

## INTEGRATED CONTROL OF BIOLOGICAL VECTORS ASSOCIATED WITH TRANSPORTING RADIOACTIVE CONTAMINATION

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The Department of Energy – Richland Office, in early 1998 conducted a formal inquiry into the extent and cause of an apparent increase of radioactive contamination incidents caused by biological vectors at the Hanford Site. This increase was noted to be growing at a linear rate since 1994 and amounted to approximately 20 additional cases each year (145 in 1997). A broad range of biota had been involved, including *Salsola kali* (tumbleweeds), *Pogonomyrmex owyheii* (harvester ants), *Peromyscus maniculatus* (deer mice), and *Canis latrans* (coyotes). The findings indicated that there were deficiencies in four areas: surveillance, cleanup, control, and remediation or restoration. Subsequent investigations by Fluor Hanford, the Management and Integration Contractor at Hanford, confirmed that there was a concern, that more than 80 species of biota had been implicated in radioactive transport, and confirmed the DOE conclusions of the areas needing to be improved. Additional impetus for improved control of biological vectors occurred in the fall of 1998 when *Drosophila melanogaster* (fruit flies), a previously unknown vector, were directly implicated in transfer of radioactive contamination from the Hanford Site core areas, via hauling of nonregulated refuse, to a local community landfill. Resolution of this problem alone was extremely costly and ranged from identification of the vector and source, to retrieval of the contaminated refuse, to eradication of the flies, to sealing the source. A new program, including the monitoring and surveillance of flying insects, was created in the Office of Radiation Protection to deal with the control of biological-related radioactive contamination. The program was designed to integrate with existing functions within such organizations as Environmental Monitoring, Radiation Protection, and Site Infrastructure. Through integration it was possible to enhance ongoing control efforts, to avoid redundant operations, and to implement missing aspects of surveillance, cleanup, control, and restoration. This poster presents the scope of the findings of both inquiries; the design of the program created to resolve those findings; the benefits noted in the first year of operation; and the lessons learned during the first year of operation.

### FINDINGS OF DOE & FLUOR HANFORD INQUIRIES INTO INCREASES IN BIOTA-CAUSED SPREAD OF RADIOACTIVE CONTAMINATION:

- Contamination caused by biota (i.e., vegetation and animals) is increasing in a roughly linear manner and is threatening to get out of control.
- Contamination spread due to biota is not uniformly addressed or corrected.
- Control of biological-caused spread of radioactive contamination should be integrated under one contract rather than 90 separate contracts existing at the time.
- Control of biological-caused spread of radioactive contamination should be monitored and controlled in a uniform manner rather than at the discretion of various projects.
- Surveillance should be expanded to detect contamination at suspected underground waste sites and transfer lines, and sites with deep-rooted vegetation and burrowing animals.

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- Cleanup of contamination and biota intrusion sites detected during surveillance should be immediate rather than relying on posting requirements.
- Control of deep-rooted vegetation, burrowing animals, and flying insects should be pursued with graded-approach vigor at all projects and facilities.
- Restoration, such as reseeded disturbed areas with native grasses, at source locations of contamination would decrease the frequency and cost of biological contamination control.

**BIOLOGICAL CONTROL PROGRAM DESIGN:**

- Create an Integrated Biological Control Program under the direction of Fluor Hanford's Radiation Protection Director.
- Develop policies and procedures to unify the control of biota with the potential to spread radioactive contamination.
- Integrate the control of biota and provide uniform support to all projects.
- Unify all biological control contracts (~90) into one.
- Increase environmental surveillance to monitor recent biological-caused contamination incidents (e.g., fruit flies).
- Create a cross-craft Bargaining Unit Cleanup Team composed of Radiation Control Technicians, Nuclear Chemical Operators, and Teamsters to respond to detected contamination, to provide prompt cleanup, and isolate of detected sources.
- Allow the Cleanup Team to make decisions to take proactive measures to prevent biological intrusion on known or suspected waste sites.
- Initiate restoration of waste sites to conditions that are not supportive of deep-rooted vegetation, and burrowing or flying animals.

**FIRST YEAR BENEFITS:**

- A three-fold increase in the area treated for control of deep-rooted vegetation (~ 1600 hectares in 1998 to ~ 4900 hectares in 1999).
- Use of a helicopter to increase the area treated with herbicides to control deep-rooted vegetation.
- Eradication of deep-rooted contaminated vegetation at three former problem locations.
- Monitoring of additional biota (e.g., flying insects).
- Timely application of chemical controls.
- Restoration of shallow-rooted vegetation at selected sites.
- Cleanup of ~ 4 hectares of previously contaminated land.
- Application of biobarrier to two locations with recurring contamination spread.
- Increased cleanup with decreased reliance on posting.

**LESSONS LEARNED:**

- Ask yourselves "what species are out there and are they spreading contamination?"
- It's easier and cheaper to prevent problems than clean them up.
- Look to long term fixes such as restoration of native vegetation and habitats.
- Things that you didn't think would go wrong sometimes do.
- It's sometimes harder than you thought it would be.

- Be flexible.
- Talk and listen to the first-line workers.
- Check it out - don't just speculate.
- Spend time in the field
- Recognize good work.
- Communication is absolutely necessary.
- Publicize your results.

TABLE:

- Table showing yearly increase in number of biota-caused contamination incidents.

**CONTAMINATED BIOTA INCIDENT TRENDS**

