbits, squirrels, turkeys, red-tailed
hawks, numerous songbirds, and butterflies (Bramble and Byrnes, 1972; Bramble, 1974;
Asplundh Environmental Services, 1977; Bramble et al, 1997).

There are numerous challenges utilities encounter in ROW vegetation management,
including the following: rare, threatened, endangered, or sensitive species; cultural or heritage
resources; and public perceptions. Some of these issues center around the initial clearing, while
others are associated with the follow-up herbicide application. Some of the keys to a success are
communication, good agency relationships (USFS, California Department of Fish and Game,
County Agricultural Commissioners, California Department of Forestry and Fire Prevention,
etc.), utilizing high quality contractors, and education (internally as well as externally). The only
way PG&E will continue to be able to utilize herbicides as part of their IVM program will be to
utilize them in the most professional manner possible. The following outlines some of the details
that must be considered before implementing an IVM program.

1. The following factors should be considered in the planning of any vegetation
management activity:
   - Target species
   - Rare and endangered species
   - Height and density of brush
   - Land use: within and adjacent to the right-of-way
   - Legal restrictions
   - Natural and man-made restrictions
   - Safety
     - Worker Safety
       - Potential for physical injury from chain saws
       - Exposure to poison oak
       - Exposure to poisonous snakes
       - Required Safety Equipment
       - Exposure to chemicals (petroleum, herbicides)
       - Tripping Hazards
     - Public Safety
       - Exposure to poison oak
       - Exposure to poisonous snakes
       - Tripping Hazards
       - Exposure to chemicals (petroleum, herbicides)
       - Potential for facility failure
     - Fire Safety
       - PRC 4435 and 4431, Federal Regulations
     - Environmental Safety
       - Water Quality
       - Wildlife Species and/or Habitat
       - Soil Compaction
Soil Erosion
Fire Potential
Cultural Resources
potential for disturbing recorded sites
Facility Safety
Cost Effectiveness

2. Only Federal and California EPA registered herbicides will be applied.

3. Operator ID numbers and Site ID numbers will be obtained for each facility from the County Agricultural Commissioner.

4. Licensed Pest Control Advisors will write “Pest Control Recommendations” for each application.

5. All herbicide applications will be supervised by a Licensed Pest Control Operator.

6. All fire regulations relating to manual, mechanical, or burning activities will be strictly adhered to.

7. All herbicide applications will be made in compliance of all label requirements as well as all appropriate federal, state and local laws.

8. County Agricultural Commissioners will make appropriate inspections of all applications.

9. The amount of each herbicide used will be reported monthly to the County Agricultural Commissioner by the Licensed Pest Control Operator.

10. PG&E will conduct annual Worker Safety Training sessions for all employees and contractors involved in the herbicide applications and manual/mechanical clearing.

11. PG&E, in consultation with the National Forest, Bureau of Land Management and other appropriate agencies will evaluate the need for rare and endangered species surveys in all areas requiring vegetation management. Where it is determined to be appropriate or necessary, these surveys will be conducted prior to the start of activities.

12. Selective application techniques should be used wherever practical so that desirable vegetation is not adversely affected.

13. Back-pack equipment will be used for all directed foliar applications.

14. Applications along culverts with water flowing will have a one foot buffer established so directed applications will not enter the water, unless the product is registered for aquatic use.
15. Herbicide containers will be reused, recycled or otherwise disposed of in a proper manner.

16. Minimum operating pressures will be used. Coarse nozzle tips should be used to minimize drift.

17. Pesticides will not be transported in the same compartment with persons, food or feed. Pesticide containers will be secured to the vehicle during transportation in a manner that will prevent spillage into or off the vehicle.

18. The contractor will have a written training program for employees who handle pesticides. The written program must describe the materials and the information that will be provided and used to train the employees.

19. Training must be completed before an employee is allowed to handle any pesticide and be continually updated to cover any new pesticides that will be handled. Training must be repeated at least annually thereafter.

20. These special precautions will be observed during periods of inclement weather:

- Applications will not be made in, immediately prior to, or immediately following rain when runoff could be expected.
- Applications will not be made when wind and/or fog conditions have the potential to cause drift.
- Basal bark applications will not be made when stems are wet with rain, snow or ice.

**References**


