

Appendix E: Integrated Biological Control Management Plan



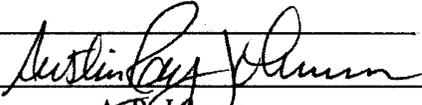
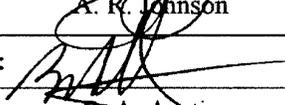
E **Appendix**

Integrated Biological Control Management Plan

Appendix E briefly describes the Hanford Site's Integrated Biological Control Management Plan.

Integrated Biological Control Management Plan

HNF-MP-5824, Rev. 0

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Integrated Biological Control Management Plan

1.0 INTRODUCTION

Biological control is any activity taken to prevent, limit, clean up, or remediate potential environmental, health and safety, or workplace quality impacts from plants, animals, or microorganisms. At Hanford the principal emphasis of biological control is to prevent the transport of radioactive contamination by biological vectors (plants, animals, or microorganisms), and where necessary, control and clean up this contamination. Other aspects of biological control at Hanford include industrial weed control (e.g.; tumbleweeds), noxious weed control (invasive, non-native plant species), and pest control (undesirable animals such as rodents and stinging insects, and microorganisms such as molds that adversely affect the quality of the workplace environment).

Biological control activities may be either preventive (*a priori*) or in response to existing contamination spread (*a posteriori*). Surveillance activities, including ground, vegetation, flying insect, and other surveys, and *a priori* control actions, such as herbicide spraying and placing biobarriers, are important in preventing radioactive contamination spread. If surveillance discovers that biological vectors have spread radioactive contamination, *a posteriori* control measures, such as fixing contamination, followed by cleanup and removal of the contamination to an approved disposal location are typical response functions. In some cases remediation following the contamination cleanup and removal is necessary. Biological control activities for industrial weeds, noxious weeds and pests have similar modes of prevention and response.

1.1 Objective

It is the objective of Fluor Hanford (FH) to limit and control the spread of radioactive contamination by biological vectors, and to prevent the off-site spread of contamination. Biological control activities can significantly affect the Hanford environment, ecosystems, safety of the workplace, project work-scope, and schedules (DOE-RL 1998). FH will have an effective, site-wide biological control program that is systematically integrated with environmental, safety, health and quality principles across the FH Projects, and with other Hanford Prime Contractors, consistent with the goals of the Hanford Strategic Plan. This includes the control of noxious weeds, industrial weeds, other vegetation, and animal pests for the purposes of protecting employees, the public, and Site cultural and environmental (including biological) resources.

1.2 Purpose and Scope

This management plan describes the structure, roles and responsibilities, requirements, and implementation of the **Integrated Biological Control (IBC)** program. The principal purpose of the IBC program is to control the transport of radioactive contamination by biological vectors beyond radiological control areas outside facility perimeters, and within and/or across the designated Hanford Areas (e.g., 100, 200, 300, 400, and 600 Areas). Radioactive contamination control within facility perimeters is the responsibility of the affected facility landlord and Radiological Control (RadCon) organization. However, by agreement with the affected facility landlord and the facility RadCon organization, the IBC program may take actions inside facility perimeters that are consistent with the IBC mission. IBC activities may take place on all types of real property controlled by FH including land, buildings, other facilities, waste sites, cribs, roadways, railways, and so on. It includes all biological vectors, plant or animal. Known biological vectors at the Hanford Site include 30 species of vegetation and 46 species of wildlife (e.g., tumbleweeds, rabbit brush, sagebrush, trees, fruit flies, termites, ants, wasps, toads, snakes, pigeons, swallows, waterfowl, hawks, owls, mice, pocket gophers, rabbits, bats, and coyotes).

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It is also the purpose of the IBC program to provide non-radiological biological control. This may directly interface with radiological protection, such as the control and reduction of seedbeds to prevent re-seeding of potentially contaminated areas and biological spread of contamination (e.g., from rolling tumbleweeds). Other types of non-radiological biological control include eliminating or reducing the spread of designated noxious weeds; inhibiting and removing biological vectors (e.g., rodents and insects) where employees are present to maintain a safe and desirable workplace and to limit the potential spread of disease; controlling the growth of industrial weeds in firebreaks to limit potential for and spread of fires; removing accumulations of industrial weeds to limit the potential for fire or structural damage; and inhibiting industrial weeds in access areas to provide unhindered access to site facilities. These types of non-radiological biological control activities may take place inside or outside the perimeters of facilities operated and controlled by Fluor Hanford.

1.3 Applicability

This program applies to all FH facilities and activities at the Hanford Site for biological control. It also applies to FH in its interactions with other Hanford Site contractors, mainly the Environmental Restoration Contractor (ERC), the Pacific Northwest National Laboratory (PNNL), and the River Protection Project (RPP) when IBC services may be provided by mutual consent using the FH resources of this program.

2.0 REQUIREMENTS

This section discusses the key regulatory drivers and guidance for integrated biological control activities at the Hanford Site. The drivers and guidance discussed here relate specifically to the unique features of Integrated Biological Control activities to potentially affect the well-being of the environment, workers, and public within the broad scope of environment, safety and health protection.

2.1 Radioactive Contamination Control and Cleanup

Three federal regulations provide nuclear safety and radiation protection requirements for IBC radioactive contamination control activities. 10 CFR 820 *Procedural Rules for DOE Nuclear Activities* requires DOE contractors to comply with nuclear safety regulations. 10 CFR 830 *Nuclear Safety Management* provides rules for safe management at DOE's nuclear facilities, with section 830.120 providing quality assurance requirements. This section notes "Work shall be performed to established technical standards and administrative control using approved instructions, procedures, or other approved means" meaning contractors may be held liable for failure to follow their own procedures and standards. Requirements for implementing 10 CFR 830.120 for FH and its contractors are found in HNF-MP-599 *Quality Assurance Program Description*.

Requirements for radiation protection are provided in 10 CFR 835 *Occupational Radiation Protection* with radioactive contamination control requirements specified in section 1102 (December 13, 1998). The requirements of 10 CFR 835 are implemented by FH under the contractual requirements of HNF-5173, *PHMC Radiological Control Manual*. Additional activity-specific direction is provided in a variety of Project Hanford procedures. Three Project Hanford procedures are related directly to radiological biological control activities; HNF-PRO-325, *Contaminated Wildlife or Vegetation*; HNF-PRO-425, *Evaluation of Outdoor Contamination*, and HNF-PRO-454, *Inactive Waste Sites*.

Noncompliances/violations to all of these federal rules are enforceable under the Price Anderson Amendments Act (PAAA).

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2.2 Noxious Weed Control

General information on noxious weed control is provided in the draft *Hanford Site Integrated Pest Management Plan* (WHC 1996). More specific information for noxious weed control is provided in *Guidelines for Coordinated Management of Noxious Weeds at the Hanford Site* (WHC 1995). Key drivers for these documents are:

The *Federal Noxious Weed Act of 1974*, as amended by Section 15 - *Management of Undesirable Plants on Federal Lands, 1990*, authorizes the Secretary of Agriculture "to cooperate with other federal and state agencies, and others in carrying out operations or measures to eradicate, suppress, control, prevent, or retard the spread of any noxious weed. Each federal agency shall 1) designate an office or person adequately trained to develop and coordinate an undesirable plants management program for control of undesirable plants on federal lands under the agency's jurisdiction, 2) establish and adequately fund an undesirable plants management program through the agency's budgetary process, 3) complete and implement cooperative agreements with State agencies regarding the management of undesirable plant species on federal lands, and 4) establish integrated management systems to control or contain undesirable plant species targeted under cooperative agreements."

Memorandum of Understanding for the Establishment of a Federal Interagency Committee for the Management of Noxious and Exotic Weeds, 1994 among the U.S. Department of the Interior, U.S. Department of Agriculture, U.S. Department of Defense, U.S. Department of Transportation, and U.S. Department of Energy identified government interagencies united efforts to control exotic and noxious weeds on government properties.

The *Revised Code of Washington Chapter 17.10 - Noxious Weed - Control Boards* provides the regulatory authority for control of noxious weeds in Washington. It also establishes county and regional noxious weed control boards, and the structure for establishing county noxious weed lists.

WAC 16-750, *Washington State Noxious Weed List and Schedule of Monetary Penalties* provides the list of species categorized in Washington as noxious weeds and delineates monetary penalties for failure to control their spread.

Memorandum of Understanding between the Washington State Department of Agriculture, Adams County Noxious Weed Control Board, Benton County Noxious Weed Control Board, Franklin County Noxious Weed Control Board, Grant County Noxious Weed Control Board, and U.S. Department of Energy Richland Field Office for Management of Noxious Weeds and Undesirable Plants, 1997, establishes agreement for ongoing control of noxious weeds on the Hanford Site between the U.S. Department of Energy, Richland Operations Office and the neighboring counties of Adams, Benton, Franklin, and Grant.

Executive Order 13112, "Invasive Species," dated February 3, 1999 directs federal agencies to prevent the introduction of invasive species, to detect and respond rapidly if invasive species are found, monitor for the presence of invasive species, provide for restoration of native species, conduct research on invasive species, and promote public education on these species.

2.3 Pest Control

General information on pest control is provided in the draft *Hanford Site Integrated Pest Management Plan* (WHC 1996). Procedures exist for animal control in WMTS-ACO-001, *Animal Control Operations*

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Procedures (WMTS 1999a), and for industrial weed control in ES-IVM-001, *Industrial Vegetation Management Procedures Manual* (WMTS-1999b). Key drivers for these documents are:

The *OSHA General Duty Clause (section 5(a))* of the *Occupational Safety and Health Act of 1970* requires employers to provide a safe and healthful working environment.

For protection of workers, *29 CFR 1910 Occupational Safety and Health Standards, Subpart J, General Environmental Controls, 1910.141(a)(5) Vermin Control* reads as follows: "Every enclosed workplace shall be so constructed, equipped, and maintained, so far as reasonably practicable, as to prevent the entrance or harborage of rodents, insects, and other vermin. A continuing and effective extermination program shall be instituted where their presence is detected."

The *Revised Code of Washington Title 77 - Game and Game Fish* provides the regulatory basis for a Nuisance Wildlife Control Permit administered by the Department of Wildlife and required for animal control activities at the Hanford Site.

2.4 Requirements Affecting All IBC Components

Pesticide Control

The *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)* gives the federal government control over pesticide sale, use, and distribution with EPA being the implementing regulatory agency. There is little delegation of authority to the states. The two main regulatory requirements under FIFRA are pesticide registration and use, with use being the regulatory driver for IBC activities. Facilities that use pesticides on their premises must comply with the requirements outlined by EPA on each pesticide container label. "General use" pesticides may be applied by anyone, but "restricted use" pesticides may be applied only by certified applicators or by persons working under the direct supervision of a certified applicator. Applicators are certified by a state if the state operates a certification program approved by the EPA.

The *Revised Code of Washington Chapter 15.58 - Washington Pesticide Control Act* sets requirements for the formulation, distribution, storage, transportation, and disposal of any pesticide and the dissemination of accurate scientific information (i.e., labeling) as to the proper use, or nonuse, of any pesticide.

The *Revised Code of Washington Chapter 17.21 - Washington Pesticide Application Act* sets the requirements for applying pesticides, including requirements for commercial pesticide applicator and operator licenses. Because of the commercial nature of Hanford facilities, only a licensed Commercial Pesticide Applicator, or someone working under that authority, may apply any pesticides or do pest control work on the Hanford Site.

Environmental and Biological Protection

The *Endangered Species Act (ESA)* provides for designation and protection of wildlife, fish, and plant species in danger of becoming extinct because of natural or human-made factors and for the conservation of the ecosystems on which these species depend. The Act makes it illegal to kill, collect, remove, harass, import, export, or conduct interstate or international commerce in an endangered or threatened species without a permit from the Secretary of the Interior. The Act requires all federal agencies to use their authorities to carry out programs that conserve endangered or threatened species.

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The *Migratory Bird Treaty Act* (MBTA) prohibits hunting, taking, killing, capturing, or possessing migratory birds (or any part, nest, or egg of such a bird) except as authorized by regulation or in accordance with a permit. The U.S. Fish and Wildlife Service designates those species that qualify as migratory birds under the Act and administers the permit system.

The *National Environmental Policy Act* (NEPA) sets forth a national policy to protect, preserve and enhance the environment and make it “the continuing responsibility” of all federal agencies to further this policy. It requires federal agencies to prepare a “detailed statement” analyzing the environmental impacts of all “major federal actions significantly affecting the quality of the human environment.” NEPA has a dual purpose of aiding the federal decision making process and informing the public. DOE has published requirement for implementing NEPA in 10 CFR 1021 “National Environmental Policy Act Implementing Procedures,” which adopt the Council on Environmental Quality NEPA regulations at 40 CFR 1500 through 1508. For the most part IBC activities have been addressed and are covered by categorical exclusions in 10 CFR 1021.

The *National Historic Preservation Act of 1966* protects resources of historical significance. It requires federal agencies to evaluate potential impacts to “cultural” resources prior to conducting operations that could destroy the resource.

Hanford Site Guidance for Ecological and Biological Protection

DOE-RL is responsible for conserving fish, wildlife, and plant populations and their habitats on the Hanford Site and requires Hanford Site contractors to do the same. The IBC Program must assist in efforts to ensure that potential impacts to biological resources from FH activities are adequately assessed, avoided or minimized and mitigated where appropriate, and, if damage results, provide for remediation or compensation. Accordingly, adherence to the following plans is recommended for IBC activities.

The *Draft Hanford Site Biological Resources Management Plan* (BRMaP) (DOE 1996a) provides a management strategy for addressing the overall health of the Hanford ecosystem, including potential impacts to threatened and endangered species. It addresses monitoring and managing biological resources, and establishes biological resource management priorities and strategies.

The *Biological Resources Mitigation Strategy* (BRMiS) (DOE-RL 1996b) addresses mitigation after project completion via habitat improvements and establishing and operating mitigation banks. This strategy is particularly important for guiding the direction of IBC remediation activities.

The *Ecological Compliance Assessment Management Plan* (ECAMP) (DOE-RL 1995) is focused on biological resource impact assessment and management. It addresses impact evaluation, impact minimization through identification of alternative project sites, impact minimization through identification of alternative project scheduling, and identifying habitat mitigation to projects as per the direction of the Biological Resources Mitigation Strategy.

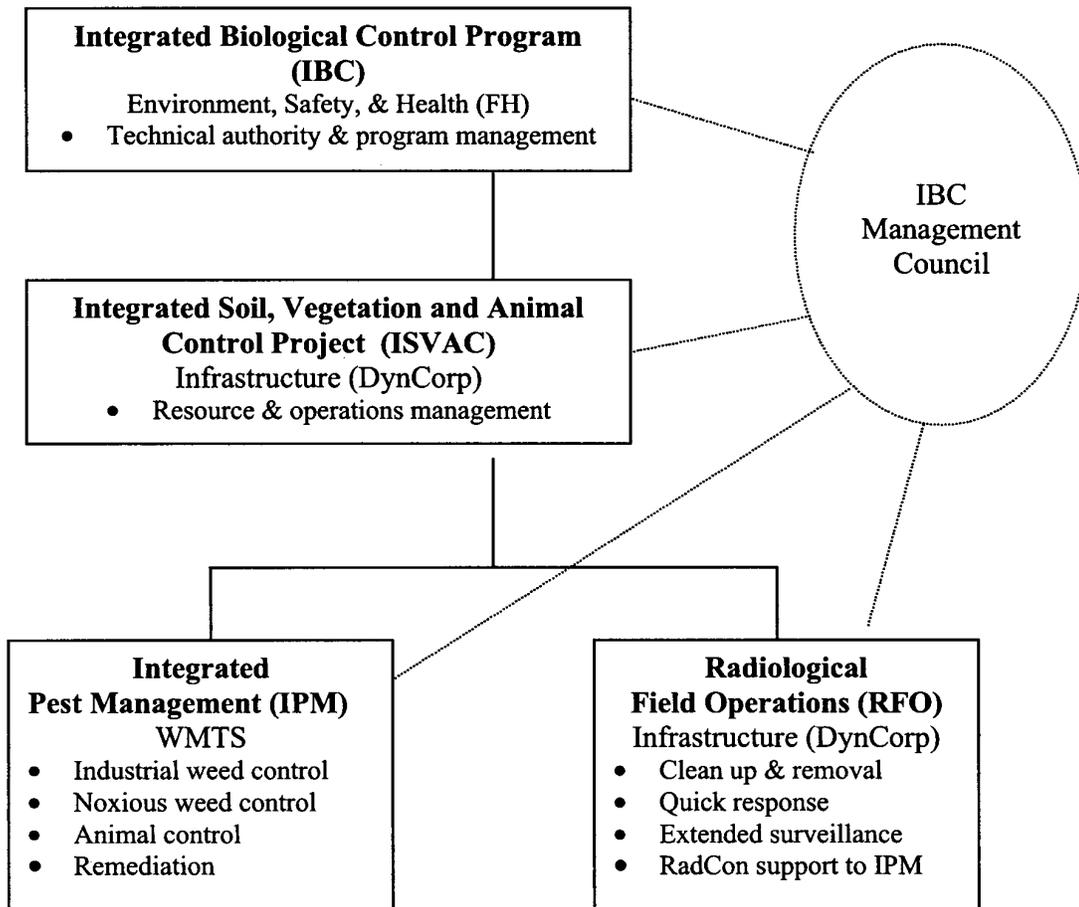
3.0 ROLES AND RESPONSIBILITIES

Integrated Biological Control services are provided to all FH organizations through the centrally funded IBC program administered and managed through the FH Radiation Protection functional organization. For routine biological control activities, there are no direct charges to FH organizations or projects. The organization of the IBC is presented in Figure 1. Roles and responsibilities of the key program components and associated contacts for integrated biological control are presented below.

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Figure 1. Organization of the Integrated Biological Control Program



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3.1 Biological Control Manager

Fluor Hanford manages the *Integrated Biological Control* program. The Biological Control Manager directs this program as part of the Environment, Safety and Health (ES&H) organization, has technical authority for environment, safety, and health issues as well as overall integration and relationship responsibility and in particular, responsibility for regulatory interface. The manager also provides strategic direction for IBC. Specific functions or responsibilities of the Biological Control Manager are:

- overall IBC program management, including responsibility for the IBC Management Plan, program policies, objectives and procedures, and current year and long-term planning,
- technical authority for biological control issues,
- program centralization, integration, coordination and prioritization,
- oversight of *Integrated Soil, Vegetation, and Animal Control* Project (ISVAC) operations,
- interacting with: DOE, State & local regulators; Hanford Site contractors (PNNL, ERC, RPP) and other Site entities; and Near Facility Monitoring (NFM)
- interaction with PNNL for environmental compliance issues,
- management review,
- internal program oversight and evaluation,
- establishing the membership of the IBC Management Council (includes all managers in this chapter, plus others as determined by the Biological Control Manager), and
- chairing the periodic meetings of the IBC Management Council.

3.2 ISVAC Project Manager

The *Integrated Soil, Vegetation, and Animal Control* Project (ISVAC) is managed as part of the Infrastructure organization by DynCorp Tri-Cities Services, Inc., (DynCorp) and is the other principal IBC management element, providing tactical direction. DynCorp provides the ISVAC Project Manager, who has responsibility for resources, operations, and financial management for all IBC field operations and functions as approved by the FH Biological Control Manager. The ISVAC Project Manager is also responsible for providing field direction to the Radiological Field Operations and Integrated Pest Management and is the principal Infrastructure representative for biological control issues. Specific functions or responsibilities of the ISVAC Project Manager are:

- operations management,
 - resource (manpower, equipment, funding) management,
 - financial management and funding, including budgeting, cost tracking, and reporting
 - scheduling (current year work plan),
 - planning (next two years work plans),
 - contracting and task orders for field operations,
 - responsibility for overall implementation of radiological field operations and integrated pest management services,
 - interacting with: facility landlords and project managers, Near Facility Monitoring, and Environmental Restoration Contractor (ERC) and River Protection Project (RPP) for operational issues,
 - prioritizing activities,
- management review, self-assessment, and
- member of IBC Management Council.

3.3 Radiological Field Operations Manager

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Radiological Field Operations (RFO) are also provided by the Infrastructure organization. These functions include cleanup of contaminated vegetation and soil, removal of contaminated vegetation, animals, and soil, extended surveillance and controlled area posting and de-posting in support of cleanup and removal, and radiation protection support to Integrated Pest Management where needed. The Radiological Field Operations Manager directs teams responsible for radiological field operations. Team members are qualified radiation workers and include Radiation Control Technicians (RCTs), Nuclear Plant Operators (NPOs), and Teamsters. Operations of the Quick Response Team (QRT) are included in this area. Because many members of the RFO also provide support to NFM, communication between NFM and IBC within this component are well integrated and coordinated. Specific responsibilities of the RFO Manager are directing radiological field operations, supervising the radiological field teams, establishing field team leads, and serving as a member of the IBC Management Council.

3.4 Integrated Pest Management Manager

Integrated Pest Management (IPM) services are provided contractually by Waste Management Technical Services (WMTS). IPM services include industrial and noxious weed control that consists principally of herbicide spraying and animal control that includes baiting and removal of animal pests. The IPM Manager directs pest management operations. Control activities often involve the application of pesticides, so key members of control teams are Licensed Commercial Pesticide Applicators (CPA) and Licensed Commercial Pesticide Operators (CPO). IPM may also include small-scale remediation activities that may take place in the field following operational disturbances or radiological cleanup related to biological transport or control activities. Remediation activities are cooperative efforts that involve WMTS, ERC, and PNNL scientists in addition to IPM field team members. The Biological Control Manager, as the IBC technical authority, is also a participant. Specific responsibilities of the IPM Manager are directing Integrated Pest Management services, supervising all nonradiological/pest management field teams, and serving as a member of the IBC Management Council.

3.5 IBC Management Council

The IBC Management Council is a forum to discuss the current status of IBC activities and exchange information and ideas about biological control at the Hanford Site. Generally, the council meets weekly. The mandatory membership of the council is the four IBC managers (Biological Control Manager, ISVAC Project Manager, Radiological Operations Manager, and Integrated Pest Management Manager) and a representative of Near Facility Monitoring. The Biological Control Manager chairs the Council. At his discretion or the recommendation of other members, the Biological Control Manager may name other members to the council, or request the attendance of other individuals.

3.6 Near Facility Monitoring

WMTS also has responsibility for Near Facility Monitoring (NFM). The NFM has responsibility for environmental monitoring outside facility perimeters for radioactive contamination. IBC field and administrative support activities are provided cooperatively by WMTS under mechanisms established to support NFM. These may include data collection and database entry, waste site ranking, mapping and Geographic Information System (GIS) interface with the ERC, and data and text preparation for reporting. Report material is prepared and submitted under the auspices of Near Facility Monitoring with the agreement of the Biological Control Manager for biological control reporting. A more extensive description of NFM responsibilities is provided in Chapter 4.0.

3.7 Project Areas

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The responsibilities of Project Areas include establishing a point of contact for inquiries from any of the IBC components, providing access for field operation teams conducting biological control activities in or on contractor facilities, and generally following provisions of the IBC Management Plan. Specific guidance is also provided via formal letter from the Biological Control Manager.

3.8 Hanford Site Contractors

1. Environmental Restoration Contractor (ERC)

The ERC has no direct responsibilities under the IBC Program Plan which principally guides the actions of FH and its contractors. However, to ensure biological control activities are integrated and coordinated sitewide, the ERC is expected to consult with the Biological Control Manager or his designee for specific program areas to ensure ERC and FH activities are not in conflict, do not negatively affect the activities of other contractors, and provide for effective sitewide use of resources.

Specific responsibilities of the ERC with respect to the IBC Management Plan may be established by mutual consent through a Service Agreement to determine appropriate interfaces and coordinate services.

2. Pacific Northwest National Laboratory (PNNL)

PNNL has no direct responsibilities under the IBC Plan, which principally guides the actions of FH and its contractors. However, to ensure biological control activities are integrated and coordinated sitewide, PNNL is expected to consult with the Biological Control Manager or his designees for specific program areas to ensure PNNL and FH activities are not in conflict, do not negatively affect the activities of other contractors, and provide for effective sitewide use of resources. PNNL has been tasked by DOE-RL the responsibility for reviewing potential biological and cultural resource impacts from IBC activities, as part of the Environmental Compliance Assessment Project.

Specific responsibilities of the PNNL with respect to the IBC Management Plan may be established by mutual consent through a Service Agreement to determine appropriate interfaces and coordinate services.

3. River Protection Project (RPP)

The RPP has no direct responsibilities under the IBC Management Plan, which principally guides the actions of FH and its contractors. However, to ensure biological control activities are integrated and coordinated sitewide, the Biological Control Manager, or his designee, has the responsibility to consult with RPP for specific program areas to ensure RPP and FH activities do not negatively affect the activities of other contractors (e.g., allowing biological vectors to spread contamination to other facilities) and to provide for effective sitewide use of resources.

Specific responsibilities of the RPP with respect to the IBC Management Plan may be established by mutual consent through a Service Agreement to determine appropriate interfaces and coordinate services.

4. Others

Other Hanford Site entities may also chose to contract integrated pest control or other biological control services from the contractors operating the program components. The responsibilities of these entities with respect to the IBC Management Plan may be specifically determined in such cases. In any event,

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integration and coordination are essential to ensure effective use of resources. Other Hanford Site entities that may potentially contract services include LIGO, US Ecology, Energy Northwest, the Port of Benton, and others.

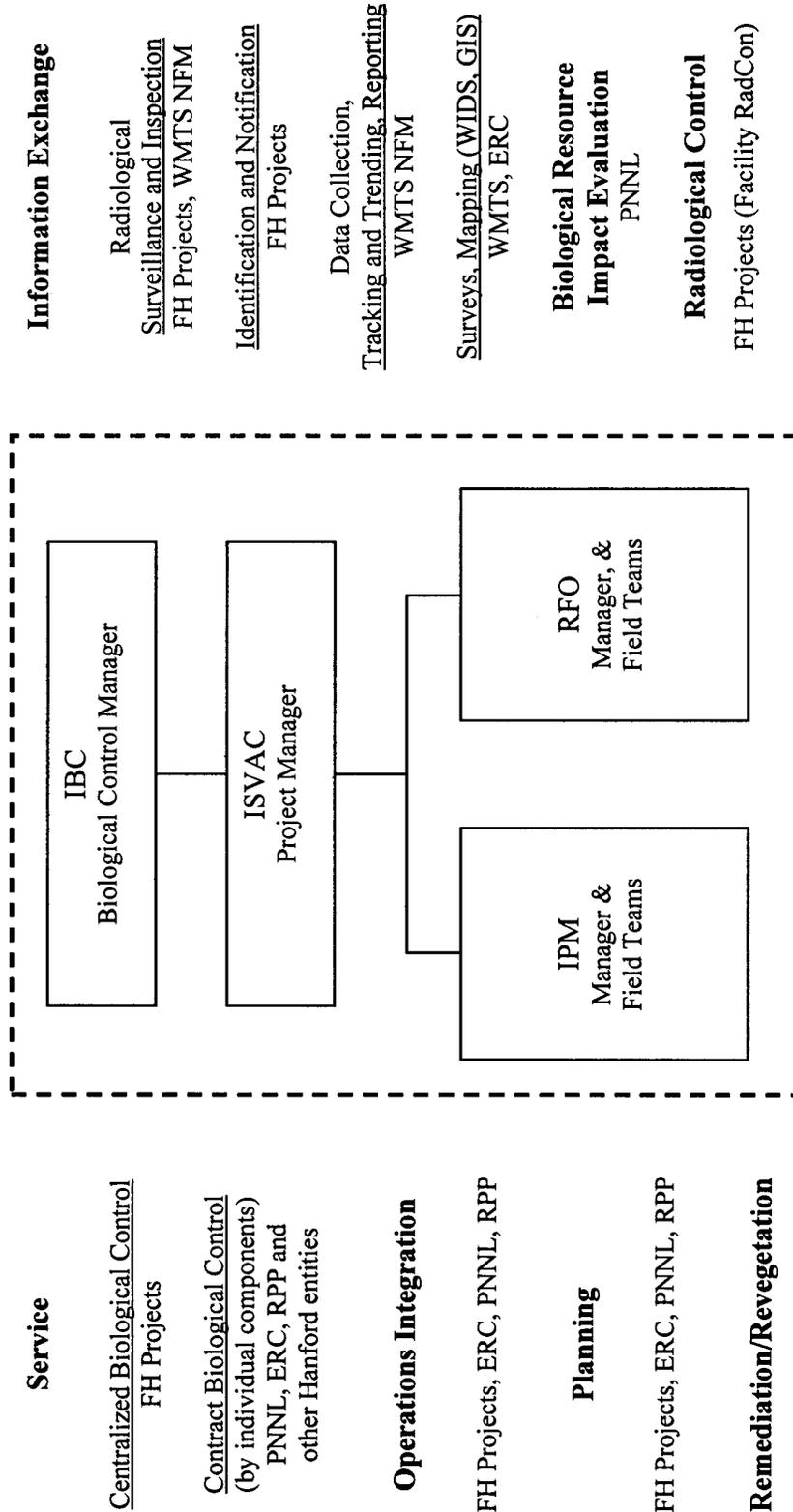
Specific responsibilities of these entities with respect to the IBC Management Plan may be established by mutual consent through a Service Agreement to determine appropriate interfaces and coordinate services.

4.0 FUNCTIONAL RELATIONSHIPS

The Integrated Biological Control program has a multi-faceted group of relationships with other Hanford Site organizations and projects, in the role of service provider, client, information exchange, or in other cooperative relationships with the same planning and operative objectives. These relationships are described, and shown in Figure 2.

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Figure 2. Functional Relationships of the IBC Program for Hanford Site Integrated Biological Control.



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4.1 Service

As the service provider, the IBC Program provides routine biological control services to facility landlords and project managers for FH facilities and projects. The respective roles of client and service provider are clarified in letters sent to representatives of each of the major FH projects from the ISVAC Project Manager. In some infrequent cases, those where special biological control activities are needed, service is still provided but roles may be somewhat different. In these cases, additional support from facilities may be needed and a more interactive relationship develops. The facility may actually take more of a provider role, to ensure biological control activities being undertaken have adequate support to accomplish the objectives.

Biological control and pest management services may also be provided on a contract basis to other Hanford Site contractors, including PNNL, ERC, and RPP contractors and to other non-Hanford entities by WMTS, which operates the Integrated Pest Management component. In these cases the guidelines and direction of this plan would not apply, with the contractor retaining responsibilities normally taken by other components of the program.

4.2 Information Exchange

Surveillance and inspection. An important information exchange relationship exists between IBC components and Near Facility Monitoring (NFM). Near Facility Monitoring has responsibility for environmental monitoring and inspection of known potential radioactive contamination areas in the environment of FH facilities and for ranking these waste sites for cleanup priority (WMTS 2000). Additionally, NFM has surveillance and inspection responsibility for unoccupied facilities where FH facility radiological control (RadCon) organizations do not have primary survey responsibility. Near Facility Monitoring in cooperation with and at the request of RPP, may provide surveillance support over RPP source terms such as cribs, transfer lines, and facility perimeters. As a result of its surveillance activities, NFM directly contacts the RFO when areas of contaminated vegetation (and surrounding soil) or contaminated animals are identified. The RFO then is responsible for cleanup and notifying NFM of the resulting area status. In the event contamination is found in an unexpected location by either RFO or NFM, the respective managers will notify the Waste Site Management program to determine ownership and if the location is an "orphan" waste site.

Data Collection, Tracking and Trending, and Reporting. Another area of cooperation and integration in information exchange is with the NFM in data collection, analysis, and reporting. Near Facility Monitoring is responsible for acting as the central point of contact for radiological surveillance and biological contamination data. Information on biological contamination events and environmental contamination are provided to members of the IBC Management Council weekly. The Biological Control Manager may request more detailed information or analysis of data to assist in evaluation and trending of biological contamination events. These data are reported in the *Quarterly Environmental Radiological Survey Summary* (FDH 1999a), which includes the most recent quarterly data plus data for approximately the last five years. Chapter 4.0, Biotic Transport, specifically addresses biological contamination events and vectors. In addition, more detailed information is kept and a database is being developed by WMTS to make all historical Hanford biological contamination information available electronically. Radiological and noxious weed control information are reported in the Hanford Annual Site Environmental Report, and there is ongoing communication with the county noxious weed control board. Information specifically related to industrial weed control is kept internally and not routinely reported externally, although reports on pesticide application including what was sprayed, number of acres, and spraying conditions are required by state regulations and available at any time to State regulators.

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Surveys and Mapping. WMTS also provides radiation and contamination area mapping for FH, including contamination areas, soil contamination areas, and underground radioactive material. Mapping is also conducted to support control of noxious weeds. This information is updated quarterly and provided to the ERC, which operates the Hanford Geographic Information System (HGIS), the central repository for Hanford GIS data. Data are collected using survey-grade global positioning system (GPS) equipment and using ERC procedures. The updated information is reported in the *Quarterly Environmental Radiological Survey Summary* (FDH 1999a). Currently there is no mapping or GIS information related specifically to biological control activities or biological contamination events, although technical capability does exist for event locations to be plotted using GIS capabilities.

4.3 Planning and Operations Integration

All biological control activities on the Hanford Site require integration and coordination among the IBC components and the facility landlords and project managers, and, in many cases with other Hanford Site contractors. For example, application of herbicide to a FH site adjacent to an active ERC project may require coordination to minimize impacts to both operations. As a result, the Biological Control Manager and ISVAC project manager maintain contact and share information with all site contractors to facilitate effective biological control activities. Revegetation and remediation activities following cleanup are an important area for integration and coordination. The Biological Control Manager sponsors a bi-monthly Technical Exchange meeting on biological control that includes all interested Hanford Site parties, including regulators.

4.4 Radiological Control (RadCon)

Radiological control is an integral part of IBC operations. The RFO Manager has direct RadCon responsibilities, and Radiological Control Technicians (RCTs) are integral part of all the RFO field teams. Guidance and direction for radiological control/radiation protection issues is provided to the Biological Control Manager by Radiation Protection, part of the Environment, Safety, & Health organization. For radiological control issues at specific facilities the responsible contractor RadCon organization may also provide direction and guidance. The ISVAC project manager and the RFO manager are responsible for coordinating with facility RadCon organizations where needed. Similarly, the IPM manager must interface with the responsible RadCon organization to make sure that all IPM field teams are cognizant of radiological conditions and contamination areas where pest control operations are to take place. When ISVAC Teams are requested by another Contractor (e.g., PNNL, ERC, or RPP) to enter their facilities or areas for the purpose of providing biological control work, that work will be conducted under the host Contractor's Radiation Work Permit (RWP).

4.5 Biological Resource Impacts

The PNNL Ecological Compliance Assessment Project has responsibility for determining the regulatory basis and evaluating the potential for biological resource impacts from FH biological control activities. PNNL uses the *Ecological Compliance Assessment Management Plan* (DOE-RL 1995) (see section 2.5) as a basis for evaluating and minimizing impacts. The Biological Control Manager is the primary interface with the Ecological Compliance Assessment Project, (initiates ecological compliance review).

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5.0 REFERENCES AND KEY CONCEPTS

5.1 References

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5.2 Key Concepts

This section provides descriptions of key concepts that are needed to understand the role and function of biological control at the Hanford Site.

A **biological vector** is a member of a biological species – plant, animal, or microorganism – that is involved in the passive or active movement or transport of radioactive contamination. A common Hanford example is the tumbleweed, whose taproot may transport radionuclides from below surface into the aboveground plant tissue, making it available for active dispersal if the plant is moved across the site by wind.

Biological control (or often simply “control”)is any activity taken to prevent, limit, clean up, or remediate potential environmental, health and safety, or workplace quality impacts from plants, animals,

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or microorganisms. The radiological component includes activities to address the potential spread of radioactive contamination, while the non-radiological component includes activities to control pests that may affect the workplace.

Animal control is any activity taken to prevent, limit, or remove undesirable animals and arthropods through use of chemical, cultural or mechanical methods. Arthropods include any invertebrate animals that belong to the phylum *Arthropoda*, which includes insects and allied classes whose members are wingless and usually have more than six legs (i.e., spiders, mites, ticks, and centipedes).

Industrial weeds – weeds on industrial sites– are not only a nuisance but also cause fire hazards, contribute to losses for stored equipment and materials, and reduce the efficiency of men and machines working in the area. Usually, the objective of a weed control program in industrial areas is to totally eliminate vegetation. Plant growth must be controlled to make sure the industrial area is safe, usable, attractive, as inexpensive as possible to maintain, and not harmful to the environment of the surrounding area. Areas that are often the focus of industrial weed control are tank farms and pumping installations, industrial sites, transmission lines and stations, warehouses and buildings, storage and work areas, and along fence lines.

A **noxious weed** is a non-native plant that is generally highly aggressive, and which can cause problems for natural areas, agriculture, and/or recreation. "Noxious" is a legal designation, and not simply a matter of personal annoyance. In the US, noxious weeds are usually regulated on a State and County basis, depending on how serious the threat is to a particular area and how widespread the weed is already. If a weed is under *quarantine*, it is illegal to propagate, transport, or offer to buy or sell any part of the plant. Trained personnel are required to treat noxious weeds because even to kill or remove the weed can spread seeds or other plant parts further. The *Federal Noxious Weed Act* notes that a noxious weed includes any living stage, such as seeds and reproductive parts of any parasitic or other plant of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation, or the fish or wildlife resources of the United States or the public health. According to the Revised Code of Washington (RCW), a noxious weed is any plant which when established is highly destructive, competitive, or difficult to control by cultural or chemical practices (RCW 17.10.010). These are often plants that form unnoticeable components of their native communities, but have become aggressive invaders in new environments and can overcome native species. Noxious weed control is essential to preserve native ecosystems and wildlife habitat in some areas of the Hanford site.

Remediation is a common activity on the Hanford Site, but has specific meaning and limitations as applied to Integrated Biological Control activities. It may be undertaken in response to the disturbance of land areas because of biological transport of contamination or biological control activities including cleanup. It may include soil removal and replacement, revegetation of soil surface, or placement of engineered barriers to biological intrusion (biological barriers). Such remediation is typically performed on sites where there is the potential for recurring problems of surface contamination or infestation, with the objective of preventing recurrence.

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5.3 Acronyms

DynCorp	DynCorp Tri-Cities Services, Inc.
ERC	environmental restoration contractor
ES&H	environment, safety, and health
FH	Fluor Hanford, Inc.
IBC	integrated biological control
IPM	integrated pest management
ISVAC	Integrated Soil, Vegetation, and Animal Control Project
NFM	near facility monitoring
PNNL	Pacific Northwest National Laboratory
RadCon	radiological control
RFO	radiological field operations
RPP	River Protection Project
WMTS	Waste Management Technical Services