7-24-2007

Implementing an Agricultural Chemical Removal Project to Protect Water Quality

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Abstracts of the presentations given on Wednesday, 25 July 2007, in Session 11 of the UCOWR Conference.

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Introduction

Agricultural chemicals, including pesticides, herbicides, and fertilizers, can pose a significant threat to water quality (Anderson et al. 1997; Rinella and Janet 1998; Blomquist et al. 2001). The McKenzie River is the sole source of drinking water for more than 200,000 people in Eugene, Oregon and surrounding communities, and the Middle Fork Willamette River provides drinking water to an additional 60,000 people in the Springfield area. The Eugene Water & Electric Board (EWEB) and Springfield Utility Board (SUB) have Oregon Department of Environmental Quality (DEQ)-approved Drinking Water Source Protection Plans that list pesticides as a major threat to drinking water supplies (EWEB 2000). In addition to posing a risk to public health, agricultural chemicals also increase raw water treatment costs, as most treatment plants are not designed to handle these contaminants. Besides human health concerns, both watersheds provide habitat for ESA-listed fish, with the McKenzie River having one of the last populations of native bull trout in the Northwest (ODFW 2005).

Both the McKenzie and Middle Fork Willamette Watersheds are located in the larger Willamette Basin in western Oregon. Studies conducted by the US Geological Survey (USGS) have found increased levels of pesticides and nutrients at monitoring sites in agricultural areas of the Willamette Basin (Anderson et al. 1997; Rinella and Janet 1998; Blomquist et al. 2001). An analysis conducted by EWEB found that almost 8,000 pounds of chemical active ingredients (such as herbicides and insecticides) are applied to crops in the McKenzie Valley on an annual basis (EWEB 2006a). In a recent survey of over 700 growers in the Upper Willamette Basin by Oregon State University (OSU) Extension, it was found that thousands of gallons of obsolete agricultural chemicals remain on farms. Over 1,500 pounds of DDT were found in dilapidated containers at one farm (Penhallegon, personal communication, June 27, 2005). Some reasons for continued presence of these chemicals may be; high disposal cost ($5-8/gallon), growers do not know how to handle these illegal chemicals, and growers are not allowed to participate in household hazardous waste collection events.

In order to address the risk from old agricultural chemicals near these critical resources, EWEB applied for and received a grant from the Governor's Fund for the Environment to conduct an agricultural chemical collection program in the McKenzie and Middle Fork Willamette watersheds. The purpose of the Agricultural Chemical Removal Project was to remove pesticides and other chemicals from the McKenzie and Middle Fork Willamette Watersheds in order to protect a critical drinking and groundwater resource. The project was designed to allow growers in these watersheds to dispose of old pesticides, fertilizers, waste oil, and other chemicals at no cost or risk to themselves. Grant funds were available to assist growers with identifying unknown chemicals and repacking containers to ensure that they would be safe for transport to the collection site. In addition to protecting domestic wells and drinking water

sources, removing these types of chemicals also protects people, pets, livestock, and wildlife from accidental exposure. The project collected approximately 44 tons of pesticides and other chemicals over 10 collection days and was the result of a partnership between the Eugene Water & Electric Board (EWEB), Springfield Utility Board (SUB), Lane County Public Works Waste Management Division, Oregon State University (OSU) Extension, the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Human Services (DHS) Drinking Water Program, McKenzie Fire & Rescue, and Eugene Fire (Region 2 HazMat Team).

Objectives

The objectives of the agricultural chemical collection project were to:

1. Assess the magnitude of risk to drinking water supplies from obsolete agricultural chemicals;

2. Educate growers on proper chemical storage and use to reduce exposure to family, pets and farm animals, and protect domestic wells and waterways;

3. Remove obstacles that prevent growers from participating in the disposal of old chemicals;

4. Make the process of chemical identification and removal as easy as possible for growers;

5. Use existing partnerships to efficiently and effectively assess, remove, and dispose of agricultural chemicals;

6. Document process, quantities and types of chemicals disposed, costs, lessons learned, and recommendations for improvement to assist in the implementation of similar projects in other parts of the state; and,

7. Remove a significant risk from obsolete agricultural chemicals in the McKenzie and Middle Fork Willamette watersheds to protect both drinking water resources for Oregon's second largest population center and critical ESA fish habitat.

Methods

The Eugene Water & Electric Board (EWEB) obtained a $40,200 grant from the Oregon Governor's Fund for the Environment, as well as $5,840 of DEQ Section 319 grant funds and $70,000 in matching funds or in-kind services to implement the agricultural chemical removal project. As mentioned above, EWEB partnered with several other local agencies to execute this project, including the Springfield Utility Board (SUB), Lane County Public Works Waste Management Division, OSU Extension, Oregon DEQ, Oregon DHS (Drinking Water Program), McKenzie Fire and Rescue, and Eugene Fire (Region 2 HazMat Team).

EWEB wrote a project implementation plan (EWEB 2006b) to guide the project execution, which described the roles and responsibilities of the various agencies involved and outlined the

project schedule. In addition, project partners held several planning/coordination meetings to further flesh out roles and responsibilities, brainstorm about how to handle event logistics, ensure that all partners were in agreement with the process, and keep activities on schedule. It was helpful that several of the project partners had worked together previously.

Using the implementation plan mentioned above, the project team conducted the following steps/tasks to accomplish this project:

1. *Conducted extensive farm surveys and outreach to inform growers of the project and encourage participation.* EWEB and SUB created a database of growers in their respective watersheds and generated a mailing list for the project. Correspondence sent to growers included:
   - Initial postcard describing the project and alerting growers that more information would be forthcoming
   - Cover letter describing the project in more detail and listing the steps required to participate, along with a farm chemical survey to complete
   - Two reminder postcards reiterating collection dates and encouraging growers to participate
   - Appointment postcards reminding growers of their scheduled appointment times and providing directions to the collection facility

   One public meeting in each watershed was held to answer any questions about the project and assist growers in filling out forms. The farm chemical survey was also posted on EWEB's website so that growers could download the survey if they had internet access.

2. *Conducted farm visits (when requested) to assist growers with chemical identification and/or overpacking of wastes for safe transport to the collection event.* EWEB, SUB and Lane County Waste Management, with help from McKenzie Fire & Rescue and Eugene Fire Region 2 HazMat, conducted more than a dozen onsite farm visits. Partners assisted growers with chemical identification, overpacked wastes that were in containers unsuitable for safe transport, removed empty rusted drums, and loaded containers onto growers' trailers or trucks if needed.

3. *Evaluated farm chemical survey results and developed a collection event plan to document the collection process and logistics of conducting the collection events.* As growers returned farm chemical surveys, the information was entered into an Access database. The amount and type of chemicals listed by growers helped Lane County Waste Management to develop a collection plan (Lane County 2006) for the actual collection event that addressed the logistics of traffic flow, chemical identification, handling, and sorting, storage procedures, safety and training, emergency response, etc.

4. *Scheduled dates and times with growers for delivery of chemical wastes at Lane County Waste Management's household hazardous waste facility in Glenwood.* The project team scheduled time slots for each grower over the five collection events. Time slots ranged from 15-45 minutes, depending on the amount of chemicals growers were planning to bring in for disposal.

5. *Conducted a series of collection events at the Glenwood facility for growers in the McKenzie and Middle Fork Willamette watersheds.* Five collection events were scheduled at Lane County Waste Management's household hazardous waste facility in Glenwood (October 18, 19, 20, 25, and November 1). Based on the procedures described in the Chemical Collection Plan, Lane County Waste Management personnel handled the actual collection logistics, offloading and sorting the chemicals, and providing growers with a summary "receipt" if desired.

6. *Conducted final outreach effort to growers.* After the completion of the collection events, the total amount of chemicals received was calculated. This information was included in a letter sent out to growers thanking them for their participation in the project and describing the impact that the chemical collection would have on the watershed in terms of improving water quality and removing a threat to people, pets, livestock, and wildlife.

Second Collection Event

Enough funds remained after the first collection event in the fall to conduct a second event. OSU Extension and Oregon DEQ expressed strong interest in expanding the collection radius to include the Southern Willamette Valley Groundwater Management Area (GWMA). This area was declared a GWMA by DEQ in 2004 based on high nitrate levels detected in shallow groundwater, which serves as a drinking water source for many residents (Oregon DEQ 2004). The area also includes a number of large farmers, several of whom had indicated in the recent OSU farm survey that they had substantial amounts of obsolete chemicals. OSU extension and the Oregon DEQ volunteered to take the lead on contacting growers in the Southern Willamette Valley (GWMA), assisting them with chemical identification, and coordinating repackaging efforts as needed. At the same time, EWEB and SUB sent out another round of postcards informing growers in the McKenzie and Middle Fork Willamette Watersheds of this additional opportunity to dispose of unwanted chemicals. Although response in these watersheds was obviously less than the first event, several growers who had not been able to participate the first time were able to take advantage of this additional opportunity.

The process followed for the second round of collection events was similar to the first round; the primary exception being that no public meetings were held (due to the minimal response to the public meetings the first time). The second collection event was held over 5 days in February and netted almost twice the volume of chemicals as the first event in the fall.

Results

More than 120 growers from the McKenzie and Middle Fork Willamette Watersheds and Southern Willamette Valley GWMA participated in the agricultural chemical removal project. As a result of this effort, the Eugene Water & Electric Board (EWEB) and partner agencies successfully collected:

- 49,000 lbs of pesticides;
- 5,500 lbs of old fertilizer;
- 27,800 lbs of waste oil and solvents; and,
- 6,590 lbs of various other chemicals (paints, acids, oxidizers, caustics).

The majority of pesticides collected included obsolete chemicals such as DDT, paraquat, lindane, chlordane, dieldrin and others. Lane County Waste Management sorted, overpacked, and shipped the pesticides to Washington State for incineration. Fertilizers and other chemicals were properly disposed of or recycled depending on type and condition. Reusable waste oil was collected by Safety-Kleen, a company that re-refines the oil for reuse. The table below shows some selected statistics from the collection events.

Table 1. Agricultural Chemical Collection Event Statistics

Number of growers contacted	1,192
Number of growers who participated	126
Number of growers needing assistance with chemical identification or repackaging	37
Number of farm visits made prior to collection events	30
Number of outreach mailings to growers (includes initial outreach, reminder postcards, appointment cards, and thank-you notes)	5,494
Total quantity of chemicals collected	88,890 lbs (~44 tons)
Average quantity per farm	705

Outreach

The nature of the agricultural chemical event required a substantial amount of information dissemination to the general public, or more specifically, to growers in the McKenzie, Middle Fork Willamette watersheds and Southern Willamette Valley GWMA. We sent introductory letters, farm chemical surveys, and postcards to growers to introduce the project, provide details and contact information, and encourage them to participate.

In addition, the local media was incorporated into public outreach efforts. During the Fall 2006 Agricultural Chemical Collection Event, both radio and TV were employed to publicize the event, potentially reaching about 110,000 and 440,000 people, respectively. In addition, a number of newspapers and newsletters carried stories, or short segments about the collection events, including the OSU Extension newsletter (circulation approximately 70,000), the EWEB internal newsletter (about 880), SUB newsletter (about 29,000), GWMA listserv, watershed council newsletters, organizational newsletters, and several local newspapers/newsletters. Both radio and newspapers/newsletters were used for the Winter 2007 collection event. Links to information about the Agricultural Chemical Collection Event, including a place to download the farm chemical survey, were placed on EWEB and OSU Extension's websites. We tried to be prudent in when and where we published information about the events in order to avoid

confusion and prevent people living outside the target area from "just showing up" at a collection event without following the necessary process.

Lessons Learned

While the primary goal of this project was to remove a threat to drinking water from the McKenzie and Middle Fork Watersheds, the project was also intended to be a pilot project for similar initiatives in other areas of the state. With this in mind, we have provided some lessons learned:

- **Scheduling/timing of the collection event:** It is important to find a balance between growers' schedules and reasonable weather conditions. While our fall collection dates avoided the primary planting and growing seasons (spring and summer) and most of the harvest period, some hazelnut farmers in the watershed were still finishing their harvesting during the time of our collection events. This made initial outreach efforts to these growers difficult, as they did not have time to inventory and gather up their chemicals. With repeated outreach and follow-up by OSU Extension, as well as a deadline extension for returning chemical surveys, most of these growers eventually did end up participating – but only with this additional effort. However, we did not want to schedule events much later in the year due to increasingly inclement weather that could hinder transport of chemicals, as well as conflicts with the holiday season. Our second collection event, held in February, seemed to be a good time of the year for growers. However, inclement weather at this time of year is also a risk in this area.

- **Building trust:** It is critical in a project like this to gain the trust of growers. Some growers were initially skeptical of participating in this event, especially when they could not remain anonymous. We had to repeatedly emphasize the fact that growers would not be regulated, investigated, or subjected to any enforcement actions by participating in the survey and chemical collection event. It was helpful that we had worked with a number of growers in previous projects and had started to build relationships with them. In addition, growers tended to trust the OSU Extension horticulturist, with whom they had worked previously. The Oregon DEQ tried to remain more in the background, as growers often tend to distrust state regulatory agencies. Finally, word-of-mouth was extremely important in encouraging other growers to participate. Gaining the trust of a few key growers who could reach out to friends and neighbors should not be underestimated.

- **Public meetings:** The public meetings held were poorly attended. This may have been due to the timing conflicts with harvest in early September, or perhaps initial skepticism. In any case, we found that word-of-mouth and one-on-one contact with growers was much more effective in obtaining participation and therefore we did not hold any public meetings during the second round of collection events.

- **Conducting farm visits:** Although time-consuming, this service was critical for some growers who would not have participated otherwise. Several growers had old chemicals that they had "inherited" from family or previous farm owners that they could not identify. Other growers had chemicals in unstable packaging – for example, one grower had a 55-gallon

drum precariously located on a steep slope and half buried in blackberry (see Figure 1). This grower was afraid the drum might break open if he attempted to move it. Finally, health conditions of some elderly growers prevented them from being able to easily gather and transport their old chemicals. This process of identifying and packaging chemicals onsite involved multiple agencies and strengthened both inter-agency ties as well as relationships and trust with growers. It also gave local fire department personnel valuable experience in handling hazardous chemicals.

Figure 1. Unstable drum on steep slope

- **Use of Media:** Because this project focused specifically on farmers in the McKenzie and Middle Fork Willamette watersheds, the media was not utilized as a mechanism to get the word out for the first round of collection events. However, a press release was issued the day before one of the last collection events and as a result, a number of farmers and residents from other areas showed up unannounced to dispose of chemicals. This reaffirmed our suspicion that press releases may generate significant interest, but then there is no control over who participates, when they arrive to drop off chemicals, or the type and quantity of chemicals delivered. Press releases are effective to highlight the project and achieve recognition for the agencies and farmers that participated, especially after the event. There was reduced direct media coverage for the second round of collection events. Outreach efforts were focused on targeted publications, like the OSU Extension newsletter, watershed council newsletters, and other local publications.

- **Disposal Costs:** It is important to budget for the hefty disposal costs associated with some of the chemicals that growers may bring in for disposal. For example, two cylinders of bromine and anhydrous ammonia that were collected cost $1,907 and $1,656 to dispose of, respectively. We recommend having a contingency source of funds that can be mobilized if necessary.

- **Packaging and Labeling Guidelines:** One recommendation for future projects is to distribute some written packaging and labeling guidelines to growers prior to the collection event so that they can pack and transport their chemicals in a safe manner. Some of this information was passed on to growers in general terms in the initial cover letter and in person if project staff talked to the grower directly. However, providing a detailed written document

would be much more efficient and effective. For example, some growers brought containers to the disposal event that had pesticide residue or dust on the outside. Repacking these containers in carefully-labeled boxes or garbage bags would make categorization and disposal safer, easier, and more efficient for waste management personnel.

- **Intergovernmental Agreement (IGA) for Waste Disposal:** It is important to agree upon and set up a clear process for how disposal costs are tracked and billed between partner agencies. For instance, in this project, Lane County Waste Management was collecting and shipping the chemicals off for disposal, but EWEB was administering the grant, and thus ultimately responsible for paying the disposal costs.

We hope that these lessons learned will be valuable to other agencies and locales as they consider coordinating a similar type of agricultural chemical collection event. We will be more than willing to serve as a resource for people who have questions about setting up and running such a project.

Economic Benefit to Growers

Not only was the Agricultural Chemical Removal Project successful in removing chemicals from a watershed and protecting drinking water resources, but it also was a boon for area growers. Disposing of chemicals is not cheap, and providing this service to growers free of charge saved them a significant amount of money. Estimates of disposal costs for growers who are Conditionally Exempt Generators (CEGs) (i.e. they produce less than 220 lbs of hazardous chemicals per month) are $5/gallon for poison solids and $9/gallon for poison liquids. Growers who produce more than that must obtain and EPA ID number (at $200-$250) and pay taxes on wastes that they dispose. If we assume that most growers fall within the CEG category, then this project may have saved them hundreds, if not thousands, of dollars in disposal costs.

Conclusion

The Agricultural Chemical Removal Project, which covered the McKenzie and Middle Fork Willamette Watersheds and the Southern Willamette Valley GWMA, was very successful in removing a significant threat to drinking water (44 tons of chemicals), as well as reducing exposure to families, domestic animals, and endangered aquatic life. It also engaged growers and increased their awareness of the connection between their farming practices and drinking water quality. It provided a relatively easy and free service to growers to dispose of hazardous chemicals that, in some cases, had been lying around farms for decades. The project served to enhance working relationships between local government agencies and local growers that will hopefully lead to additional collaboration opportunities in the future. In addition, the publicity from this project generated interest from growers outside of the collection area (and as far away as Klamath Falls). We hope that this chemical removal project will be used a model for implementing additional collection events around the state and perhaps beyond.

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For additional information see:
http://www.eweb.org/Home/water_quality/watershedprotection.htm